University of Waterloo
Registration and Scheduling Information
For Undergraduate Students Registering in September, 1978

Registration
Enclosed are your Student Registration Form and Fee Statement, a return envelope for payment of fees, an Address Information Card and a Faculty Advisor List. The following information, along with the information on the back of the Student Registration Form and Fee Statement, outlines the basic steps involved in Registration.

Please pay particular attention to the last date that you may register as well as the date when late fees begin.

You are registered officially in the University once you have had your course selections approved and you have made arrangements with the Financial Services Office regarding payment of your fees.

Note: If you have already registered by mail and your fee assessment has not changed please disregard the procedures regarding registration.

We would encourage you to Pay Your Fees by Mail, as early as possible, so that you can begin your classes in September and avoid any possible line-ups.

If you have decided not to register at the University of Waterloo for the session indicated, simply write “Not Coming – Please Cancel” across the Student Fee Statement and return it in the envelope provided.

Procedures for Registration by Mail
You may register by mail prior to the start of the on-campus registration period.
1. Separate the Student Registration Form from the Fee Statement and retain it for later use on campus.
2. Complete the Student Fee Statement as outlined on the back of the form.
3. Mail All Three Parts of the Student Fee Statement in the envelope provided, enclosing:
   - a cheque or money order payable to the institution of your intended registration, i.e., University of Waterloo, Renison College, or St. Jerome’s College.
   - supporting documents if you are claiming any fee credits, (notice of assessment from OSAP, scholarship award information, etc.)
   - Address Information Card if you already know where you will be living while attending classes; otherwise complete an address card when you arrive on campus.

Note: If you are registering in a Co-operative programme, complete your address card and hand it in to your Co-ordinator when you have your first interview.

ID cards are issued only to new students. Returning students are to attach validation stickers to the ID cards to validate the cards for the appropriate term.

Fee receipts, ID cards or validation stickers for your present ID card and Health Services ID cards (for full time students only) will be mailed to you up until one week prior to the on-campus registration. Thereafter, this material can be picked up at the on-campus Registration Centre. Receipts and ID cards/validation stickers will continue to be mailed only to Part Time students after the on-campus registration.

On-Campus Registration
On-campus registration will take place in the Physical Activities Complex. During the first week you may pick up your schedules and pay your fees in the Small Gymnasium. During the second week you may pick up your schedules in the Red Activity area and pay your fees in the Blue Activity area.

Assessment of Tuition and Incidental Fees
1. For students in Engineering, Architecture, Optometry and Integrated Studies the fees assessed as shown on the enclosed Student Fee Statement are on a programme basis. Additional details are included in the 1978-1979 Undergraduate Calendar starting on page 30.
2. For all other students, fees are assessed by course as detailed in the Undergraduate Calendar and represent the number of courses requested at re-registration.
3. The Incidental Fees as shown on the Fee Statement are as follows:
   a) Payment of the Federation of Students and Society fees is required at the time of registration.
   b) Payment of the OIPRG, Sandford Fleming Foundation and Radio Waterloo fees is not a requirement of registration.
   c) Refunds of the fees paid in a) or b) may be obtained within three weeks of the start of classes for the session or term from the group concerned.
   d) Payment of the Graduate Society, Health Services and Intercollegiate Athletic fees is compulsory.
4. Effective September 1978, a new Health Services plan with extended benefit coverage has been approved for full time students. The fee for this is reflected on your fee statement. Full details of the plan and a Health Services Card will be supplied when you register.
Re-Assessment of Tuition and Incidental Fees

1. As a result of course changes:
   a) For Students Assessed on a Per Course Basis
      Courses added will be assessed at the full rate up to the maximum. Courses dropped after registration may result in a reduced assessment and may entitle a student to a refund based on the conditions outlined below under Tuition Fee Refund Table and Incidental Fee Refund.
   b) For Students Assessed on a Programme Basis
      Generally students in this category are taking a full complement of courses. Course drops or adds will normally have no effect on the tuition fee.

2. As a result of withdrawal from the University:
   Withdrawal from the University may entitle a student to a refund based on the conditions outlined below. The refund policy is the same regardless of the method of assessment.

Tuition Fee Refund Table
First three weeks of term (from the first day of lectures) — 100% refund
Fourth to seventh week of term — 50% refund
After the start of the eighth week — no refund
The above calculations are subject to a minimum $25.00 registration fee if a student withdraws from the University.

Incidental Fee Refund
If a student withdraws from the University or reduces a course load to below the incidental fee assessment level, fees will be refunded at the same percentage as applied to the tuition fee refund.

For a more complete description of assessment, re-assessment and refund policies, please refer to the University Undergraduate Calendar.

Late Registration
The rates are $10.00 for the first day, and $3.00 a day thereafter (no limit). Applicable dates are following.

Income Tax Receipts and Education Deduction Certificates
Receipts for income tax purposes for fees paid will be mailed by March 1, 1979. Education Deduction Certificates will be mailed at the same time.

Ontario Student Assistance Programme (O.S.A.P.)
Certificates of Eligibility for loan portions of O.S.A.P. and Ontario Study Grant Cheques should be available at Registration from the Student Awards Officer for those students who have received a Notice of Assessment.

Use of the Library
In order to borrow books using the Library's new automated circulation system, a bar-coded label must be placed on your ID card. If you have not already had your ID card validated, you should do so during the first week of classes in either the E.M.S. or Arts Library.

Class Scheduling Information
A legend of abbreviations and instructions regarding dropping and adding of courses or changing of programmes are printed on the back of the Student Registration Form.

Note: There have been some changes made to building codes which are not yet reflected on the back of the Student Registration Form. These and some additional codes are as follows:

Building Code Changes
- PAS (Psychology, Anthropology and Sociology) from PSY (Psychology)
- ESC (Earth Science and Chemistry) from C1 (Chemistry 1)

Building Code Additions
- AJM (Administrative Services)
- AN1 (Annex 1 - 415 Phillip Street)
- ES2 (Environmental Studies 2 - 156 Columbia Street)
- NH (Needles Hall)

Course Changes
If your schedule of classes is incomplete (i.e., contains course conflicts, full section messages, etc.), you must make course changes to obtain a complete, conflict-free schedule. Ensure that you are registered to all required "meet" types of a course (class, laboratory, tutorial, etc.).

All changes must be made on the Student Registration Form and must be authorized by your Faculty Advisor. A list of Faculty Advisors for all programmes is attached. Copies of the Timetable Enrolment Report will be available at your Faculty Advisor's Office. This report will enable you to choose courses which will fit into your timetable.

Dates
Please pay attention to the following important dates, especially regarding payment of fees and registration.

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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<tbody>
<tr>
<td>Fall 1978 On-campus registration begins</td>
<td>September 5</td>
</tr>
<tr>
<td>Fall 1978 On-campus registration ends</td>
<td>September 8</td>
</tr>
<tr>
<td>Fall 1978 Late Registration Penalty Begins</td>
<td>September 12</td>
</tr>
<tr>
<td>Fall 1978 Lectures begin</td>
<td>September 11</td>
</tr>
<tr>
<td>Fall 1978 Change period begins</td>
<td>September 11</td>
</tr>
<tr>
<td>Fall 1978 Change period ends</td>
<td>September 29</td>
</tr>
<tr>
<td>Fall 1978 Last Day For Late Registration</td>
<td>October 13</td>
</tr>
</tbody>
</table>

For Additional Service and Information Regarding
- Course Selection — See your Faculty/departmental advisors
- Fee Assessment — See the Assistant Registrar for your Faculty
- Payment or Arrangement of Fees — See the Student Accounts section in the Financial Office.
University of Waterloo
Undergraduate Faculty Advisors

Note 1: Students registered through St. Jerome's or Renison College make all changes at the college.

Note 2: Please refer to the reverse side of Student Registration Form for Building Abbreviation legend.

<table>
<thead>
<tr>
<th>Faculty of Arts</th>
<th>Faculty Advisor</th>
<th>Building</th>
<th>Room</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Yr-non-major &amp; Post Degree</td>
<td>R.L. Knight</td>
<td>ML</td>
<td>119</td>
<td>3638</td>
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<tr>
<td>Anthropology</td>
<td>S. Hornshaw</td>
<td>PAS</td>
<td>2013</td>
<td>2837</td>
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<tr>
<td>Classics</td>
<td>R. Porter</td>
<td>ML</td>
<td>325</td>
<td>3266</td>
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<tr>
<td>Drama &amp; Theatre Arts</td>
<td>M. Kelman</td>
<td>HH</td>
<td>143</td>
<td>3672</td>
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<tr>
<td>Economics</td>
<td>S.K. Ghosh</td>
<td>HH</td>
<td>212</td>
<td>2136</td>
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<tr>
<td>English</td>
<td>W.R. Martin</td>
<td>HH</td>
<td>251</td>
<td>2121</td>
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<td>Fine Arts</td>
<td>A. Roberts</td>
<td>HH</td>
<td>383K</td>
<td>2442</td>
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<td>French</td>
<td>A. Ages</td>
<td>ML</td>
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<td>Geography</td>
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<td>237</td>
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<td>History</td>
<td>K. Eagles</td>
<td>IIII</td>
<td>115</td>
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<td>Latin</td>
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<td>Philosophy</td>
<td>M. McDonald</td>
<td>HH</td>
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<td>Political Science</td>
<td>P. Woolstencroft</td>
<td>HH</td>
<td>306</td>
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<td>D. Amoroso</td>
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<td>N. Charness</td>
<td>PAS</td>
<td>4055</td>
<td>3313</td>
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<td>D. Coulson</td>
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<td>4023</td>
<td>3140</td>
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<td>J. Dyal</td>
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<td>4024</td>
<td>3028</td>
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<td></td>
<td>P. Rowe</td>
<td>PAS</td>
<td>4036</td>
<td>3056</td>
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<tr>
<td>Religious Studies</td>
<td>D. Sahra</td>
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<td>F. Fasick</td>
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<td>2065</td>
<td>2109</td>
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Faculty of Engineering

| Year 1                          | L. Bodnar       | E4       | 4304 | 3308      |
| General & Chemical              | C. Hodgson      | E4       | 4305 | 3200      |
|                                 | G.N. Soulis     | E4       | 4305 | 3192      |
| Chemical                        | I. Macdonald    | E1       | 2503 | 2413      |
| Civil                           | K. Fearnall     | E2       | 2336A| 3681      |
|                                | J. Shortreed    | E2       | 2327 | 3377      |
| Electrical                      | J.D. Aplevich   | E2       | 3317 | 2869      |
|                                | E. Waugh        | F7       | 3304 | 2874      |
| Mechanical                      | B. Statham      | E2       | 2330 | 3625      |
|                                | A. Strong       | E2       | 2325 | 2171      |
| Systems Design                  | L. Houghtling   | E2       | 3331 | 2826      |
|                                | B. Wills        | E2       | 3334 | 2897      |

Faculty of Environmental Studies

| Architecture                    | B. Hunt         | ARC      | 114  | 2605      |
| Geography                       | R. Bullock      | ENV      | 237  | 2403      |
| Man-Environment                 | J. Fauquier     | ES       | 202  | 3256      |
| Planning                        | J. Theberge     | ENV      | 112  | 2182      |

Integrated Studies

| T.W. Smyth                      | PAS             | 1051B    | 3437 |
### Faculty of Human Kinetics and Leisure Studies

<table>
<thead>
<tr>
<th>Department</th>
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<th>Room</th>
<th>Extension</th>
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<tr>
<td>Kinesiology</td>
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<tr>
<td>Recreation</td>
<td>Assigned Faculty Advisor</td>
<td></td>
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<tr>
<td>Dance</td>
<td>Assigned Faculty Advisor</td>
<td></td>
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<tr>
<td>Health Studies</td>
<td>Assigned Faculty Advisor</td>
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</tr>
</tbody>
</table>

### Faculty of Mathematics

**Faculty Advisors**

- E. Anderson
- P. Brillinger
- S. Brown
- J. Bullen
- Z. Dvoracek
- B. Marshman
- F. Moskal
- R.G. Scoins
- C. Springer
- J. Vellinga

**Rooms and Extensions**

- E. Anderson: MC 5191, 3537
- P. Brillinger: MC 5115, 3697
- S. Brown: MC 5145, 3737
- J. Bullen: MC 5115, 3620
- Z. Dvoracek: MC 5011, 3571
- B. Marshman: MC 5006, 3762
- F. Moskal: MC 5068, 2691
- R.G. Scoins: MC 5199, 3496
- C. Springer: MC 5039, 3467
- J. Vellinga: MC 5095, 3485

### Years 3 & 4 General or Honours Programmes

- **Actuarial Science**
  - F.G. Reynolds: MC 6092B, 3010
- **Applied Math**
  - M. Snyder: MC 5007, 3248
- **Comb. & Optim.**
  - C.E. Haff: MC 5025, 3486
- **Comp. Sci.**
  - V.A. Dyck: MC 5183, 3244
- **Pure Math**
  - W. Gilbert: MC 5171, 3711
- **Statistics**
  - C. Springer: MC 5039, 3467

**Years 2 - 4 Co-op Teaching Option**

- E. Anderson: MC 5191, 3537
- R.G. Scoins: MC 5199, 3496

**Co-op Honours Applied Math (with Engineering Electives) Option (all years)**

- M. Snyder: MC 5007, 3248

**Co-op Business and Chartered Accountancy Options, Management Accounting**

- R. Dunkley: MC 5103, 3480

### St. Jerome's College Mathematics

- D.G. Mowat: St. Jerome's College
- S.A. Vanstone: St. Jerome's College

### Faculty of Science

**Yr. 1 & non-Major programmes**

- Biology
  - J. Carlson: B2 252A, 2664
  - H.R.N. Lydt: B1 2/8, 2562
  - W. Hawthorn: B1 280, 2117
- Chemistry
  - H.C. McLeod: ESC 357A, 2624
  - A.D. Maynes: C2 263, 2625
- Earth Science Regular
  - F. Reardon: ESC 209, 3224
  - Office: B2 148, 3244
- Co-op
  - E.C. Appleyard: ESC 233, 3232
  - W.S. Long: OPT 340, 3176
- Optometry
  - J.A. Cowan: PHY 242, 3555
- Physics
  - H.M. Morrison: PHY 243, 2848

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**Office of the Registrar**

**July, 1978**
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 1978-79 academic session which commences in September 1978.

The University also publishes:

- a Graduate Studies Calendar
- an Admissions Brochure

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

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.

The Senate and Board of Governors of the University of Waterloo reserve the right to invoke changes in this Calendar without prior notice.
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<td>Index 2, General, 441</td>
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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 1978

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
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<tbody>
<tr>
<td>Meeting—Senate Executive Committee</td>
<td>March 6</td>
<td>Monday</td>
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<tr>
<td>Supplemental Examinations Begin—Co-operative Programmes</td>
<td>March 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Pre-registration Begins—Regular and Co-operative Students for Fall Term 1977</td>
<td>March 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Pre-registration Ends—Regular and Co-operative Students for Fall Term 1977</td>
<td>March 10</td>
<td>Friday</td>
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<tr>
<td>Meeting—University Senate, 7:30 p.m.</td>
<td>March 20</td>
<td>Monday</td>
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<tr>
<td>Good Friday—University Holiday*</td>
<td>March 24</td>
<td>Friday</td>
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<tr>
<td>Lectures End—Winter Term</td>
<td>March 29</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Examinations Begin—Winter Term</td>
<td>April 1</td>
<td>Saturday</td>
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<tr>
<td>Meeting—Senate Executive Committee</td>
<td>April 3</td>
<td>Monday</td>
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<tr>
<td>Meeting—Board of Governors, 10:00 a.m.</td>
<td>April 4</td>
<td>Tuesday</td>
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<tr>
<td>Meeting—University Senate, 7:30 p.m.</td>
<td>April 17</td>
<td>Monday</td>
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<tr>
<td>Examinations End—Winter Term</td>
<td>April 21</td>
<td>Friday</td>
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<tr>
<td>Final Examination Results Due</td>
<td>April 28</td>
<td>Friday</td>
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<tr>
<td>Winter Work Term Ends—Co-operative Programmes</td>
<td>April 28</td>
<td>Friday</td>
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<tr>
<td>Spring Work Term Begins—Co-operative Programmes</td>
<td>May 1</td>
<td>Monday</td>
</tr>
<tr>
<td>Registration—Undergraduate Co-operative Programmes</td>
<td>May 1</td>
<td>Monday</td>
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<tr>
<td>Registration—Graduate Studies—Spring Term</td>
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* Some university departments may be open for limited service on these days.
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<td>September 8</td>
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<tr>
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<td>Christmas Holidays*</td>
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* Some university departments may be open for limited service on these days.
## 1979

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<td>New Year's Day—University Holiday*</td>
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<tr>
<td>Registration—Graduate Studies—Winter Term</td>
<td>January 2</td>
<td>Tuesday</td>
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<td>Lectures Begin—Winter Term</td>
<td>January 2</td>
<td>Tuesday</td>
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<tr>
<td>Meeting—Senate Executive Committee</td>
<td>January 2</td>
<td>Tuesday</td>
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<tr>
<td>Meeting—University Senate, 7:30 p.m.</td>
<td>January 15</td>
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<td>End of Course Change Period—Winter Term</td>
<td>January 19</td>
<td>Friday</td>
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<tr>
<td>Meeting—Senate Executive Committee</td>
<td>February 5</td>
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<tr>
<td>Meeting—Board of Governors, 10:00 a.m.</td>
<td>February 6</td>
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<td>Meeting—University Senate, 7:30 p.m.</td>
<td>February 19</td>
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<tr>
<td>Study Week Begins—Arts &amp; Environmental Studies (Regular Programmes)</td>
<td>February 19</td>
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<td>February 23</td>
<td>Friday</td>
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<td>Meeting—Senate Executive Committee</td>
<td>March 5</td>
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<td>Supplemental Examinations Begin—Co-operative Programmes</td>
<td>March 5</td>
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<td>Pre-registration Begins—Regular and Co-operative Students for Fall Term 1979</td>
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<td>Pre-registration Ends—Regular and Co-operative Students for Fall Term 1979</td>
<td>March 9</td>
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<td>Meeting—University Senate, 7:30 p.m.</td>
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<td>Lectures End—Winter Term</td>
<td>March 28</td>
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<td>Examinations Begin—Winter Term</td>
<td>March 31</td>
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<td>Meeting—Senate Executive Committee</td>
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<td>Good Friday—University Holiday*</td>
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<td>Registration—Undergraduate Co-operative Programmes</td>
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<td>Registration—Graduate Studies—Spring Term</td>
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<td>Meeting—Senate Executive Committee</td>
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<td>Meeting—University Senate, 7:30 p.m.</td>
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<td>Meeting—Board of Governors, 10:00 a.m.</td>
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<td>Pre-registration Begins—Co-operative Students for Winter Term 1980</td>
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<td>Meeting—University Senate, 7:30 p.m.</td>
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* Some university departments may be open for limited service on these days.
### 1979 Continued

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<td>Supplemental Examinations Begin</td>
<td>July 9</td>
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### Calendar for 1978, 1979, 1980

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|         | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|         | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|         | 29 | 30 | 31 |   |   |   |   |
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|         | 29 | 30 | 31 |   |   |   |   |
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|         | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|         | 29 | 30 | 31 |   |   |   |   |
| October | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
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|         | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|         | 29 | 30 | 31 |   |   |   |   |

| **1980** |   |   |   |   |   |   |   |
| January | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|         | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
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|         | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|         | 29 | 30 | 31 |   |   |   |   |
| April | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
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|         | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|         | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
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|         | 29 | 30 | 31 |   |   |   |   |
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|         | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|         | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|         | 29 | 30 | 31 |   |   |   |   |
Campus Guide

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

Parking Lots
Visitor pay parking D (.50c per hr.) 8:00 a.m.- 8:00 p.m.
weekdays, 50c per entry evenings, weekends and holidays; N, M (.50c); Visitor lot Optometry adjacent to O (.50c); B & H evenings and weekends (.25c); Student pay parking in C (.25c); 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
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 (Philip 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 Chemistry 1
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 Studies' 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; Counselling
   Services; Development; Graduate 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 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 1978-79 academic session which commences in September 1978.

The University also publishes:

- a Graduate Studies Calendar
- an Admissions Brochure
- a Part-time Studies Brochure

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. The office is not open weekends.

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

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 people. 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, a stadium, 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.

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.

Full time enrolment for each Faculty including church colleges and off campus students (as of September 28, 1977)

| Faculty of Arts | 2,642 |
| Faculty of Engineering | 2,915 |
| Faculty of Environmental Studies | 1,354 |
| Faculty of Human Kinetics and Leisure Studies | 1,165 |
| Integrated Studies Programme | 72 |
| Faculty of Mathematics | 3,294 |
| Faculty of Science | 1,934 |
| Total Undergraduate Enrolment (Full-Time) | 13,376 |
| Graduate Student Enrolment (Full-Time) | 1,338 |

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.

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 English, French, Geography, Psychology, Religious Studies, and Sociology. Renison College faculty members and courses are indicated by an R suffix.

The college has two residences accommodating 100 men and 82 women.

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.

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.

Degrees Offered
The University of Waterloo offers the following undergraduate degrees:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Acronym</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Architecture</td>
<td>B.Arch.</td>
</tr>
<tr>
<td>Bachelor of Arts</td>
<td>B.A.</td>
</tr>
<tr>
<td>Bachelor of Applied Science</td>
<td>B.A.Sc.</td>
</tr>
<tr>
<td>Bachelor of Environmental Studies</td>
<td>B.E.S.</td>
</tr>
<tr>
<td>Bachelor of Independent Studies</td>
<td>B.I.S.</td>
</tr>
<tr>
<td>Bachelor of Mathematics</td>
<td>B.Math.</td>
</tr>
<tr>
<td>Bachelor of Science</td>
<td>B.Sc.</td>
</tr>
<tr>
<td>Doctor of Optometry</td>
<td>O.D.</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Acronym</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master of Arts</td>
<td>M.A.</td>
</tr>
<tr>
<td>Master of Applied Science</td>
<td>M.A.Sc.</td>
</tr>
<tr>
<td>Master of Mathematics</td>
<td>M.Math.</td>
</tr>
<tr>
<td>Master of Philosophy</td>
<td>M.Phil.</td>
</tr>
<tr>
<td>Master of Science</td>
<td>M.Sc.</td>
</tr>
<tr>
<td>Doctor of Philosophy</td>
<td>Ph.D.</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Acronym</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor of Engineering</td>
<td>D.Eng.</td>
</tr>
<tr>
<td>Doctor of Environmental Studies</td>
<td>D.E.S.</td>
</tr>
<tr>
<td>Doctor of Laws</td>
<td>L.L.D.</td>
</tr>
<tr>
<td>Doctor of Letters</td>
<td>D.Litt.</td>
</tr>
<tr>
<td>Doctor of Science</td>
<td>D.Sc.</td>
</tr>
</tbody>
</table>

Systems of Study
The University offers it 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 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.

Correspondence Courses
The University of Waterloo offers degree credit courses by correspondence in Biology, Chemistry, Classical Civilization, Earth Sciences, Economics, Engineering, English, Fine Arts, French, German, Greek, History, Latin, Mathematics, Philosophy, Physics, Political Science, Psychology, Recreation, Sociology and Spanish. Other Arts courses are contemplated. Lectures are recorded on magnetic tape and are accompanied by supplementary material.

The Correspondence Programme was originally designed to assist elementary and secondary school teachers in upgrading their teaching qualifications. However, 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. Degree programmes in Arts, Mathematics and Science may be taken entirely on a part-time basis by any combination of correspondence, regular or summer courses which will fulfill the degree requirements of the faculty. Further information can be obtained from:

The Director,
Correspondence Programme
University of Waterloo
Waterloo, Ontario.

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

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 Student's 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 Student's 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 Computing Centre

Mathematics and Computer Building

The Computing Centre, 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. Administration and staff also use the computer in applications such as student records, course timetables, examination results, library circulation control, 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.

In addition to the computing facilities and services outlined above, the Computing Centre 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 Centre 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 4,096 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

Archaeology students use early Indian methods to fire pottery
**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 requirements set forth in the Calendar are applicable for admission beginning in September 1978.

**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.

**Renison College**

Applicants may apply for the Social Development Studies Programme and for other programmes in Arts through Renison College. Renison College applicants should indicate "Renison College" clearly on the application form.

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 minimal.

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 1978 the following programmes will be designated as limited enrolment programmes:

- Architecture
- Engineering
- Geography
- Kinesiology
- Man Environment Studies
- Mathematics
- Optometry
- Recreation
- Urban and Regional Planning

**Applicants – 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 1978-79 Admission Requirements for applicants from Ontario Year 5 Programmes (Grade 13) are shown in the accompanying chart. (page 24, 25)
Applications for admission may be made by any student who has completed the minimum requirement for admission. Stated in terms of Ontario secondary school preparation, the minimum requirement for admission is the completion of the minimum number of credits as specified in the regulations for each program.

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.

Mature 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 offer programmes that have been approved by the University. Factors affecting the determination of the level of admission include the applicant's academic record, the nature of the programme, and the programme's prerequisites. The minimum requirement for admission stated in terms of Ontario secondary school preparation is the completion of the minimum number of credits as specified in the regulations for each program.

Applicants who have completed two years with first class honours or high second class honours are considered for admission to Year Two of a relevant programme at the University of Waterloo.

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

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 page 24, 25 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.

A) Applicants from Other Canadian Provinces
Alberta
Grade 12
British Columbia
Grade 12
Manitoba
Grade 12
New Brunswick
Grade 12
Newfoundland
Year 1 Memorial University
Nova Scotia
Grade 12
Prince Edward Island
Year 1 University of P.E.I.
Quebec
First Year CEGEP programme or equivalent
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.

continued page 26
### Specific Faculty Program 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><strong>Arts</strong></td>
<td>Relations and Functions</td>
<td>60%</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
<td>Relations and Functions, Calculus, Algebra, Chemistry, Physics</td>
<td>60%</td>
</tr>
<tr>
<td><strong>Environmental Studies</strong></td>
<td>Relations and Functions, Calculus, Physics, English (Français)</td>
<td>60%</td>
</tr>
<tr>
<td><strong>Geography</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Man-Environment Studies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Urban and Regional Planning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Human Kinetics &amp; Leisure Studies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Kinesiology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recreation</strong></td>
<td>as Year 4 Mathematics Course</td>
<td></td>
</tr>
<tr>
<td><strong>Integrated Studies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mathematics</strong></td>
<td>Relations and Functions, Calculus, Algebra</td>
<td>Regular Programme 60%</td>
</tr>
<tr>
<td><strong>Science (Regular)</strong></td>
<td>2 Science courses, one of which must be Physics or Chemistry, Calculus, Functions and Relations or Algebra (preferably F &amp; R)</td>
<td>60%</td>
</tr>
<tr>
<td><strong>Co-operative Applied Chemistry</strong></td>
<td>as above</td>
<td>70% in Chemistry and in Mathematics courses</td>
</tr>
<tr>
<td><strong>Co-operative Applied Physics</strong></td>
<td>as above</td>
<td>70% in Physics and Mathematics courses</td>
</tr>
</tbody>
</table>
### Specific Faculty Program Recommendations and Requirements

<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 programs. 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 the 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>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>
<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 85 students. Because of the interview requirement and the large number of applicants normally considered, applications must reach the University by April 1st in order to be considered for September admission.</td>
</tr>
<tr>
<td>Applicants should include Geography in their Year 5 programme.</td>
<td>Applicants with overall Year 5 averages above 65% are given first consideration.</td>
</tr>
<tr>
<td>Applicants may find at least one Year 5 Mathematics course helpful.</td>
<td>Applicants indicating Man-Environment Studies as first choice are given first consideration. The first year programme is limited to 70 students.</td>
</tr>
<tr>
<td>Applicants should include four Year 5 courses from Biology, Chemistry, Physics, Functions and Relations, Algebra, Calculus.</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 and on secondary school achievement. The first year programme is limited to 60 students.</td>
</tr>
<tr>
<td>Applicants lacking Algebra but who have high overall Year 5 standing will be considered for admission.</td>
<td>Applicants to the Regular programme with an overall Year 5 average of over 65% are given first consideration. Applicants to the Co-operative programme with an overall Year 5 average of 70% are given first consideration.</td>
</tr>
</tbody>
</table>

For all Science programmes applicants should select both Year 5 Chemistry and Physics courses.

In selecting Year 5 Mathematics courses, other than Calculus, Functions and Relations is preferred.
International Baccalaureate
Passes in at least 6 subjects, 3 higher level and 3 subsidiary level with a grade total not less than 26.

Hong Kong
Hong Kong Certificate of Education (English) and University of Hong Kong Matriculation (Advanced Level) with passes in at least 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.

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) Applicants requesting part-time, non degree or correspondence courses should contact the University for the appropriate application forms. Do not apply through the Application Centre.

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.
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.

<table>
<thead>
<tr>
<th>Session/Term starting</th>
<th>Last date for application</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 1, 1978</td>
<td>March 1, 1978</td>
</tr>
<tr>
<td>July 4, 1978</td>
<td>June 1, 1978</td>
</tr>
<tr>
<td>September 5, 1978</td>
<td>July 1, 1979*</td>
</tr>
<tr>
<td>January 2, 1979</td>
<td>November 1, 1978</td>
</tr>
</tbody>
</table>

*Applications and all supporting documentation must be received no later than May 1, 1978 for all Year 1 limited enrolment programmes, with the exception of Architecture, in which case applications must be received by April 1, 1978.

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 Admission Committee for consideration.

All Ontario Year 5 applicants will be notified on or after June 16, 1978, 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, 1978.

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 32 of this calendar.
Fees and Registration

Students promote UW's concert band
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 that will be taken in the subsequent session/term, during:

- March, for regular students
- The preceding on-campus term for co-operative students
- The summer months for first year students

This action will produce the "Student Schedule-Fee Statement".

Registration
Registration is the process of payment or arrangement of fees, assessed as a result of pre-registration. Registration is completed when fees have been paid or arranged, the "Fee Statement" has been received by Financial Services, and any course changes have been finalized.

Assessment
Fees are assessed to students as follows: (Student Visa Students—see note 4)

A) Per Term (on-campus co-operative students; regular students registering for the Winter or Spring term.)
1) Students taking one or two term courses are assessed for each term course at the unit course fee of $77.50.
2) Students (except those in 4. below) taking more than two term courses and less than five term courses are assessed:
   i) for each term course at the unit course fee of $77.50,
   ii) full incidental fees as shown in the Schedule of Fees,
   iii) the co-operative fee, for co-operative students only.
3) Students taking five or more term courses are assessed:
   i) the Basic Fee as shown in the Schedule of Fees,
   ii) full incidental fees as shown in the Schedule of Fees,
   iii) the co-operative fee for co-operative students only.
4) Students in the Faculty of Engineering, the Integrated Studies Programme, the Architecture Programme, the Optometry Programme who are taking:
   a) more than two full courses are assessed on a programme basis:
      i) the Basic Fee as shown in the Schedule of Fees,
      ii) full incidental fees as shown in the Schedule of Fees,
      iii) the co-operative fee for co-operative students only.
   b) one or two term courses are assessed for each term course at the unit course fee of $77.50.

B) Per Session (all regular students registered in the Fall term.)
1) Students taking up to two full courses or equivalent are assessed for each course at the unit course fee of $155.00 per full course and $77.50 per half course.
2) Students (except those in 4. below) taking more than two full courses but less than five full courses are assessed:
   i) at the unit course fee of $155.00 per full course or $77.50 per half course,
   ii) full incidental fees as shown in the Schedule of Fees.
3) Students taking five or more full courses are assessed:
   i) the Basic Fee as shown in the Schedule of Fees,
   ii) full incidental fees as shown in the Schedule of Fees.
4) Students in the Integrated Studies Programme, the Architecture Programme, the Optometry Programme who are taking:
   a) more than two full courses are assessed on a programme basis:
      i) the Basic Fee as shown in the Schedule of Fees,
      ii) full incidental fees as shown in the Schedule of Fees,
   b) two full courses or less are assessed for each course at the unit course fee of $155.00 per full course and $77.50 per half course.

C) Summer School (students registered for the July-August summer school).
1) Students are assessed for each course at the unit course fee as shown in the Schedule of Fees.

Payment
All fees are due and payable before the first day of lectures. For sessional students unable to pay 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 due prior to the start of lectures in January.

Instalment values are as follows:
   i) for students assessed the Total fee as shown in the Schedule of Fees, two equal instalments.
   ii) for students assessed at less than the Total fee, the first instalment will be for the value of the courses taken in the Fall term plus 50% of applicable incidentals. The second instalment will be for the balance.
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 prior to the beginning of lectures for each term. The dates of registration and beginning of lectures are listed on pages 5 to 8 of the calendar.

Fees should be paid with money order or cheque payable to "University of Waterloo". For the 1978/79 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 postdate the cheque as follows:

<table>
<thead>
<tr>
<th>Session/ Term Starting</th>
<th>Cheque Must be Dated</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 1978</td>
<td>30 August 1978</td>
</tr>
<tr>
<td>January 1979</td>
<td>22 December 1978</td>
</tr>
<tr>
<td>May 1979</td>
<td>21 April 1979</td>
</tr>
</tbody>
</table>

Cheques returned by the bank for any reason will be assessed a handling charge of $15.00 plus late registration penalty as applicable. Fee payments by scholarships, bursaries or methods other than those outlined above must be authorized by Student Accounts, Financial Services. Students over the age of 60 will be awarded a University Bursary to cover tuition and related incidentals (correspondence tape deposits not included). Proof of eligibility for this bursary should be furnished to the appropriate Assistant Registrar at the time of preregistration.

Students who register after the first day of lectures will be assessed a late fee penalty as follows:

- **First Day**: $10.00
- **Thereafter**: $3.00 per day (no limit)

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.

Students must register before the start of lectures whether or not a final class schedule has been received.

Students will not be allowed to register after the following dates:

<table>
<thead>
<tr>
<th>Session/ Term Starting</th>
<th>Last Date to Register</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 1978</td>
<td>9 June 1978</td>
</tr>
<tr>
<td>July 1978</td>
<td>14 July 1978</td>
</tr>
<tr>
<td>September 1978</td>
<td>13 October 1978</td>
</tr>
<tr>
<td>January 1979</td>
<td>19 January 1979</td>
</tr>
<tr>
<td>May 1979</td>
<td>12 June 1979</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 fees calculated as follows:

a) Students withdrawing in first three weeks of a term (first week for Summer Session) will receive full refund less $25.00 service charge.

b) Students withdrawing during weeks 4 to 7 of a term (second week of Summer Session) will be charged 50% of the value of courses taken that term plus 50% of applicable incidental fees.

c) Students withdrawing after week 7 of a term (week 3 of Summer Session) will be charged 100% of the value of the courses taken that term plus 100% of applicable incidental fees.

Drop/Adds

For students assessed on the per course basis:

- **Courses added** will be assessed at the full rate.
- **Courses dropped** will be assessed as follows:
  1. If dropped during first 3 weeks of a term (first week of Summer Session), no assessment.
  2. If dropped during weeks 4 to 7 of a term (second week of Summer Session) the student will be charged 50% of the assessed value of the course.
  3. If dropped after week 7 of a term (third week of Summer Session) the student will be charged 100% of the assessed value of the course.

Schedule of Fees

The fee schedule is the one proposed for the 1978/79 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 fee 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 & Incidental Fees for all Years

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Session/ Term (See Note 1)</th>
<th>Basic Fee</th>
<th>Co-op Fee (See Note 2)</th>
<th>Total Tuition Fees</th>
<th>Incidental Fees</th>
<th>Total</th>
<th>Unit Course Fee (See Note 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Architecture</strong></td>
<td></td>
<td></td>
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<td>155.00</td>
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<tr>
<td>- Winter, Spring</td>
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<td>362.50</td>
<td>28.75</td>
<td>391.25</td>
<td>77.50</td>
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<tr>
<td>- Co-op</td>
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<td>422.50</td>
<td>28.75</td>
<td>452.50</td>
<td>77.50</td>
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<tr>
<td><strong>Summer School</strong></td>
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<td></td>
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<td></td>
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### Student Visa Students (See Note 4)

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<td>29.75</td>
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<td>56.50</td>
<td>1,573.50</td>
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<tr>
<td></td>
<td>Winter, Spring</td>
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<td>60.00</td>
<td>817.50</td>
<td>29.25</td>
</tr>
<tr>
<td></td>
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<td>29.25</td>
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<td>1,515.00</td>
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<td>1,573.50</td>
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<td>Winter, Spring</td>
<td>757.50</td>
<td>60.00</td>
<td>817.50</td>
<td>29.25</td>
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<td>57.50</td>
<td>1,572.50</td>
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<tr>
<td></td>
<td>Half Course</td>
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### Incidentally

- Federation of Students: 27.50 13.75
- Intercollegiate Athletics: 22.00 11.00
- OPIRG (See Note 5): 4.00 2.00
- Society Fee (See Note 6): Sanford Fleming Foundation (See Note 7)
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 $155.00 for each full course at a weight of 1.0; at $77.50 for each half or term course at a weight of .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 January 1, 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 other students beginning a programme on or after January 1, 1977, except for those who qualify for exemption under one of the following categories:

1) Canadian citizens within the meaning of The Canadian Citizenship Act;
2) Landed immigrants within the meaning of The Immigration Act;
3) Dependents of persons admitted to Canada under Section 7(1)(a) of The Immigration Act (diplomatic, consular and other representatives of foreign countries, the UN and other international agencies, their dependents and suites);
4) Dependents of persons admitted to Canada under Section 7(1)(h) of The Immigration Act for the temporary exercise of their profession, trade or occupation;
5) Students sponsored and financially assisted by the International Development Research Centre;
6) Foreign students in Canada on Canadian International Development Agency grants.
7) Persons studying in an institution 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 to Ontario residents in the other country.

For applicable fees, refer to Schedule of Fees, Student Visa Students on page 33.

Note 5 - O.P.I.R.G. (Ontario Public Interest Research Group)
In April 1977, the Federation of Students petitioned the Board of Governors to assess each undergraduate student $4.00 per session (regular) or $2.00 per term (co-op) as a contribution to O.P.I.R.G. This fee is voluntary, refundable, and not a requirement for registration. Requests for refunds or questions concerning O.P.I.R.G. should be directed to the on-campus O.P.I.R.G. office.

Note 6 - Society Fees
The following schedule of fees applies:

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<thead>
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<td>Arts</td>
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<tr>
<td>Environmental Studies</td>
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<tr>
<td>(including Architecture)</td>
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<tr>
<td>Human Kinetics &amp; Leisure Studies</td>
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<td>$3.00</td>
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<tr>
<td>Mathematics</td>
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<td>$2.50</td>
</tr>
<tr>
<td>Science (including Optometry)</td>
<td>$4.00</td>
<td>$2.00</td>
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</tbody>
</table>

Payment of the Society Fee is required at registration, but a student who does not wish to participate may obtain a refund by applying to the respective Society within three (3) weeks after the start of lectures as indicated on pages 5 to 8 of this Calendar.

Note 7 - Sandford Fleming Foundation (S.F.F.)
In February 1976 the Engineering Undergraduate Student Societies, jointly with the Federation of Students, petitioned the Board of Governors to assess each Engineering Undergraduate Student $2.50 per term as a contribution to the Sandford Fleming Foundation. This fee 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 as indicated on pages 5 to 8 of this Calendar.
Miscellaneous

Supplemental Examination each paper $10.00
Residing Fee
(at outside centre each half day) $10.00
Returned Cheques - Handling charge of $15.00 plus late registration penalty as applicable.
Duplicate Fee Statement or tax receipt (per request) $2.00
Transcript of Record (per request) $2.00
Replacement of lost identification card $5.00

Residence

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

Income Tax Receipts

Receipts for income tax purposes for fees paid for the period 1 May 1978 to 30 April 1979 will be mailed after 1 March 1979 to the home address on record.

Enquiries

Enquiries concerning payment of fees should be directed to Student Accounts, Financial Services.
Chapter 4
Scholarships, Bursaries, Prizes and Financial Aid

Students in a tutorial session
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 (O.S.A.P.) 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 number of Entrance Scholarships to entering students on the basis of outstanding performance in secondary school. In some faculties and departments, these Scholarships are also based on the results of the following competitions: The Chem 13 NEWS Exam; The Sir Isaac Newton Physics Test; Descartes Mathematics Competition.
Details regarding these Scholarships are listed on the following pages. 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.

The Allen-Bradley Canada Limited Award
The Allen-Bradley Canada Limited is making available three awards, each for $100, to second, third and fourth year electrical engineering students. These awards are given for the 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 award is made each term and the winner will be determined by the Department of Co-ordination in consultation with the Department of Electrical Engineering. Reports considered confidential are not eligible.

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 AOCC Canada Limited Scholarship
AOCC 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 $600 is allocated for first year and an additional $800 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.

Babcock & Wilcox Canada Limited Award
The Babcock & Wilcox Canada Limited is making available three awards, each for $500, to second, third and fourth year mechanical engineering students. These awards are given for the 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 award is made each term and the winner will be determined by the Department of Co-ordination in consultation with the Department of Mechanical Engineering. Reports considered confidential are not eligible.

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 $1675.

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 Foundations 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.

Borden Chemical Company Canada Limited Award
Borden Chemical Company Canada Limited is making available three awards, each for $100, to second, third and fourth year Applied Chemistry students. These awards are given for the 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 award is made each term and the winner will be determined by the Department of Co-ordination in consultation with the Faculty of Science. Reports considered confidential are not eligible. No application is necessary.

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.

Canada Packers Limited Awards
Two $500 awards, one to a third-year student in each of Chemical Engineering and Mechanical Engineering, based on high academic achievement, extra-curricular activities, and personal characteristics.

Canadian Information Processing Society – Grand Valley Chapter Scholarship
C.I.P.S. is making available one scholarship in the amount of $200 to a third year Math student with Computer Science and Business options. Selection will be based entirely on second year marks as recorded by the faculty.

Centennial Optical Scholarships
The Centennial Optical Company offers two scholarships in the amount of $250 to each of two students admitted to Year 1 (the First Professional Year) of the School of Optometry. These awards are made on the basis of academic achievement. Recommendations for these awards is made by the Scholarship Committee of the School of Optometry.

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.

Chemistry Scholarships of $500, $400, $300 and $200 are also awarded to the top four students entering Years 2, 3 and 4 in Honours Chemistry, (regular or co-op). These scholarships may be subject to the condition that no other awards be held concurrently.

The above scholarship will be awarded subject to the availability of funds and the attainment of a minimum academic standard by candidates. Candidates for Year 1 awards must write the CHEM 13 NEWS/Exam. No application is necessary for awards for Years 2, 3 and 4.

Concordia Club Scholarship in German
A scholarship in the value of $150 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 Cather 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 first 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.

The Sandford Fleming Work Term Report Awards
The Sandford Fleming Foundation makes available awards of $100 each to second, third, and fourth year students in all departments of engineering. Awards are for the work term reports judged best for clarity, grammar, and other communication skills, and which are based upon actual work term experience. Awards are available each term to each class following 2A, in each undergraduate department, for those classes in which industrially sponsored prizes have not yet been established.

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 $1,900 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.

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 Scholarship
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.

Inco Limited Award
Inco Limited is making available three awards, each for $100 to second, third and fourth year Systems Design students. These awards are given for the 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 award is made each term and the winner will be determined by the Department of Co-ordination in consultation with the Department of Systems Design. Reports considered confidential are not eligible. No application is necessary.

S. C. Johnson and Son, Limited Award
S. C. Johnson and Son, Limited is making available three awards, each for $100, to second, third and fourth year Chemical Engineering students. These awards are given for the 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 award is made each term and the winner will be determined by the Department of Co-ordination in consultation with the Department of Chemical Engineering. Reports considered confidential are not eligible.

James F. MacLaren Limited Award
James F. MacLaren Limited is making available three awards, each for $100, to second, third, and fourth year Civil Engineering students. These awards are given for the 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 award is made each term and the winner will be determined by the Department of Co-ordination in consultation with the Department of Civil Engineering. Reports considered confidential are not eligible.

Sir Issac Newton Scholarships
The Department of Physics awards two freshman Sir Issac 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 Issac Newton Assistantships
The Department of Physics offers Sir Issac 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 $2,600, 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.
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.

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 scholarships are awarded 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.

Ukrainian Credit Union “Buduchnii” 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.

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 provided they make application at the beginning of the 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.

Xerox Research Centre of Canada Limited Award
Xerox is making available three awards annually, each for $100, to upper year Applied Physics students. These awards are given for the 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 award is made each term and the winner will be determined by the Department of Coordination in consultation with the Faculty of Science. Reports considered confidential and not to be marked by the Faculty of Science are not eligible. No application is necessary.

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, 1978.

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.

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.

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.

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

Bursaries

Note
Second class standing is normally required of applicants for bursary assistance. 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 Bursaries
(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.

Roberta Golightly Bursary
A bursary, in the amount of $100 is offered annually by the Citizens’ Committee for Pollution Control, Burlington, Ontario. The bursary may be awarded to a student who is resident of the town of Burlington, who is enrolled in the Faculty of Environmental Studies and who has a good academic standing.

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.

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.

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.

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.

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 $150 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 the Faculty of Mathematics, who ranks first in the final examinations; the other is for the third year Applied Mathematics student who ranks first on the final examinations. In the initial year the value of the first year prize will be increased by an amount donated by Professor Davies' students. 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.

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.

Vodnoy Clinical Optometry Award for Orthoptics
The gift of Bernard E. Vodnoy, O.D., D.O.S, F.A.A.O. 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 Detwiler Student Loan Fund
This loan fund has been established by Mr. J. R. Detwiler in memory of his mother, Adelaide Detwiler, 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 Division 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 Program (O.S.A.P.)

O.S.A.P. consists of the following individual plans:
- Ontario Study Grant Plan
- Canada Student Loan Plan
- Ontario Student Loans Plan
- Ontario Special Bursary Plan

These plans provide assistance in various forms to eligible full-time and part-time students. Depending on the eligibility and the level of need, a student may receive assistance in the form of grant, grant plus loan, or all loan. Loans are normally interest-free and non-repayable as long as the student is engaged in full-time studies. Grants do not normally have to be repaid.

The two main principles behind the programmes are:
- you qualify for assistance on the basis of financial need, not on your level of academic achievement;
- assistance is to supplement, not replace, your own financial resources and those of your immediate family. You will be expected to contribute to the cost of your own education and, depending on your circumstances, your parents or your spouse may also be expected to contribute.

Further details and applications are available from the Awards Office.

Ontario Special Bursary Programme for Part-Time Students

This programme will provide bursary assistance based on financial need to students taking less than 60% of a normal full course load. The assistance is intended for individuals who are unemployed, receiving social assistance, or have a low family income.

Additional information and application forms are available from the Awards Office. A personal interview is required.
The Department of Co-ordination and Placement

Co-op students enquire about work-term interviews
Department of Co-ordination and Placement

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

Associate Directors
B. A. McCallum, BA (Western)
J. C. Wilson, BSc, CE (UNB), 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. Westlake, BASc, MASc, PhD (Waterloo), PEng

Co-ordinators
D. G. S. Anderson, BASc (Toronto), PEng
G. P. Berthuin, BASc (Manitoba), Eng
W. G. Cole, BASc (Toronto), PEng
G. P. Dobbin, BASc (Toronto), PEng
A. T. Girard, BASc (Toronto), PEng
R. A. Grant, BASc (Queen’s), PEng
D. S. Harris, BEng (McGill), PEng
W. C. Jorgensen, BS (Illinois), PEng
A. L. Lind, BASc (Queen’s), Eng
R. Mateyk, BASc (Toronto), PEng
R. McDowell, BASc (Saskatchewan), PEng
W. A. Runge, BASc (Queen’s), PEng
M. M. Smith, BASc (Queen’s), PEng

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

Co-ordinators
L. R. Bricker, BSc, MSc (Waterloo)
W. J. Palmer, BSc (St. Francis Xavier), MSc (Dalhousie)

Mathematics
Programme Administrator
R. A. Klawitter, BA (Western)

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

Co-ordinators
D. J. Beaupre, BComm (Loyola), CA
A. P. Bradshaw, BA (McMaster)
W. G. Clapham, BMath (Waterloo)
M. O. Deschenes, BA, BEd (Queen’s)
H. W. Fell, BA (Rider)
E. M. Johnson, BA (Queen’s)
R. H. Robson, BMath (Waterloo)
R. M. Slater, 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 (Western)

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

Co-ordinators
M. S. McLaughlin, BA (Waterloo)
P. J. Uptgrove, BSc (Waterloo)

Arts
Co-ordinator
M. M. Scandiffo, 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

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<td>Applied Physics</td>
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</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 Althouse College of Education, London.
V Admission occurs by January for the 2B term.
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; 2A - Sept. or Jan.; 2B - May or Sept.; 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. 53) 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 sequence from that point. A student is not given advanced admission to a co-op programme unless there remains, at least, the minimum number of work terms available for meeting the requirements of the programme.

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
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.

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.

Graduation Requirements for Co-operative Programmes

Work Reports
Quantity and Grading: In most programmes the programme includes 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.

Performance Evaluation: In those programmes with a stated minimum number of work terms, this number is also the minimum number of 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 these disciplines are known to have gone through the co-operative system. In Chemistry, Economics, English, Geography, Geology, Kinesiology, Mathematics, Physics, and Recreation, students may graduate from either the regular or the co-operative programme. In recognizing the difference for one of these disciplines where the choice is optional, 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 counsellors.

Group sessions for students are held on job-hunting techniques, resume writing and how to take an interview. 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 also in the January interviews.

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

Organizations Employing Co-Operative Architecture Students

Adamson Associates
Agnew Peckham Associates
Akitt & Swanson, Architects
Anthony Butler, Architect
Anthony L. Kemp, Architect
Arcop Associates
Arthur Erickson, Architect
Bank of Montreal
Bell Canada
Bittorf Holland Christianson
Bregman & Hamann
John Brock, Architect
Brook Carruthers & Shaw
Built Environment Co-ordinators Limited
Campeau Corporation Limited
Canadian Imperial Bank of Commerce
Canadian National Railways
Canadian Penitentiary Service
City of Cambridge
City of St. Catharines
Clifford Laurie Bolton Ritchie
Cohon Evamy & Partners
Graeme Consiglio
Giang & Boake
Dale Chandler Kennedy
A. J. Diamond, Architect
Dominik Thompson Lefraimboise Mallett
Dunlop Farrow Aitken
C. Edward Lutman
Frick Bellinger Associates
Jude Fusco, Architect
Gail E. Lamb
H. Gordon Engineering Limited
Gore & Storrie Limited
Govan Kaminker Keenleyside Devonshire Wilson, Architects
Government of Northwest Territories
Noel Hancock, Architect
Harold Freure Limited
Peter Hemingway, Architect
Henry Fless, Architect
Horton Ball Walter Fredy McCargar Hachborn
Humber College of Applied Arts & Technology
Ian Martin Associates Limited
IRI Group
Imperial Oil Limited
INCO Employment Office
Irv Raymon, Architects
Jackson Ypes & Associates
John Stevens & Associates
Johnson & McWhinney
Andres Kalm
Anthony Kemp
Kilborn Engineering Limited
L. Koffman, Architect
Lingwood & Robertson, Architect Engineer
Co-ordination and Placement
Organizations Employing Co-operative Architecture Students

Lipson & Daskin, Architects
MacDonald & Zuberec
Mathers & Haldenby, Architects
Matsui Bear Vanstone
McMurrich & Oxley
Meek Klausen Servage Walker
Merrett Stahl Elliott
Metropolitan Separate School Board
Moffat Moffat & Kinoshita
Moffet & Duncan, Architects
Morrison Heshfield Theakston & Rowan
National Research Council of Canada
The Niagara Parks Commission
Niagara Peninsula Conservation Authority
Nightingale & Quigley, Architects
North York Board of Education
Parkin Architects, Engineers, & Planners
Pawlowski Construction Inc.
The Planistics Group
Robert Burley, Architect
Robinson & Heinrichs
Sawchuck & Peach, Architects
Sherrill & Hicks, Chartered Architects
Schoeler Heaton Harvor & Menendez
Sheridan College of Applied Arts & Technology
Shore Tilbe Henschel Irwin, Architects & Engineers
Smith Associates
Smith Mill & Ross
SNC/GECO Limited
Snider Huget & March, Architects
Stark & Temporale
R. Stewart Smith, Architect
Stone & Kohn
Sunoco Limited
Swain & Rupnow, Consulting Engineers
Thom Partnership
J. P. Thomson Associates
Toronto Dominion Bank
Toronto Malton Implementation Team
Toronto Parking Authority
Toronto Transit Commission
Towend Stefura Baleshta
Vintage Homes Limited
WebbZerafa Menkes & Housden, Architects & Engineers
William Kachmaryk, Architect
B. James Wensley, Architect

Organization Employing Co-operative Arts Students

Canadian Imperial Bank of Commerce
The Globe & Mail
Goodyear Canada Incorporated
Health & Welfare Canada
Humber College of Applied Arts & Technology
Informetrica Limited
Kitchener-Waterloo Record
The MacMillan Company of Canada Limited
McGraw-Hill Ryerson Limited
Office of The Premier
Ontario Ministry of the Environment
Ontario Ministry of Government Services
Ontario Ministry of Health
Ontario Ministry of Industry & Tourism
Ontario Ministry of Natural Resources
Ontario Ministry of Treasury Economics & Intergovernmental Affairs
Organizations Employing Co-operative Engineering, Applied Science & Geography Students

Abacus Industrial Equipment Company Limited
Abex Corporation Limited
Abilie Paper Company Limited
Abitibi Provincial Paper Limited
Adam Clark Company Limited
The Adams Mine
Addiction Research Foundation
AES Data Limited
Ainley & Associates Limited
Air Canada
Air Photo Analysis Associates
Alberta Research Council
Aberley, Pullerits, Dickson & Associates Limited
Algoma Ore Division
The Algoma Steel Corporation Limited
Allen-Bradley Canada Limited
Allied Chemical Canada Limited
Aluminum Company of Canada Limited
American Can of Canada Limited
American Hoist of Canada Limited
Amoco Canada Petroleum Company Limited
Anchor Shoring Limited
R. V. Anderson Associates Limited
Angelstone Limited
Aptec Engineering Limited
Aquitaine Company of Canada Limited
Armco Canada Limited
Armstrong Cork Company
Associated Test Equipment Limited
Associated Tube Industries Limited
Atlas Steels Company
Atomic Energy of Canada Limited
August Apon Associates Limited
Automotive Hardware Limited
BDH Chemicals Limited
Babcock & Wilcox Canada Limited
Bacon Engineering Limited
Bank of Nova Scotia
Bayly Engineering
Beak Consultants Limited
Beaver Engineering Limited
Beel Controls Limited
Bell Canada
Bell Northern Research
Bennett Paving & Materials Limited
Best Pipe
Bird Construction Company Limited
Black & Decker Manufacturing Company Limited
Black & McDonald Limited
Bondar-Ciegg of Canada Limited
The Borden Chemical Company (Canada) Limited
Borough of Etobicoke
B.P. Oil Limited
B. P. Refinery Canada Limited
T. G. Bright & Company Limited

Bristol-Myers Canada Limited
The Budd Automotive Company of Canada Limited
Building Products of Canada Limited
R. J. Burnside & Associates
Burroughs Business Machines Limited
Butler Manufacturing Company (Canada) Limited
Cabot Carbon of Canada Limited
Canada Glue Company Limited
Canada Machinery Corporation Limited
Canada Packers Limited
Canada Post Office Gateway Facility
Canada Sand Papers Limited
Canada Wire & Cable Company Limited
Canadian Admiral Corporation Limited
Canadian Association of Oilwell Drilling Contractors
Canadian Bechtel Limited
Canadian Blowor/Canda Pumps Limited
Canadian Brass Limited
Canadian Broadcasting Corporation
Canadian Canners Limited
Canadian Carborundum Company Limited
Canadian Fram Limited
Canadian General Electric Company Limited
Canadian Gypsum Company Limited
Canadian Industries Limited
Canadian Johns-Manville Company Limited
Canadian Liquid Air Limited
Canadian National Railways
Canadian National Telecommunications
Canadian Occidental Petroleum Limited
Canadian Pacific
Canadian Pittsburgh Industries Limited
Canadian Refractories Division
Canadian Standards Association
Canadian Tire Corporation Limited
Canadian Vegetable Oil Processing Limited
Can-Eng Alloys Limited
Canron Limited
Casey Hewson Construction Limited
CFTO TV Limited
Chemetics International Limited
Chevron Standard Limited
Chipman Chemicals Limited
Chrysler Canada Limited
Ciba-Geigy Canada Limited
Cimco Limited
City of Barrie
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
City of Kitchener
City of London
City of Mississauga
City of Niagara Falls
Co-ordination and Placement  
Organizations Employing Co-operative  
Engineering, Applied Science & Geography Students

City of Orillia  
City of Peterborough  
City of Port Colborne  
City of Regina  
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  
Collins Radio Company of Canada Limited  
Cominco Limited  
Comstock International Limited  
Conestoga Engineering Limited  
Conspec Power Limited  
County of Brant  
The Consumer's Gas Company  
Continental Can Company of Canada Limited  
Control Data Canada Limited  
Conwest Exploration Company Limited  
V. B. Cook Company Limited  
Cooper-Bessemer of Canada Limited  
A. Cope & Sons Limited  
Corrosion Service Company Limited  
Coulter Copper & Brass Limited  
County of Perth Planning Office  
R. L. Crain Limited  
Crane Packing Company Limited  
Crouse-Hinds of Canada Limited  
Cumming-Cockburn & Associates  
Data Crown Limited  
Decor Metal Products Limited  
John Deere Limited  
Deleuw, Cather, Canada Limited  
Delta-Benco Cascade Limited  
Deutz Diesel (Canada) Limited  
Denison Mines Limited  
Diamond Clay Division of Canada Brick  
Diesel Equipment Limited  
Digital Equipment of Canada Limited  
M. M. Dillon Limited  
Dilworth, Secord, Meagher & Associates Limited  
Diversey (Canada) Limited  
Dixon Red Devil  
Dome Petroleum Limited  
Donglas Limited  
Dominion Aluminum Fabricating Limited  
Dominion Bridge Company Limited  
Dominion Cutout Limited  
Dominion Foundries & Steel Limited  
The Dominion Road Machinery Company Limited  
Domtar Chemicals Limited  
Domtar Construction Materials Limited  
Domtar Packaging Limited  
Dover Corporation (Canada) Limited  
Dow Chemical of Canada Limited  
Dufferin Construction Company  
Dupont of Canada Limited  
Eastern Steel Products Limited  
Eaton Yale Limited  
E C E Group  
Eco-Research Limited  
N L Ede Limited  
Eddy Forest Products Limited  
Eldorado Nuclear Limited  
S & C Electric Canada Limited  
Electronics Corporation of America (Canada) Limited  
Electro & Optical Systems Limited  
Eli Lilly & Company (Canada) Limited  
Ellis-Don Limited  
Engelhard Industries of Canada Limited  
Environmental Protection Services  
Epitek Electronics Limited  
Erco Industries Limited  
Ernst Leitz (Canada) Limited  
Esso Chemical Canada  
Explosafe Division of Vulcan Industrial Packaging Limited  
FAG Bearing Limited  
Falconbridge Nickel Mines Limited  
Federal Pioneer Limited  
Fermar Paving Limited  
Ferranti-Packard Limited  
Fiberglas Canada Limited  
Firestone Canada Limited  
Fischback & Moore of Canada Limited  
Flecto Coatings Limited  
Ford Motor Company of Canada Limited  
Foster Wheeler Limited  
Foundation of Canada Engineering Corporation Limited  
Fowler Construction Company Limited  
E. S. Fox Limited  
The Foxboro Company Limited  
Frankel Steel Construction Services Limited  
Fraser Companies Limited  
Freure Homes Limited  
Functrack Vehicles Limited  
Galt Malleable Iron Limited  
Gandalf Data Communications Limited  
Garrett Manufacturing Limited  
Gaspe Copper Mines Limited  
General Foods Limited  
General Motors of Canada Limited  
Giddon Industries Incorporated  
Giffels Associates Limited  
Glaxo Canada Limited  
Goldar Associates  
B. F. Goodrich of Canada Limited  
Goodyear Canada Incorporated  
Gore & Storrie Limited  
Government of Canada  
Government of Northwest Territories  
Government of Ontario  
Grand River Cable TV Limited  
Grand River Conservation Authority  
Grandview Industries Limited
Great Canadian Oil Sands Limited
A. P. Green Refractories Canada
GTE Automatic Electric (Canada) Limited
Guelph Hydro
Gulf Oil Canada Limited
Halliday Homes Limited
Hamilton Harbour Commissioners
Hart Chemicals Limited
Hart & Cooley Manufacturing Company of Canada Limited
Harth Industries Limited
Hatch Associates Limited
Hawker Siddley Canada Limited
Hayes-Dana Limited
Heathwood Engineering Association Limited
John T. Hepburn Company Limited
R. J. Higgins & Associates Limited
Honeywell Limited
Hostess Foods Products Limited
Houdaille Industries of Canada Limited
Hudson Bay Exploration & Development Company Limited
Hudson Bay Mining & Smelting Company Limited
Hudson's Bay Oil & Gas Limited
Huron Steel Fabricators
Hydraulic Machinery Company Limited
Hydro Mississauga
IBI Group
IBM Canada Limited
ICN-Canada Limited
Imperial Oil Limited
Imperial Oil Enterprises Limited
Imperial Tobacco Division of Imasco Limited
Imperial Tobacco Limited
Inax Instruments Limited
Inco Metals Company
INCO Limited
Inducon Consultants of Canada Limited
Inglis Company Limited
International Harvester Company
International Rectifier Canada Limited
International Systoms Limited
Iron Ore Company of Canada
Irving Steel Limited
IST Incorporated
ITT Canada Limited
Jacuzzi Canada Limited
Johnson Controls Limited
Joy Manufacturing Company (Canada) Limited
Kapelle Wright & MacLeod Limited
Kaufman Footwear Limited
Kearney-National (Canada) Limited
Keeprite Products Limited
Kellogg Salada Canada Limited
W. E. Kelly & Associates Limited
Kendall Company of Canada
Kerr Addison Mines Limited
Kilborn Engineering Limited
Kimberly-Clark of Canada Limited
King Hydraulic Power Limited
Kitchener Chamber of Commerce
Kitchener-Waterloo Hospital
The Kleinfeldt Group Limited
Koehring-Waterous Limited
Labatt Breweries of Canada Limited
Lackie Brothers Limited
Lakefield District Secondary School
Lake Ontario Steel Company
Lear-Siegler Industries Limited
Leigh Instruments Limited
Lely Limited
Lennox Industries (Canada) Limited
Linear Technology Incorporated
Litton Systems (Canada) Limited
London Concrete Machinery Company
W. P. London and Associates Limited
Long Manufacturing Division
Looby Construction Limited
The Lummus Company Canada Limited
Lundy Steel Limited
3M Canada Limited
M & T Products of Canada Limited
MTD Products of Canada
James F. MacLaren Limited
Magnetic Coil Limited
Malcolm Condensing Company Limited
Mallory Hardware Products Limited
Manitoba Forestry Resources Limited
Manitoba Hydro Limited
Marshall Macklin Monaghan Limited
Massey-Ferguson Industries Limited
Mastico Limited
Mattabi Mines Limited
McAsphalt Engineering Services
McCormick Rankin & Associates Limited
McGeorge & Barry Limited
McGrath Engineering Limited
McGuinness Distillers Limited
McGurk Matthews Greggain & Associates
D. McLean Landscaping Limited
Miles Laboratories Limited
Millhaven Fibres Limited
Mississauga Precision Limited
Mobil Paint Company
Molson's Brewery (Ontario) Limited
Monarch Fine Foods Company Limited
Monsanto Canada Limited
Monteith & Sutherland Limited
Montgomery Elevator Company Limited
Montreal Engineering Company Limited
Motorola Canada Limited
Mould Tek Industries Limited
Mount Sinai Hospital
Municipality of Metro Toronto
National Cash Register of Canada Limited
National Research Council
Nelco Mechanical Limited
Noranda Exploration Company Limited

Co-ordination and Placement
Organizations Employing Co-operative Engineering, Applied Sciences & Geography Students
Noranda Mines Limited
Noranda Research Centre
Northern Central Gas Corporation Limited
Northern Telecom Company Limited
North York Hydro Office
Novatronics of Canada Limited
Nuco-Technics Limited
Nuodex Canada Limited
Ontario Die Company
Ontario Hydro
The Ontario-Minnesota Pulp and Paper Company Limited
Ontario Northland Railways
The Ontario Paper Company Limited
Ontario Plastics
Ontario Provincial Police
Ontario Research Foundation
Ontario Transportation Development Corporation
Ortho Pharmaceutical (Canada) Limited
Oshawa Paving Company Limited
Ottawa Hydro
Outboard Marine Corporation of Canada Limited
Oxford Regional Centre
C. C. Parker & Associates Limited
Parking Authority of Toronto
Pathex Canada Limited
Perle Systems Limited
Petrosar Limited
Phillips Cables Limited
Pigott Construction Company Limited
Pilkington Brothers Canada Limited
Pitts Engineering & Construction Limited
Plastoflex Industries
Plax Canada Limited
Polysar Limited
Pratt & Whitney Aircraft of Canada Limited
Preston Sand & Gravel Company Limited
Prince George Pulp & Paper Limited
Procter & Gamble Company of Canada Limited
Procter & Gamble Specialties Limited
Proctor & Redfern Limited
Pro-Eco Limited
Provincial Crane Division
Public Utilities Commission of Brantford
Public Utilities Commission of Ingersoll
Public Utilities Commission of Woodstock
Purolator Limited
Quaker Oats Company of Canada Limited
Raytheon Canada Limited
Rebco Chemicals Limited
Reed Limited
Regional Municipality of Durham
Regional Municipality of Haldimand-Norfolk
Regional Municipality of Halton
Regional Municipality of Hamilton-Wentworth
Regional Municipality of Niagara
Regional Municipality of Peel
Regional Municipality of Sudbury
Regional Municipality of Waterloo
Relocatable Homes Limited
Reuter-Stokes Canada Limited
J. L. Richards & Associates Limited
Richmond Hill Laboratories Limited
Rio Algom Limited
Wm. Roberts Electrical & Mechanical Limited
Rockwell International of Canada Limited
Romm Construction Company Limited
Rondar Services Limited
B. M. Ross and Associates Limited
P. S. Ross and Partners
Roxton Furniture Limited
Sandwell and Company Limited
Sarco Canada Limited
Sayers and Associates Limited
Scintrex Limited
Seaway/Midwest Limited
Semco Instruments Company Limited
G. M. Sernas and Associates
Sheldons Engineering Limited
Shell Canada Limited
Sherman Mines
Kenneth Siddal Incorporated
Simpsons-Sears Limited
Sinclair Radio Laboratories Limited
Sinclair & Valentine Company of Canada Limited
Skega Canada Limited
Snap-On Tools of Canada Limited
Southam Printing Company Limited
Spar Aerospace Products Limited
Spiers Industrial Constructors Incorporated
St. Anne-Nackawic Pulp and Paper Company Limited
The Steel Company of Canada Limited
Steele's Wire Springs Limited
Steep Rock Iron Mines Limited
Stephens-Adamson
Sterling Drug Limited
Sterling Varnish Company (Canada) Limited
Stevenson & Kellogg Limited
St. Joseph's Hospitality
St. Lawrence Cement Company
St. Mary's Cement Limited
Strathcona Mineral Services Limited
Sudbury Hydro
Sudbury Mining Contractors
Suico Chemicals Limited
Sunnybrook Medical Centre
Sun Oil Company Limited
Syncrude Canada Limited
Taylor Engineering Ontario Limited
Taylor Instrument Companies of Canada Limited
J. J. Taylor & Sons Limited
Tectrol Incorporated
Teklogix Limited
Telesat Canada
Tembec Forest Products Company Limited
Temprite Industries Limited
Terriro Automotive Limited
Texaco Canada Limited
Texas Gulf Canada Limited
Paul Thiel Associates Limited
J. E. Thomas Specialties Limited
Tobac Curing Systems Limited
Toron Building Products
Toronto-Hydro Electric System
Toronto Malton Implementation Team
Toronto Transit Commission
Toten, Sima, Hubicki Associates Limited
Town of Grimsby
Town of Halton Hills
Town of Markham
Town of Oakville
Town of Pickering
Township of Elliott Lake
Transcanada Pipelines
Traugott Construction Limited
Trench Electric Limited
TRI Canada Cherry-Burrell Limited
Triton Engineering Services Limited
Irow Group Limited
Underwood McLellan and Associates Limited
Union Carbide Canada Limited
Union Drawn Steel Company Limited
Union Gas Company of Canada Limited
Union Miniere Explorations and Mining Corporation Limited
Uniroyal Chemical – Division of Uniroyal Limited
Uniroyal Limited
United Co-operative of Ontario
United Tire and Rubber Company Limited
Uni-Tel Limited
Universities and Colleges
  Alberta
  Guelph
  Royal Military
  St. Clair
  Western Ontario
  Val-Mar Pools Limited
Varta Batteries Limited
Victaulic Company of Canada Limited
V, M, E. Associates Limited
Wabush Mines
B. P. Walker Associates Limited
Waltec Industries Limited
Jervis B. Webb Company of Canada Limited
Westeel-Rosco Limited
Western Foundry Company Limited
Westinghouse Canada Limited
Weston Research Centre
White Farm Equipment Division
Whitall Laboratories Limited
Whiting Equipment Limited
Willroy Mines Limited
George Wimpey Canada Limited
Worthington (Canada) Limited
Xerox of Canada Limited
Xerox Research of Canada Limited
X-Ray Assay Laboratories Limited
Yoder Equipment Canada Limited
M.S. Yoiles & Partners Limited
York Steel Construction Limited

Co-ordination and Placement
Organizations Employing Co-operative
Human Kinetics & Leisure Studies Students

Organizations Employing Co-operative
Human Kinetics & Leisure Studies Students

The Ability Centre
Adult Occupational Centre, Edgar
Alcoholism & Drug Addiction Research Foundation
A.R.C. Northpeel Enterprises
Adsable-Bayfield Conservation Authority
Balmer Crapo and Associates Inc.
Balmoral Hall
Bluewater Centre For The Developmentally Handicapped
Blue Hills Academy
Blue Mountain Resorts Limited
Boards of Education
  Cochrane – Iroquois Falls
  Durham
  Etobicoke Borough
  Muskoka
  North York
  Ottawa
  Peel
  Sault Ste. Marie
  Timmins
  Waterloo County Separate
  Wellington
Borough of Etobicoke
Borough of North York
Boyne River Natural Science School
Boys’ Club of Brantford
Branchton Camp
Branksome Hall School
Bronte Creek Provincial Park
Camp Tawingo
Camp Towhee
Canadian Police College
Canadian Public Health Association
Carleton Condominium Corporation
Carol Currier Residence
The Chateau Annex
Childrens Psychiatric Research Institute
City of Barrie
City of Brampton
City of Brantford
City of Burlington
City of Cambridge
City of Kitchener
City of Noranda
City of North Bay
City of Ottawa
City of Sault Ste. Marie
City of St. Catharines
City of Thunder Bay
City of Timmins
City of Trenton
City of Waterloo
City of Windsor
Colleges of Applied Arts and Technology
Cambrian
Co-ordination and Placement
Organizations Employing Co-operative
Human Kinetics & Leisure Studies Students

Centennial
Conestoga
Humber
Loyalist
Northern
Sault
Seneca
St. Clair
St. Lawrence
Constellation Hotel
The Creative Child
Defence and Civil Institute of Environmental Medicine
Dofasco
Ecoplans Limited
Elmsdale Tennis Club
Elm Tree Nursing Home
Etobicoke Olympium
Family Service Association of Metropolitan Toronto
Ferguson Farm
Government of Northwest Territories
Halton Region Conservation Authority
Hamilton Psychiatric Hospital
C. N. Hicks Treatment Centre
Homewood Sanitarium
Humber Memorial Hospital
Huronia Regional Centre
Huronia Regional Sports Council
Intega Foundation
Kitchener-Waterloo Hospital
Lakeshore Psychiatric Hospital
Lynwood Hall Children's Centre
Dr. MacKinnon Phillips Hospital
Markham Fitness & Racquets Club
Mental Health Centre, Penetanguishene
Midwestern Regional Centre
Minto Management Recreation Department
Mississauga Racquets Club
Mount Oxford
Muskoka Centre
Nepean Sportsplex
Northwestern Regional Centre
Oaklands Regional Centre
Oakville Reception & Assessment Centre
Ontario Association for the Mentally Retarded
Ontario Ministry of Correctional Services
Ontario Ministry of Culture and Recreation
Ontario Ministry of Health
Ontario Ministry of Natural Resources
Ontario Place

Ontario Police College
Ontario Society for Crippled Children
Onondaga Camp
Oxford Regional Centre
Parks Canada
Participation House
Pine Ridge, Aurora
Queen Street Mental Health Centre
Recreation Facilities Research Project
Reena Foundation
Royal Ottawa Hospital
Scouts Canada
The Sheppard Squash Club
Simcoe Hall Boy's Club
Sir James Whitney School
Snowshoe Resort
Southwestern Regional Centre
St. Lawrence Centre
St. Peter's Centre
St. Thomas Psychiatric Hospital
Sunbeam Home
Sunnybrook Hospital
Sunset Home for the Aged
Toronto Conference United Church House
The Toronto Squash Club
Town of Huntsville
Town of Milton
Town of Oakville
Town of Petrolia
Town of Timmins
Town of Vaughan
Township of Woolwich
Valleyview Home for the Aged
Victoria Woods Development Corporation
Wellesley Hospital
Whitby Psychiatric Hospital
YM-YWCA
Guelph
London
YMCA
Hamilton
Kitchener
Metropolitan Toronto
Orillia
Toronto Central
Waterloo
YWCA
Kitchener
Organizations Employing Co-operative Mathematics Students

AGT Data Systems Limited
Albert College
The Algoma Steel Corporation Limited
Allen, Miles, Fox & Johnston
Alphatext Systems Limited
Aluminum Company of Canada Limited
A. E. Ames & Company Limited
Ashbury College
Atomic Energy of Canada Limited
Kenneth W. Ball & Company
Bank of Canada
Bank of Montreal
Bank of Nova Scotia
Bata Limited
The Bay
Beallor Beallor & Burns
Beaver Engineering Limited
Beaver Lumber Company Limited
The Booker Milk Company Limited
Bell Canada
Bell Northern Research
Boards of Education
Brant County
Carleton
Cochrane Iroquois Falls
Elgin
Etobicoke
Frontenac
Grey County
Halton County
Hamilton
Leeds-Grenville County
Lincoln County
Muskoka
Nipissing
North York
Pool
Peterborough
Sault Ste. Marie
Scarborough
Simcoe County Roman Catholic Separate Timmins
Toronto
York Borough
Bouris, Wilson, Scott & Proctor
Brunton, Browning, Day & Partners
Buck Lawrence
Burns Foods Limited
Burroughs Business Machines Limited
Cadillac, Fairview Corporation Limited
Campbell Lawless & Punchard
Campbell, Sharp, Nash & Field
Canada Permanent Trust Company
Canada Systems Group
Canadian Bechtel Limited
Canadian Fram Limited
Canadian Imperial Bank of Commerce
Canadian Industries Limited
Canadian National Telecommunications
Canadian Pacific
Canadian Tire Corporation Limited
Carling O'Keefe Limited
C.C.M.
Central Mortgage & Housing Corporation
Cheney, Glenn & Graydon
Chrysler, Shillington & Company
City of London
City of Sault Ste. Marie
City of Sudbury
City of Thunder Bay
City of Toronto
Clark, Stark & Diegel
Clarkson, Gordon & Company
Cole Rubin Finkelstein & Green
Collins, Barrow
Columbia Records of Canada Limited
Combine Insurance Company of America
Computing Devices of Canada Limited
Comtech Group Limited
Confederation Life Insurance Company
Consumers Gas Company
Continental Can Company of Canada Limited
Control Data Institute
Control Data Canada Limited
Co-operators Insurance Association
Coopers & Lybrand
Cooper Tool Group Limited
Cossar, Hector, Payne & Company
Coutts Hallmark Cards
Cox, Hyatt & Company
CP Rail
The Crown Life Insurance Company
Daciuk & Tindale
Data Crown Limited
George Deeth
Deloitte, Haskins & Sells
Desmarais Arsenault & Company
Dominion Foundries & Steel Limited
The Dominion Life Assurance Company
Dow Chemical of Canada Limited
D.A. Dunlop & Company
Dunwoodo & Company
Durst Vodden Bender
Dylex Limited
Eaton Financial Services Limited
Eaton Yale Limited
Ellis-Don Limited
Ennis, Graham & Setterington
Erickson Lee MacDonald & Company
Facelle Company Limited
Falconbridge Nickel Mines Limited
Falk Corporation of Canada Limited
Fiberglas Canada Limited
Financial Post
Ford Keast Giles Smith & Phillips
Co-ordination and Placement
Organizations Employing Co-operative Mathematics Students

Ford Motor Company of Canada Limited
Foundation Software Incorporated
Fox Glicksman & Company
Galt Metals Limited
Gardner, McDonald & Company
Gaviller & Company
GEAC Computer Corporation Limited
Gellman, Hayward & Partners Limited
General Foods Limited
General Motors Canada Limited
Gerling Global Life Insurance Company
The Globe and Mail Limited
Goebelle & Wagner
Goodyear Canada Incorporated
Gore Mutual Insurance Company
Government of Canada
Government of Ontario
Hans Graf
Grand & Toy Limited
Greenwood, Meltz, Silverstein & Herlick
Greer, Fleming, Roland & Company
Guaranty Trust Company of Canada
Gulf Oil Canada Limited
Harrison, Glover & Company
Harding Carpets Limited
Samuel Harrison & Company
M. A. Hassel
Havergal College
Hilborne & Company
Donald Hill & Partners
Hiram Walker & Sons Limited
Hobbs McCrae Poupore & Kendall
Honeywell Information Systems
Hyde-Houghton & Company
IBM Canada Limited
Imperial Life Assurance Company Limited
Imperial Oil Limited
Imperial Tobacco Limited
INCO Limited
The Independent Order of Foresters
Informetica Limited
International Harvester Company of Canada Limited
IST Incorporated
Jarrett Gould Elliot & Company
Johnson Richard & Company
Joscelyn, Laughlin, Harper, Tory & Associates
Kimberly Clark of Canada Limited
Kime & Company
Kodak Canada
Langlois, Hauck & Company
Laventhol, Krekstein, Howath & Howath
M. Loeb Limited
London Life Insurance Company
Loram International
Lough Lewis & Associates
3M of Canada
Mac's Milk Limited
MacGillivray & Company
Mack Trucks Canada Limited

MacKillican & Associates
A. F. MacLaren & Company
Mansfield-Denhan General Company Limited
The Manufacturers Life Insurance Company
Maritime Life Assurance Company
Marner, Mandelbaum, Landau & Rosenberg
Martin Tilley & Company
Massey Ferguson Limited
McCarney, Swinarton, Newland
McCay, Duff & Company
McColl, Turner & Company
McLurkin Schlegel & Associates
McMahon, Millard, Graham & Kentner
McNeil Crosson & Magwood
McPherson, Scott & Cragg
The Merchantile & General Reinsurance Company
Micom Data Systems Limited
Microsec Sixty Nine Limited
Millard, Rouse & Rosebrugh
Minicomputer Business Systems
Monteith, Monteith & Company
Morris, Burk, Friedman & Luborsky
Multiple Access Limited
Municipality of Metropolitan Toronto
The Mutual Life Assurance Company of Canada
National Cancer Institute of Canada
National Cash Register Company of Canada
The National Life Assurance Company of Canada
National Research Council
National Trust Company
Netherwood School
New Brunswick Telephone Company
Norcen Energy Resources Limited
North American Life Assurance Company
Northern & Central Gas Corporation Limited
Ontario Hydro
The Ontario Institute for Studies in Education
Ontario Northland Transportation Commission
Ortho Pharmaceutical (Canada) Limited
O. F. Osborne
Partridge, Skene & Company
Peat, Marwick, Mitchell & Company
Perlmutter, Shore, Wilkinson & Rodgers
Peters Brown & Company
Pfisterer Ray Arris & Grein
Phillips Electronic Industries Limited
Pilkington Glass Limited
Polysar Limited
Price-Waterhouse & Company
Proctor & Gamble Company of Canada
Quantum Information Resources Limited
Quasar Systems Limited
Reed Limited
Ross, Pope & Company
P. S. Ross & Partners
James Roth
Rothesay Collegiate School
Rowntree MacKintosh Canada Limited
The Royal Bank of Canada
Co-ordination and Placement
Organizations Employing Co-operative Mathematics Students

Royal Insurance Group
Rubbermaid (Canada) Limited
Rudy Electric Wholesale Company Limited
Saddington, Greenfield & Company
Satellite Computer & Communication Systems Limited
Scarborough Public Utilities Commission
J. M. Schneider Limited
S.D.I. Associates
Secker & Ross
Selby Madgett Boler & Company
I. P. Sharp Associates Limited
Shell Canada Limited
Simpson & Campbell
Simpsons Sears Limited
Smith, Klymas, Selks & Company
Smith, Nixon & Company
Software Brokers Limited
Sovereign Life Assurance Company
Springer Chapman & Company
St. Andrews College
The Steel Company of Canada Limited
Stille & Sutton
Sudbury Hydro
Sun Oil Company Limited
Systemhouse Limited
Systems Dimensions Limited
Tax Time Services
Telesat Canada
Tessier, Smith & Partners
Texaco Canada Limited
Texasgulf Canada Limited
Tomenson Alexander Limited
Thorne Riddell & Company
Toronto Dominion Bank
Toronto Hydro-Electric System
Toronto Mutual Life Insurance Company
Toronto Transit Commission
Touche, Ross & Company
Towers, Perrin, Forster & Crosby
Transcanada Pipelines
Travelers of Canada
TRW Data Systems
Union Carbide Canada Limited
United Co-operatives of Ontario
Universities and Colleges
Alaska
Carleton
Loyalist
Mohawk
Ryerson
Sheridan
Wildrid Laurier
York
G. H. Ward & Partners
George A. Welch & Company
Welch & Brooks
Wilkinson & Company
Wilson, Masin & McLaren
Winspear, Higgins, Stevenson & Company

Woods, Gordon & Company
Workmen's Compensation Board
Xerox of Canada Limited
York-Ryerson Computing Centre
The University Libraries

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

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

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

Business Administrator
J. Jorgensen, BA (Toronto)

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

Rare Books Librarian
S. Bellingham, BA (WLU), MLS (Western)

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
Vacant

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

Cataloguers
A. Chan, BA (Hong Kong), MLS (Western)
Y. Gordon, BA (Manitoba), BLS (Toronto)
R. Lamb, BA (Saskatchewan), MLS (Western)
M. Markiw, BA (Alberta), MLS (Western)
M. Wan, BSSc (Hong Kong), MA, MLS (Western)

Serials Department Head
B. Bruder, BA (Waterloo Lutheran)

Cataloguer
J. Kuhn, BA (Creighton), MA (Creighton), MLS (Western)

Reader Services

Associate Librarian for Reader Services
B. MacNeill, BSC (Laurentian), MLS (McGill)

Arts Library
Circulation Department Head
E. Reaman, BA (McMaster), BLS (Toronto)

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

Reference & Collections Development Librarians
J. Addico, BA (Phillips), MA (North Western), MLS (Western)
M. Aquan-Yuen, BA (Toronto), MLS (Western)
J. Beglo, BA (Waterloo Lutheran), MLS (Western)
L. Black, BA (Western), BLS, MLS (Toronto)
M. Blok, BA (Waterloo), MLS (Western)
R. Crusz, BA (Ceylon), MA (Waterloo), BLS (Toronto)
D. Fitzpatrick, BA (Windsor), MA (Windsor), MLS (Toronto)
A. Lakus, BA (Jerusalem), MLS (UDC)
S. Slade, BA (Victoria), BLS (UBC)

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

Librarians
J. Boettger, BA (Waterloo), BLS (British Columbia)
K. J. Fyans, BA (Queen’s), MLS (Toronto)

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

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
S. Buttenmiller, BSc (Waterloo), BLS (Toronto)

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

Environmental Studies Library
Head
Vacant
The University of Waterloo Library is central to the academic programmes going on throughout the University. Its function is to provide books, journals, and other library materials to support those programmes. The Library staff, aided by the university community in many important ways, works to make the library system an excellent base for teaching, study and research.

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 public service departments and the behind-the-scenes technical services. Public services located on the first floor include a large reserve reading room with seating for 160 readers, a rare book room, a listening room with facilities for both phonodiscs and audio cassettes and eight typing cubicles. From just inside the main entrance on the second floor the public catalogue, the circulation counter and the information desk are all immediately visible and close at hand. The periodical and journal collections, and microforms, are located on the third floor. Government publications are located on the fifth floor. The upper floors house the main circulating collections and seats for readers. In all there are more than fourteen hundred places for readers.

The Arts Library collections number 1,400,000 items, including books and periodicals in the Humanities and Social Sciences, pamphlets, theses, microforms, documents, reports, sound recordings, and other materials. The library grows by 3,000 volumes each month. An important element is the collection of journals and periodicals, back files and current issues. The library subscribes to 3,484 periodicals.

The Engineering, Mathematics and Science Library occupies the fourth floor of the Mathematics and Computer Science Building. Again, the three principal public services—the catalogue, the circulation counter, and the reference desk—are just inside the entrance to the library. Space is provided for 740 readers.

The E.M.S. Library collections number 400,000 items, including books, journals, and many kinds of special materials, which include technical reports, microforms, documents and maps. The library has 2,583 subscriptions to current periodicals; 1,800 volumes of books and periodicals are added per month.

The Environmental Studies Library is housed on the main floor of the Social Sciences Building. The core of the library collection consists of 45,000 maps, supported by 4,600 books and reports, together with atlases, periodicals, aerial photographs and films. Like the Arts and E.M.S. libraries, its resources are available to all members of the University.

The staff of the library system, 200 persons, both professional and supporting, is engaged in obtaining material, in processing it for the collections, and in bringing it to the attention of users. During the day and evening hours reference and circulation staff are on duty to assist in making use of the collections and facilities. Week nights the Arts and E.M.S. libraries are open for use, under the custodianship of library attendants.

Handbooks are available to explain the use of the libraries: the classification system, the card catalogues, the serial lists, and in general the rules and procedures. Also available are other publications, such as bibliographies and lists of reference materials.

For a more detailed and up-to-date description of the University Libraries see the current Library Handbook.
Faculty of Arts

Economics professor advises student on registration procedures
The Faculty of Arts

An important difference between a liberal arts education and a job training programme is that the latter is specifically directed to a definite kind of employment. The former can certainly qualify a person for professional training, but it can do something else, something of inestimable value. University students come to university expecting that their main concern will be to prepare themselves to make a living. They would do well to concern themselves also with exploring the business of living. A liberal arts education - acquaintance with some of the major ideas and forces that shape our civilization, and the ability to think clearly, critically, and creatively - can make an important 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:

<table>
<thead>
<tr>
<th>Anthropology</th>
<th>History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical Civilization</td>
<td>Latin</td>
</tr>
<tr>
<td>Drama and Theatre Arts</td>
<td>Medieval Studies</td>
</tr>
<tr>
<td>Economics</td>
<td>Philosophy</td>
</tr>
<tr>
<td>English</td>
<td>Political Science</td>
</tr>
<tr>
<td>Fine Arts (Art)</td>
<td>Psychology</td>
</tr>
<tr>
<td>Fine Arts (Music)</td>
<td>Religious Studies</td>
</tr>
<tr>
<td>French</td>
<td>Russian</td>
</tr>
<tr>
<td>Geography (See Note)</td>
<td>Social Development</td>
</tr>
<tr>
<td>German</td>
<td>Studies</td>
</tr>
<tr>
<td>Greek</td>
<td>Sociology</td>
</tr>
<tr>
<td>Spanish</td>
<td></td>
</tr>
</tbody>
</table>

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 Notes on page 138.

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.
Year 2
Students in Year 2 of the General Programme choose at least 5 credits in consultation with their departmental advisor:
- a minimum of 2 further credits in the major subject;
  (See Notes)
- 3 other credits (See Notes)

Year 3
Students in Year 3 choose 5 credits in consultation with their departmental advisor:
- a minimum of 2 further credits in the major subject
- 3 other credits

Note 1
Before graduation every student in the General Programme must have successfully completed either
i) a minimum of 8 credits beyond the 100 level or
ii) courses from no more than 7 disciplines

Note 2
Before graduation every student in the General Programme must have completed a minimum of 15 credits with a passing mark in each and an overall cumulative average of at least 60%, and a cumulative average in his major of 65%. The Faculty of Arts Group A and Group B requirements (See Degree Requirements) must also be met.

b) Non-Major
Students with interests in a variety of disciplines may choose an individualized programme rather than major in a single discipline. A student in the Arts Faculty may graduate as a Non-Major with a General Arts degree upon completion of 15 credits with a passing mark in each, including:

i) a minimum of 7.5 credits beyond the 100 level
ii) a minimum of 7.5 credits in the Faculty of Arts
iii) the Faculty of Arts Group A and Group B requirements for non-majors (See Degree Requirements).

A cumulative average of 65% is required for graduation.

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

Almost any 2 of the programmes 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. 80.

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

Note 2
Before graduation every student in an Honours Programme must have completed 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 Group A and Group B requirements (see Degree Requirements), must also be met. Students are requested to refer to "Departmental Programmes" for other departmental requirements.
Note 3
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 Economics, English, and Political Science 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-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. A minor only is available in Asian Studies. Another 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:

   Economics       History
   English         Political Science
   French          Sociology
   Geography

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          Psychology
   History               Religious Studies
   Philosophy            Sociology
   Political Science

6) Selection of Year 1 Programmes
All Year 1 students are officially classified as being in the General Arts Programme. Students may not select a specific major or an Honours programme until Year 2. Most students are relieved to discover that they do not have to choose a General or Honours Programme in Year 1. The first year is a broad exploratory year, and the student should select a programme of courses that keeps as many options as possible open for advanced work.

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.

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.
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.

It is important that students settle down in their schedule of courses just as quickly as possible. Students usually find that courses they add late in the second or third week of classes pose special problems in catching up with the work already covered.

Degree Requirements

In order to earn a B.A., a student must complete, with the necessary cumulative averages, the necessary number of prescribed and elective courses for either the General or the Honours Programme. 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 Council.

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 8 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) Group A and Group B Requirements

All Arts students must meet the Faculty of Arts Group A and B requirements. Group A comprises courses in the humanities, and Group B comprises courses in the social sciences:

Group A (i) English, History, Philosophy
Group A (ii) 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.

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 and a minimum of 2 full credits not both in the same subject, from Group B. 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)

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 and a minimum of 2 full credits, not both in the same subject, from Group B.

Note 1

Other foreign languages may be used to meet the Group A (ii) requirement; Religious Studies 105J: Elementary Hebrew; Religious Studies 106P: New Testament Greek; Arts 190/191 or 192/193: Introductory Chinese; Arts 290/291 or 292/293: Intermediate Chinese.
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.

Students should note that the Faculty of Arts operates under a course (credit) system in which student progress is measured by courses successfully completed rather than by years. Students who have earned fewer than 5 credits will be considered Year 1 students; those who have earned at least 5 credits but fewer than 10 will be considered Year 2 students; those with at least 10 but fewer than 15, Year 3, and those with 15 or more, Year 4.

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 his 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:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>95</td>
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<tr>
<td>B+</td>
<td>78</td>
</tr>
<tr>
<td>C+</td>
<td>68</td>
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<td>D+</td>
<td>58</td>
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<td>F+</td>
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<td>A</td>
<td>89</td>
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<td>A-</td>
<td>83</td>
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<td>72</td>
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<td>C-</td>
<td>62</td>
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<tr>
<td>D-</td>
<td>52</td>
</tr>
<tr>
<td>F-</td>
<td>32</td>
</tr>
</tbody>
</table>

Overall standing is determined by the cumulative average of grades assigned for all courses taken at the University (at any time, whether passed or failed) while registered in the Faculty of Arts.

Note

When a failed 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 not be repeated.

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.

c) 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.

d) A student who has been required to withdraw for academic reasons is eligible to apply for re-admission after one year's 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.

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 50 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.

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:

6) 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:
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 Examination 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.

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 the linguistics portion of this 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
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.
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.)

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

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. Anthropology 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
History 103/104 The Emergence of the Third World
History 269R History of Modern Revolution
History 282 East Asian History
History 354A Mao and the Chinese Revolution
History 440 Senior Seminar on Far East Asian History
Philosophy 365/366 Oriental Philosophy
Political Science 102 Imperialism in International Relations (section taught By A. Kapur)
Political Science 281/282 International Politics 1 and 2 (section taught by A. Kapur)
Religious Studies 110 Religions of Mankind
Religious Studies 211 Religion in Japan
Religious Studies 213 Hinduism
Religious Studies 214 Buddhism in India and South-East Asia
Religious Studies 215A
Religion in China 2
Religion in China 1
Religious Studies 215B
Religious Studies 216A Islam: "Religion Perfected"
Religious Studies 216B Development of the Muslim Community
Religious Studies 269 Myths and Symbols of the Religions of India
Religious Studies 313 Modern Religious Movements in India

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.

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.

Recommended Programme

Year 1
A) 2 courses
English 101
History 123
B) 2 courses
Economics 101/102
Geography 101/102
Political Science 101/102
Sociology 120R/121R
C) 1 course
A course given in French such as 101/102, 131'/132, or 151/152. (A course in French language is strongly recommended. In rare circumstances, however, a student unable to fulfill 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 programme 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.

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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 Classical Civilization credit). Students

Note
Knowledge of neither Latin nor Greek is required to obtain a General degree in Classical Civilization.

Honours Programmes

Honours Classical Studies

Recommended Programme

Year 1
Greek 100, or Latin 100, or Latin 150
C. Civ. 101/102
Three additional credits

Year 2
Greek 200, or Latin 150, or one other credit in Latin at 200 level
C. Civ. 251/252, 265/266
Two additional credits

Year 3
One credit in Greek or Latin at senior level
C. Civ. 270, 351/352
Two additional credits

Year 4
Two credits in Classical Civilization
Three additional credits

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.
### Joint Honours Classical Studies

**Recommended Programme**

**Year 1**
- Greek 100 or Latin 100, or Latin 150
- C. Civ. 101/102
- Three additional credits

**Year 2**
- Greek 200, or Latin 150 or one other credit in Latin at 200 level
- C. Civ. 251/252, 265/266
- Three additional credits

**Year 3**
- C. Civ. 270, 351/352
- Three additional credits

**Year 4**
- One credit in Classical Civilization
- Five additional credits

**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.*

### Drama and Theatre Arts Group

#### Sequence of Study

In the first term all students must take Drama 101 and in the second term should take Drama 102. All students are strongly advised to take Drama 251 in the Winter term of their first year.

The Honours programme is designed so that a student could work through a particular sequence of courses in one field (acting, directing, technical) which would in effect become an area of specialization. The Drama 499 project in the fourth year would then presumably be centred on this specialization. Students planning to major in Drama and Theatre Arts should confer with the Undergraduate Advisor before registering.

#### Drama and Theatre Arts Group General Programme

1) A total of fifteen courses (30 half courses) including Faculty of Arts Group A and B 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.

**Note**
*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 Group A and B requirements with an overall cumulative major average of 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 Description.

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.
3) In addition students must satisfy the following requirements:
   A) Drama 102.
   B) Drama 243.
   C) Drama 371 and Drama 372.
   D) Three of Drama 251, 252, 253, 254, 255, English 362, 363.
   E) Drama 409.
   F) Drama 499. This is a full year course. Also see note 4 below.
   G) Four other half courses.

Note 1
Joint Honours programmes other than those already approved may be arranged by consultation with the Drama and Theatre Arts group and the Department concerned.

Note 2
See Faculty of Arts requirements for other required courses.

Note 3
The Joint Honours programme in Drama and another teaching subject will enable the student to proceed towards the Ontario College of Education Combined Type A Certificate.

Economics
The Department of Economics allows a student to earn an economics degree in two ways. A student may qualify for the degree in the traditional manner by attending University during the Fall and Winter terms of each year. The department also provides a co-operative option. This option provides a mix of academic work and on-the-job experience. An honours student may study on a co-operative basis specializing in economic theory and policy or management accounting or chartered accountancy.

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 January 15 of the 1B 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, 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, 201, 202, 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
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, 191, 192, 201, 202, 211, 221, 231, 241, 263, 301, 302, 303, 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.


Note

Students in this option are also required to take Business 231 (W.L.U.) and one additional half course in Economics at the 300 level.

It is recommended that students in Year 1 adopt the following programme:

Economics 101, 102, 191, 192

Computer Science 112 and 115 or 180 and 150

One elective

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 R.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 two half courses at W.L.U., Business 388 and 398.

Joint Honours Programmes

The core courses in economics for any joint honours programme normally are: Economics 101, 102, 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 Group A and Group B 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 Faculties
Economics 101, 102, 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 1)
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 1)
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, 373, 375 (Language and Early Literature)
5) one credit from 330, 410, 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, 290, 291, 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. An English Joint Honours student 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.

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 and b) two credits from Group B (See Arts Programmes). 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.

Fine Arts

General Programme
15 credits
A & B requirements 5 credits
120/121 & additional 2 half studio 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 requirements 5 credits
120/121, 224/225, 324 plus 3 half courses in drawing 4 credits
110/111, & 6 additional half courses in art history or film history (only those film courses offered by the Fine Arts department) 4 credits
6 half courses in major area of printmaking, painting, sculpture or additional drawing including 490/491 3 credits
electives 4 credits

Note
4th year courses cannot be taken without departmental permission.

Note
Fine 390, 391, 392, 393 may be taken only as electives.
Honours Programme (Art History Option)
20 credits
A & B requirements 5 credits
120/121 & 4 additional studio half courses 3 credits
10 half courses in art history and film history (only those film courses offered by the Fine Arts Dept.) 5 credits
490/491 1 credit
electives 4 credits

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.

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.

Fine Arts Joint Honours Programmes
Programmes of this nature are possible in art history and film history only. All students must take Fine Arts 110 and 111, both of which must be taken prior to the fourth year, and 120/121. Students majoring in art history must take 390a in the third year; in addition, 472, 473, 490, and 491 must be taken in the fourth year. Students majoring in film history must take 470, 471, 490, and 491 in the fourth year. Fine Arts courses other than those mentioned above are required for this degree but since programmes will vary, these other courses must be chosen with the help of a faculty advisor from the Department of Fine Arts.

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 one additional credit 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.

**Arts**
Departmental Programmes
French/Geography

**Geography**

**Honours 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. A minimum of nine courses in Geography and Environmental Studies, of which seven must be designated as Geography courses constitutes the honours requirements but up to thirteen Geography or Environmental Studies courses may be taken in this programme. Participants in Geography programmes will not normally be permitted to switch faculties after they have entered second year.

**Year 1**
Geography 102 Introduction to Physical Geography
and one of but no more than three of
Geog 101 Introduction to Human Geography
EnvSt 195B Introduction to Environmental Problems
Geog 110 Tutorial in Human Geography
Geog 125R Introduction to the "Third World"
Geog 126R Development in the "Third World"
Geog 127 Regional Problems of Europe

Additional credits should be chosen after consultation with the department so that the student has 6 full credits. (Note that all of these courses (except Geog. 110) are available to any student in the University. Geography students, however, cannot take more than four first year geography half credits.)

**Year 2**
EnvSt 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
EnvSt 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

Two full credits 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.
For additional information see Note on p. 74.

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.

Arts
Departmental Programmes
Geography/German

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 121/122
German 105/106, or German 151/152
German 111/112

Second Year
German 201/202, or German 251/252
German 211/212 German 261/262
German 231/232 German 291/292

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
Two full courses in German
Three additional full courses

Note 1
Before graduation students must complete the Group A (i) and B requirements listed on page 73.

Note 2
A minimum of 20 full courses must be successfully completed before graduation.

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 programme in German language and literature at the University of Mannheim on the Rhine. The programme is open to third and fourth year students normally qualified to enrol in German courses at this level. In exceptional cases, second year students will also be considered. Students who would like to begin their studies in Mannheim in the Winter Semester (Oct. 15 to Feb. 15) must apply by April 1. The application deadline for those who would like to begin their studies in the Summer Semester (April 15 to July 15) is Feb. 1. Applications should be submitted to: "Waterloo in Germany" Department of Germanic and Slavic Languages and Literatures, University of Waterloo, Waterloo/Ontario.

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 will take a minimum of 22 full courses before graduation, including seven in German.

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.

History

Honours History

Year 1
Any first year programme that fulfills the general Faculty of Arts requirements is acceptable. A Level 1 programme course in History is recommended. Political Science 101 is also recommended to students intending to major in History.

Year 2
Three Honours History courses, preferably including History 250 (see note 1)
Three other courses (see note 2)

Year 3
Three Honours History courses (see note 1)
Two other courses (see note 2)

Year 4
Two Senior Seminars
One other Honours History course.
One other approved course.

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:

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<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<td>255 (or Classics 251/252)</td>
<td>262</td>
<td>252</td>
<td>277</td>
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<td>258</td>
<td>263/264</td>
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<td>340</td>
<td>357/358</td>
<td>268G</td>
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<td>343G/344G</td>
<td>359/360</td>
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<td>347G/348G</td>
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<td>353</td>
<td>364R/365R</td>
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<td>374G</td>
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<td>Classics 365/366</td>
<td>366A/366B</td>
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<td>367</td>
<td>361A/361B</td>
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**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 A and B 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 and B 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.

**Arts**
Departmental Programmes
History/Italian/Latin

**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

**Year 1**
Latin 100 or 150
One Classical Civilization credit
Three additional credits

**Year 2**
Two credits in Latin (or equivalent)
One Classical Civilization credit
Two additional credits

**Year 3**
Two credits in Latin (or equivalent)
One Classical Civilization credit
Two additional credits

**Year 4**
Two credits in Latin (or equivalent)
Three additional credits

**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 1)

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 Philosophy Programme

Note to General Philosophy Students
Five full course equivalents in Philosophy are required for the General Degree in Philosophy, including at least one of 140, 240, 241 or 340, 221 and one full-course equivalent from 280/281, 282/283, 390/391. (St. Jerome's students: see p. 370 for further information.)

Departmental Recommendation
The Department of Philosophy recommends that its Honours and Majors take at least one course in Mathematics or Science.

For students registered through St. Jerome's College in the General Programme in Philosophy: Phil. 200J or 140 or 240 or 241 or 340, 280/281, 282/283, 390, 391, plus 2.5 or 3 other philosophy electives.

Honours Philosophy Programme
Twenty full course equivalents
Ten in Philosophy, including 221/222, one of 240, 241 or 340, 280/281, 282/283, 499 (tutorial)
Ten others, including Group A and B requirements (see page 77.)
St. Jerome's students (See chapter 14, Department of Philosophy course descriptions information).

For students registered through St. Jerome's College in the Honours Programme in Philosophy: Phil. 218J or 221, 222, 240 or 241 or 340, 280, 281, 282, 283, 499J or 499, plus 5 or 5.5 other philosophy electives. College students are expected to take 450J.

Philosophy Joint Honours Programmes
Students interested in Joint Honours Programmes other than those listed here should consult with the undergraduate officer in Philosophy.

A student may register through St. Jerome's College in the Joint Honours Programme in Philosophy.

Students in joint Honours Programmes, one half of which is Philosophy, may substitute the same St. Jerome's College courses in those programmes as others may substitute in the single Honours Programme.

Honours Philosophy and Economics

Overall Requirements
Seven full-course equivalents in Economics (taken in consultation with the Economics Department)
Seven electives
Seven Philosophy courses
One senior Honours tutorial in Philosophy or Economics

Philosophy Requirements
Seven full-course equivalents in Philosophy, including one of 140, 241 or 340.
One full-course equivalent from 280/281, 282/283
One half-course in Social and Political Philosophy (e.g. 125, 225, or 325)
One half course in Ethics (e.g. 221 or 222)
Philosophy 243 and 362

Honours Philosophy and English

Philosophy Requirements
Seven full-course equivalents in Philosophy, including 221/222, one of 140, 240, 241 or 340, 280/281, 282/283, Philosophy 331.

English Requirements (See English Joint Honours Requirements)

Other Requirements
One full course equivalent in a foreign language
Two full course equivalents from Group B
Four other full course equivalents

Note
English 495, Senior Honours Essay, may be chosen as one of these courses.

Honours Philosophy and History

Philosophy Requirements
The equivalent of at least seven full courses in Philosophy which must include one of 140, 240, 241 or 340, 221/222, 280/281, 282/283, 446.

History Requirements (See History Joint Honours Requirements)
Other Requirements
Eight full course equivalents, including A and B requirements (page 77).

Honours Philosophy and Literature
Recommended Programme

Year 1
French 191 (or German 121/122)
English 101
A Social Science
two of
A Natural Science
Mathematics
History
Another Language
Another Social Science

Year 2
One of Philosophy 221/222 or 280/281
Philosophy 282/283 and one other Philosophy course
French: Minimum of two full courses or equivalent (see note)
(or German 281/282 and one of German 241/242, 251/252, 271/272)
One elective (Social Science, if requirement not met in first year)

Year 3
Philosophy 331, 399 (tutorial), and
One of Philosophy 221/222, or 280/281
French: Minimum of two full courses or equivalent (see note)
or German 341/342, 351/352, 361/362, 371/372
One elective

Year 4
Two full course equivalents in Philosophy
French: Minimum of two full courses or equivalent (see note)
(or German 451/452, 461/462, 471/472, 481/482)
Senior Essay

Note 1
In certain special cases, where the student can prove a high degree of familiarity with English literature the student may substitute French 191 or German 121/122, whichever has not already been chosen. Those taking French option should normally take Latin 190.

Note 2
Before graduation students must complete a minimum of eight courses (or equivalent) in French. Students intending to teach French should complete French 250, 300, 401/402.

Joint Philosophy – Mathematics Programme
Choice of Degree
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 toward a degree in Arts or a degree in Mathematics. The programme must then be approved by the Philosophy Department or by an appropriate department of the Faculty of Mathematics respectively.

Requirements for all students
(Other requirements will depend on which degree is taken: the student will have to add to these to meet the requirements of his faculty)

Philosophy 340, 258/359, 280/281, 282/283,
Three others, one of which is in a value area
mathematics 129, 130, 229 or 237 and one of 228, 233, 239, 240
Two others

Further requirements for the degree B.Math.
(Mathematics and Philosophy) see Chapter 14
Further requirements for the degree B.A.
(Philosophy and Mathematics)
Six more courses, including A and B requirements for an Arts Degree

Honours Philosophy and Political Science
Philosophy Requirements
The equivalent of at least seven full courses in Philosophy which must include 221/222, one of 140, 240, 241 or 340, 280/281, 282/283, 327, 362

Political Science Requirements (See Political Science Joint Honours Requirements)

Other Requirements
Either Philosophy 325/326, or Political Science 221/222 or 225/226
The equivalent of seven full courses, one of which must satisfy the Faculty’s foreign language requirement and one of which should be in a social science other than Political Science.

Honours Philosophy and Psychology
Philosophy Requirements
Seven full-course equivalents in Philosophy, including 221/222, 280/281, 282/283, one of 240, 241 or 340 and 362

Psychology Requirements (See Psychology Joint Honours Requirements)

Other Requirements
Either Philosophy or Psychology 499
Seven full courses equivalents, including A and B requirements (see page 77)
Honours Philosophy and Religious Studies

**Philosophy Requirements**

Seven full-course equivalents in Philosophy, including one of 140, 240, 241 or 340, 221/222, one full course equivalent in the history of philosophy, and 335.

**Religious Studies Requirements (See Religious Studies Joint Honours Requirements)**

**Other Requirements**

Eight full course equivalents to make a total of 22 full course equivalents, including either Philosophy or Religious Studies 499, and A and B requirements (see page 77)

Honours Philosophy and Sociology

**Philosophy Requirements**

Seven full-course equivalents in Philosophy, including 221/222, one of 140, 240, 241 or 340, 260/261, 262 or 263 and 362

**Sociology Requirements (See Sociology Joint Honours Requirements)**

**Other Requirements**

Either Philosophy or Sociology 499

Seven full course equivalents, including A and B requirements (see page 77)

**Note**

The following courses are recommended as electives for students with special interests: Sociology 603, 631, and 632

**Minor**

A minor in Philosophy consists of any five full courses (or equivalent) in Philosophy.

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**

The equivalent of four other credits

**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

with the number 9 reserved for special courses which are not regarded as 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
Year 4
The equivalent of three credits in Political Science at least two of which must be at the 400 level (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 Economics 191
1/2 credit English 210
3 credits from the major subject, one of which must be in a designated Administrative Studies course.
2 credits electives.
Total 6 credits

Year 3
1/2 credit Economics 192
1/2 credit Psychology 333 or Sociology 231 (unless Management Science 44 is to be taken in Year 4)
3 credits from the major subject, one of which must be in a designated Administrative Studies course.

2 credits electives, one chosen from designated Administrative Studies courses not in the major subject.
Total 6 credits

Year 4
1/2 credit Management Science 44 (unless Psychology 333 or Sociology 231 was taken in Year 3).
3 credits from the major subject; one of which must be in a designated Administrative Studies course.
1/2 or 2 credits electives, one chosen from designated Administrative Studies courses not in the major subject.
Total 5 credits
Total credits in programme: 22

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 three 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)*

**Year 2**
- 1/2 credit
- 1/2 credit
- 4 credits
- 1 credit
- Total 6 credits

**Year 3**
- 1/2 credit
- 1/2 credit
- 4 credits
- 1 credit
- Total 6 credits

**Year 4**
- Economics 192
- Psychology 333 or Sociology 231 (unless Management Science 44 is to be taken in Year 4)
- 4 credits
- 1 credit
- Total 6 credits

elective, chosen from designated Administrative Studies courses, not in the major subjects.
Year 4
1/2 credit Management Science 44 (unless Psychology 333 or Sociology 231 was taken in Year 3).
4 credits two in each of the major subjects; one of each major subject must be an Administrative Studies course.
1/2 or 2 credits electives, one chosen from designated Administrative Studies courses not in the major subjects.
Total 6 credits
Total credits in programme: 23

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 fields of the discipline;
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 three credits 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, 275, 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 283, 284, 285 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 283/284
The equivalent of one credit in Psychology (see note 1)
The equivalent of three additional credits

Year 3
Psychology 285
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, 203 or 207, 211, 241, 242, 283, 284, 285, 293 or 295, 311, 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 241/242, 283/284
Health Studies 140
The equivalent of two and one half additional credits

Year 3
Psychology 285, 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, before entering the fourth year:

Psychology 283, 284, 285 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 Psychology and 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. 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 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
Nine 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 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, 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

Year 1
Russian 101/102 or equivalent
Four additional full courses

Year 2
Two full courses in Russian
Three additional full courses

Year 3
Three full courses in Russian
Two additional full courses

Year 4
Three full courses in Russian
Two additional full courses

Note 1
A minimum of 20 full courses must be successfully completed before graduation.

Note 2
Before graduation students must complete the group A(i) and B requirements listed on page 77.

Russian Joint Honours Programmes

Drama and Russian
English and Russian
Economics and Russian
Environmental Studies and Russian
French and Russian
German and Russian
History and Russian
Mathematics and Russian
Political Science and Russian
Geography and Russian
Philosophy 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 will take a minimum of 22 full courses before graduation, including seven in Russian.

Social Development Studies

The Social Development Studies Programme at Renison College currently offers an interdisciplinary curriculum leading either to an honours or a general B.A.

Courses in sociology, psychology, social work and interdisciplinary concerns are offered by faculty in each of these core areas as well as by supportive faculty from other disciplines. Human growth and social issues are examined in the context of institutional arrangements that affect life, as well as safeguards and systems that must be created to enhance collective human welfare.

The programme realizes its applied emphasis through the development and operation of projects within and outside the university community to balance and test theory and practice against each other. With a commitment to confronting contemporary social problems, the Social Development Studies Programme is designed for students interested in employment or graduate studies in human service areas such as community organizing, journalism, law, social work, communications, international service programmes, theology, etc.

The General Programme

The general programme consists of 6 academic terms in a period of 3 years. Courses are normally offered in the fall or winter terms. The programme requirements are listed below.

1) A minimum of 15 full courses in total;
2) The normal “Group A and B” requirements of the Faculty of Arts;
3) A minimum of 7 full courses 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 course (120 level) in sociology, psychology and interdisciplinary social science. In the winter term which follows, the student must register in Soc Wk 120R, ISS 121R and Psych 121R (Soc 121R is optional but highly recommended). 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 courses must be distributed over at least 3 of the 4 core areas with a maximum of 3 courses 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 120 R/121 R</td>
<td>Soc Wk 120 R/121 R</td>
<td>Soc Wk 120 R/121 R</td>
<td>Psych 120 R/121 R</td>
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<td>ISS 221 R</td>
<td>220 R</td>
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<td>Psych 220 R</td>
</tr>
<tr>
<td>ISS 343 R</td>
<td>343 R</td>
<td>Soc Wk 327 R/328 R</td>
<td>Soc Wk 327 R/328 R</td>
</tr>
<tr>
<td>ISS 367 R/368 R</td>
<td></td>
<td></td>
<td>Soc Wk 367 R/368 R</td>
</tr>
</tbody>
</table>

**The Honours Programme**

The honours programme consists of eight academic terms in a period of four years. 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 "Group A and B" 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 120 R, Psychology 120 R, Sociology 120 R

**Winter:** Social Work 120 R, Psychology 121 R, ISS 121 R

The equivalent of two additional credits

**Year 2**

Interdisciplinary Social Science 250 R/251 R

At least two half courses from among:

Interdisciplinary Social Science 220 R, 221 R

Social Work 220 R, 221 R, 222 R

Sociology 220 R, 221 R, 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 320 R,

Social Work 326 R

At least two half courses from among:

Social Work 320 R, 321 R, 322 R

Sociology 325 R/326 R, 327 R/328 R

Psychology 322 R, 323 R

The equivalent of two credits from chosen theme area (see note 1)

The equivalent of 1.5 additional credits

**Year 4**

Interdisciplinary Social Science 469 R, 499 R

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 student's 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.
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 499R 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. 296, 331, 425 or 426)

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)

Year 3

- Sociology 321/322
- Two credits in sociology (or equivalent half credits)
- Two elective credits (or equivalent half credits)

Year 4

- Sociology 425/426
- Sociology 499
- One full or two half credits in Sociology
- Two elective 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.

Spanish (Department of Classics and Romance Languages)

Recommended Programmes

Year 1

- Spanish 191/192 or 193/194 (students with little or no Spanish will take Spanish 101/102 in the first year and Spanish 191/192 or 193/194, and 255/256 in thesecond 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 including 318. Two more credits
Arts
Departmental Programmes
Spanish

Year 4
A minimum of three full credits or equivalent in Spanish including 444 and 490.
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, 318, 444, 498. If the student intends to enter the teaching profession, 191/192, (or 193/194), 251/252, and 351/352 must be completed.

Note 2
To establish a Minor in a sister discipline, the student must complete five credits (fifteen hours) in that discipline. Students registering in Honours Spanish are strongly advised to minor in French.

Note 3
With the permission of the Division, the student may spend the third year enrolled in an acceptable university in Spain or in Mexico.

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 73) 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 100 or 200 level.

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, or 193/194 (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 including 318.

Year 4
Two full credits or equivalent in Spanish including 444 and 498.

Note 1
Before graduation, students in combined honours programmes must complete a minimum of eight full credits (or equivalent) in Spanish of which the following credits are obligatory: 255/256, 318, 444, 498.

Note 2
Those planning to enter the teaching profession are expected to complete 191/192, (or 193/194), 251/252, and 351/352.

Note 3
A total of 22 credits must be successfully completed before graduation.

Note 4
The degree requirements of the Faculty of Arts (see page 73) must be met for the B.A. degree.

Note 5
Students in Year 4 must have the permission of the Division to enrol in Spanish courses on the 100 or 200 level.
Faculty of Engineering

Mechanical Engineering students at work in laboratory session
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 provide 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 under 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

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.

Admission

All Year 1 students enrol in September. These Year 1 students spend the Fall term together at the University, after which they are divided into two groups. They also complete the last term of the programme and graduate together. Both groups, of course, have the same total time on campus and in industry, one group having a double academic term at the start of the programme and the other having a double academic term at the end of the programme. The division at the end of the first term of study is based upon student preferences, financial consideration of students, etc. Precise dates for the beginning and end of the various terms are shown in the academic calendar on page 5-8.

The programme in Systems Design is not divided into two groups. All students in this programme start with four months of school before going out on the first work term in the Winter.

The admission requirements and procedures for all programmes are outlined in Chapter 2 of this Calendar. The following emphasize some of the admission requirements which relate specifically to the Faculty of Engineering.

Applicants from Ontario Year 5

Applicants must present the following Mathematics courses—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
New regulations governing Examinations and Promotions were being developed at the deadline for submission of material for the 1978-1979 Calendar. If approved, they will be in effect starting Fall 1978 and will replace the regulations described here. If approved, the new regulations will be distributed to all engineering students during the first week of classes each term until the next Calendar is available.

The Faculty constitutes the examining body for all examinations and is responsible for all decisions on grades, promotions, failures, deferred examinations, appeals and the preparation or recommendations for the granting of degrees. Students are examined and marks are set for individual subjects on completion of the work for that subject. With few exceptions beyond first year, subjects are one term in length, and promotion decisions are made at the end of each term.

For the purposes of promotion the two terms of first year are considered as a unit and promotion decisions are made at the conclusion of the second term only. However, a first-year student's progress is reviewed at the end of the first term and the Engineering Faculty Council may recommend or require a student to withdraw if, in the opinion of the Council, the student is unlikely to benefit from further study.

The procedures through which promotion decisions are made are as follows:

1) At the end of each term examining faculty members submit marks to the Engineering Examinations and Promotions Committee which makes promotion decisions which may be reviewed by the Engineering Faculty Council. The decisions are reported to the students through the Registrar's Office. All recommendations to award degrees must be approved by senate.

2) Promotion decisions are made at the end of each term except the first term. The decision for each student is based on a weighted average computed from his marks in individual subjects following the weighing scheme for his department. For promotion a student must achieve an average of 60% or higher, except in special cases where, at the discretion of the Faculty, promotion may be granted with an average below 60%.

There is no “passing” or “failing” of individual subjects. Promotion is based on the weighted overall average and 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. There are no supplemental examinations except in the last term of the programme.

3) All promoted students will be shown as having obtained First, Second or Third Class Honours according to the following table:

<table>
<thead>
<tr>
<th>Average</th>
<th>Honours</th>
</tr>
</thead>
<tbody>
<tr>
<td>80.0 to 100%</td>
<td>First Class</td>
</tr>
<tr>
<td>70.0 to 79.9%</td>
<td>Second Class</td>
</tr>
<tr>
<td>60.0 to 69.9%</td>
<td>Third Class</td>
</tr>
</tbody>
</table>

The exception to this will be those special cases where a student has less than 60% but who has been given a “Promotion Granted” decision.

Students will be ranked in order of overall averages. A student's class standing will be shown on his report. Failing students will be given their failing average.

4) Students who are not promoted at the end of the first year will be required normally to repeat all of the second term, except that re-admission will be denied if, in the opinion of the faculty, a student is deemed unlikely to profit from further study.

5) Students who are not promoted at the end of the third or subsequent terms will normally be required to repeat all of the work of the term failed.

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.

Previous marks in exempted courses will not be included in the average of the repeated term.

6) Students who are not promoted at the end of any term are required to stay out 8 months before they can repeat their term.
A student may not repeat a given term more than once. The Examinations and Promotions Committee decisions “Failed, May Repeat” and “Promotion Granted” are to be considered equivalent in that the maximum number of such decisions a student may accumulate is two.

The Engineering Faculty Council will recommend or require a student to withdraw at any time if, in the opinion of the Council, the student is unlikely to profit from further participation in the co-operative programme.

A student who withdraws from the programme less than four weeks before the commencement of the final examination period in the programme, shall normally be deemed to have failed the year or term in which he was enrolled at the time of withdrawal. This does not apply to the 1A term.

Courses taken by students that are in addition to the degree requirements will not be included in a student’s average. Marks obtained in extra courses will be reported on a student’s transcript.

Courses taken by students during work terms will not be included in a student’s average for any term. The marks of 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.

In special cases other symbols may be substituted for marks and the following list summarizes these symbols and their meanings:

- **AEG** – Student was ill as per medical evidence.
- **CR** – Performance was Satisfactory, student is given a pass with no specific mark or grade assigned.
- **NCR** – Performance was Unsatisfactory.
- **INC** – Student obtained permission not to write because of illness or death in family, etc. The exam is Deferred to a later date.
  - The course and project cannot be completed until the next term thus mark is Postponed in meantime.
  - Course work is Incomplete.
- **NMR** – No mark reported.
- **DNW** – Student Did Not Write the exam and did not officially drop the course.

Students who feel that assigned grades or the promotion decision do not reflect a just evaluation of their achievement, or who have done poorly because of sickness or unavoidable absence, may appeal faculty decisions. All appeals should be addressed to the Chairman of the Engineering Examinations and Promotions Committee, Registrar’s Office, University of Waterloo. Reasons in support of the appeal must be provided. Doctor’s certificates and similar supporting documents where appropriate should be included with the student’s statement. It is to the student’s advantage to file his appeal as early as possible, preferably before the Examinations and Promotions Committee meets to discuss the grades affected. Appeals must normally be submitted no later than three weeks after the promotion decisions are mailed by the Registrar’s Office.

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's 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 356)
Mathematics 114 (see course description on page 356)
Ch E 102 (see course description on page 242)
Physics 11 (see course description on page 377)
Gen E 115 (see course description on page 294)

Term 1B
Mathematics 110b (see course description on page 356)
Gen E 114 (see course description on page 294)
Gen E 121 (see course description on page 294)
Gen E 122 (see course description on page 294)
One technical option from the following:
Civ E 116 (see course description on page 246)
E E 116 (see course description on page 275)
ME 116 (see course description on page 361)
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 242) in lieu of Gen E 115, and Ch E 101 in the 1B term.

Students enrolling in Systems Design should refer to page 123 for the Systems Design course listings.

Students in Chemical Engineering and Systems Design may transfer to Civil, Electrical or Mechanical Engineering (see booklet entitled Admissions Information '78 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 294.

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 of study, core courses
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)

ChE220  Applied Mathematics 1
ChE230  Physical Chemistry 1
ChE232  Inorganic Chemistry 1
Chem26   Organic Chemistry 1
Math210  Calculus 2 (For Chemical Engineers)
ChE211  Transport Processes 1 (Fluid Mechanics)
ChE231  Physical Chemistry 2
ChE233  Physical Chemistry Laboratory
Chem36   Organic Chemistry 2
Math216  Differential Equations
ChE312  Transport Processes 2 (Heat Transfer)
ChE320  Applied Mathematics 2
ChE330  Chemical Engineering Thermodynamics
ChE332  Inorganic Chemistry 2
ChE334  Instrumental Methods of Chemical Analysis
ChE313  Transport Processes 3 (Mass Transfer)
ChE315  Chemical Engineering Laboratory
ChE331  Chemical Reaction Engineering
ChE420  Process Dynamics and Control 1
ChE422  Engineering Economics
ChE482  Technical Seminar and Process Design
ChE280, General Awareness Seminar
ChE007   General Awareness Seminar

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></td>
</tr>
<tr>
<td>2B</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3B</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4A</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4B</td>
<td>4*</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

*must include one of ChE581 (counts as two courses), ChE583, ChE585.

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 1B term must satisfy the General Studies Programme requirements described on p. 111.

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 ChE583 and ChE585. 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
   - ChE510  Prediction of Physico-Chemical Properties
   - ChE515  Two-Phase Flow Operations
   - ChE517  Performance of Separation Processes

2) Mathematical Analysis and Control
   - ChE520  Chemical Engineering Analysis
   - ChE521  Process Dynamics and Control 2
   - ChE523  Process Control Laboratory

3) Polymer Science and Engineering
   - ChE540  Introduction to Polymer Science
   - ChE541  Physical Chemistry of Polymers
   - ChE543  Polymer Laboratory

4) Extractive and Process Metallurgy
   - ChE550  Introduction to Extractive Metallurgy
   - ChE551  Metallurgical Chemistry
   - ChE553  Principles of High Temperature Extractive Metallurgy

5) Biochemical and Food Engineering
   - ChE560  Introduction to Biochemical Engineering
   - ChE561  Fermentation Operations
   - ChE563  Food Processing

6) Pollution Control Engineering
   - ChE570  Air Pollution
   - ChE560  Introduction to Biochemical Engineering
   - ChE571  Water Pollution

7) Research/Design Option
   - ChE580  Research-Design Project 1
   - ChE581  Research-Design Project 2 (worth 2 courses)

Other Research and/or Design Projects
   - ChE583  Process Systems Design
   - ChE585  Technical Elective Project
A student may acquire a B.A.Sc. in Chemical Engineering with an option in Management Sciences by taking eight M Sci courses (see p. 118) as electives. Two of the courses in this option are to be replaced by two ChE courses; Ch E 220 is in lieu of MSci 23. The six other courses use 6 of the minimum 13 elective course choices (3 GS and 3 T).

**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.**

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**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.

f) **Hydraulic Engineering**—is intended for the student interested in the planning, design and operation of water supply and water resources management.

g) **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.
Material – 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: Hydraulics
- Civ E 381: Seminar
- 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 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.

†The offering of these courses is contingent upon sufficient demand and/or available teaching resources.

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 354, 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)††
- Civ 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)††
CivE 400, CivE 491, CivE 499; three electives chosen from CivE 404, CivE 405, CivE 415, CivE 430, CivE 442, CivE 444, CivE 454, CivE 473, CivE 480 or CivE 497; one elective in the Social Sciences and Humanities
† CivE 291 Survey Camp is taken at the commencement of the Fall Term, preceding either 2A or 2B
††For the 4A Spring ’78 and Fall ’78 terms only, CivE 453 is replaced by CivE 454 (as described in the 1977-78 University Calendar)
For the 4B Winter ’79 term only, CivE 454 is replaced by CivE 558 (as described in the 1977-78 University Calendar)

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 MSci courses (see p. 119) as electives. Note that MSci 21 and MSci 23 are equivalent to CivE 224 and CivE 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 twenty-four 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 are required to take one non-technical (General Studies) elective course in each of the 2B and 3A terms, and a free elective course in each of the last three terms. A free elective may be either technical or non-technical. During each term they also attend one general seminar course. The department uses a broad interpretation of what constitutes a “non-technical” course.

The normal recommended programme shown below involves a course load (excluding seminars) of five or six courses per term; however, students are allowed to depart from this normal load within the framework of the following rules and within the constraints of the timetable.

The technical programme will consist of a minimum of all twenty-four core courses and nine technical electives, normally chosen from the listing below (including the possibility of one or two final year project electives). Laboratory exercises are compulsory where they form part of the course.

The non-technical (General Studies) electives must be successfully completed; however, the mark is not included in the term average.

Note
† For students entering Year 1 in the Fall Term, 1977, all General Studies electives will be included in term averages. Free electives in the last three terms are included in the term average.

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 109).

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 109).

Note 1
Students may depart from this programme only within the framework of the rules given above.

Note 2
With the approval of the department in terms 4A and 4B, students may take technical courses offered by other departments.

Note 3
The laboratory hours shown are approximate indications of the average time the student will spend in the laboratory.
<table>
<thead>
<tr>
<th>Term 2A, Fall and Winter</th>
<th>Term 2B, Fall and Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course</strong></td>
<td><strong>Course</strong></td>
</tr>
<tr>
<td><strong>No.</strong></td>
<td><strong>No.</strong></td>
</tr>
<tr>
<td>EIE201 Seminar</td>
<td>EIE202 Seminar</td>
</tr>
<tr>
<td>EIE205 Advanced Calculus for Electrical Engineers (Math 211)</td>
<td>EIE206 Advanced Calculus for Electrical Engineers (Math 212)</td>
</tr>
<tr>
<td>EIE221 Principles of Digital Circuits &amp; Systems</td>
<td>EIE261 Energy Processing &amp; Conversion</td>
</tr>
<tr>
<td>EIE233 Physical Electronics</td>
<td>EIE271 Electric &amp; Magnetic Fields</td>
</tr>
<tr>
<td>EIE241 Electric Networks 1</td>
<td>EIE294 Instrumentation &amp; Measurement 2</td>
</tr>
<tr>
<td>EIE293 Instrumentation &amp; Measurement 1</td>
<td>MSci23 Engineering &amp; Managerial Economics</td>
</tr>
<tr>
<td>MSci23 Engineering &amp; Managerial Economics</td>
<td>Non-technical elective</td>
</tr>
<tr>
<td>Term 3A, Winter and Spring</td>
<td>Term 3B, Fall and Winter</td>
</tr>
<tr>
<td><strong>Course</strong></td>
<td><strong>Course</strong></td>
</tr>
<tr>
<td><strong>No.</strong></td>
<td><strong>No.</strong></td>
</tr>
<tr>
<td>EIE301 Seminar</td>
<td>EIE302 Seminar</td>
</tr>
<tr>
<td>EIE316 Probability &amp; Statistics</td>
<td>EIE317 Signal Analysis Methods</td>
</tr>
<tr>
<td>EIE317 Signal Analysis Methods</td>
<td>EIE342 Electric Networks 2</td>
</tr>
<tr>
<td>EIE342 Electric Networks 2</td>
<td>EIE351 Electronic Devices</td>
</tr>
<tr>
<td>EIE351 Electronic Devices</td>
<td>EIE362 Energy Conversion</td>
</tr>
<tr>
<td>EIE362 Energy Conversion</td>
<td>Non-technical elective</td>
</tr>
<tr>
<td>Term 4A, Fall and Spring</td>
<td>Term 4B, Winter</td>
</tr>
<tr>
<td><strong>Course</strong></td>
<td><strong>Course</strong></td>
</tr>
<tr>
<td><strong>No.</strong></td>
<td><strong>No.</strong></td>
</tr>
<tr>
<td>EIE401 Seminar</td>
<td>EIE402 Seminar</td>
</tr>
<tr>
<td>EIE407 General Electives</td>
<td>EIE407 General Electives</td>
</tr>
<tr>
<td>Five Technical Electives from the following:</td>
<td>Four technical electives from the following:</td>
</tr>
<tr>
<td>EIE418 Communication Systems</td>
<td>EIE407 Numerical Methods</td>
</tr>
<tr>
<td>EIE425 Systems Simulation</td>
<td>EIE419 Digital Communications</td>
</tr>
<tr>
<td>EIE427 Digital Hardware Engineering</td>
<td>EIE426 Software Engineering</td>
</tr>
<tr>
<td>EIE435 Semiconductor Devices 1</td>
<td>EIE434 Quantum Electronics and Magnetics</td>
</tr>
<tr>
<td>EIE446 Linear Systems</td>
<td>EIE435 Semiconductor Devices 2</td>
</tr>
<tr>
<td>EIE454 Nonlinear Electronic Circuits</td>
<td>EIE443 Electric Networks 3</td>
</tr>
<tr>
<td>EIE463 Power Electronics</td>
<td>EIE453 Linear Electronic Circuits</td>
</tr>
<tr>
<td>EIE474 Antenna &amp; Propagation Engineering</td>
<td>EIE459 Sound, Noise and Electroacoustics</td>
</tr>
<tr>
<td>EIE481 Control Systems 1</td>
<td>EIE464 High Voltage &amp; Insulation Engineering</td>
</tr>
<tr>
<td>EIE499A Project</td>
<td>EIE465 Power Systems</td>
</tr>
<tr>
<td>Service Courses</td>
<td>EIE473 Microwave Engineering</td>
</tr>
<tr>
<td>ME2A EIE14 Electrical Engineering 1</td>
<td>EIE482 Control Systems 2</td>
</tr>
<tr>
<td>ME3A EIE32 Electrical Engineering 2</td>
<td>EIE499B Project</td>
</tr>
<tr>
<td>* Indicates laboratory every second, every third week, or open lab. See Course Descriptions.</td>
<td></td>
</tr>
<tr>
<td>†The general elective can be any course that is not a repeat of course material.</td>
<td></td>
</tr>
</tbody>
</table>
Department of Management Sciences

Activities and Scope
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 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.

Undergraduate Programmes
At the present time the Department is involved in two major activities in undergraduate teaching: i) Option in Management Sciences; ii) Production/Industrial Engineering Option (jointly with the Department of Mechanical Engineering). Students completing courses in either of these options will be eligible for admission with advanced standing to the Department's M.A.Sc. programme.

Option in Management Sciences
The Department of Management Sciences offers an Option programme in Management Sciences for the following Departments.

Chemical Engineering
Civil Engineering
Electrical Engineering
Systems Design

The Option in Management Sciences is structured to provide an understanding of the issues, concepts and techniques related to managerial problems. 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.

The Option consists of eight courses (see course descriptions in Chapter 14), two in each of the following areas:

a) Probability and Statistics
MSci21 Probability and Statistics 1
(formerly Applied Probability and Statistics)
MSci31 Probability and Statistics 2
(formerly Industrial Statistics and Design of Experiments)

b) Economics
MSci23 Managerial and Engineering Economics 1
(formerly MS405)
MSci43 Managerial and Engineering Economics 2
(formerly Economics of Enterprise and Benefit Cost Analysis)

c) Operations Research
MSci46 Operations Research 1
(formerly MS406)
MSci47 Operations Research 2
(formerly MS407)

d) Decision Analysis and Organizational Behavior
MSci44 Organizational Behaviour 1
(formerly MS404)
MSci53 Organizational Behaviour 2
(formerly Decision Theory & Organization).

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.

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.

In order to facilitate the taking of all eight courses in the Option the student should start in 2A and proceed according to the following schedule:

*Prerequisites are listed under course descriptions in Chapter 14.
## Option in Management Science

<table>
<thead>
<tr>
<th></th>
<th>2A Fall</th>
<th>2A Winter</th>
<th>2B Fall</th>
<th>2B Winter</th>
<th>3A Fall</th>
<th>3A Winter</th>
<th>3B Fall</th>
<th>3B Winter</th>
<th>4A Fall</th>
<th>4A Winter</th>
<th>4B Fall</th>
<th>4B Winter</th>
</tr>
</thead>
</table>

†Part of Production/Industrial Engineering option

*Equivalent with M Sci 21

#Equivalent with M Sci 23
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 a variety of industries throughout Canada. Mechanical Engineers are required in the field of power generation where they could deal with steam, diesel or other internal combustion engines, and with hydraulic or gas turbines; in the field of heating, ventilating and refrigeration; in the design and manufacture of environmental research equipment, safety equipment, material handling equipment, automobiles, locomotives, aircraft, rockets, marine vessels, furnaces, boilers, pressure vessels, heat exchangers, motors, generators and machine tools. They are employed in industries such as steel production, mining, transportation, communications, oil refining, chemicals manufacture, paper, sugar, textiles, the government, and construction. In the last few years additional demands have been imposed by the requirement that Mechanical Engineers understand and lead in the development of new methods of energy conversion and other technologies of the space age. The undergraduate programme in Mechanical Engineering is designed to provide the student with a firm grasp of the basic fundamentals in the mathematical, physical, chemical and engineering sciences, and also provides an opportunity (on a limited scale) for specialization in the later years. The degree of B.A.Sc. in Mechanical Engineering permits registration as a Professional Engineer in the Association of Professional Engineers of the Province of Ontario upon satisfaction of the work experience requirement and carries exemption from parts 1 and 2 of the Institution of Mechanical Engineers (London) Examination.

Organization of the Mechanical Engineering undergraduate programme is founded on a core of subjects that must be taken by all students. The first year is common with Civil and Electrical Engineering. The second year provides elementary courses in Mechanical Engineering and certain subjects in Electrical Engineering together with further development in mathematics and physics. Opportunities for specialization occur during the third and fourth years. There being a choice of elective subjects available to permit pursuit of individual interests. A coherent set of electives in a particular technical area is termed an Option. Examples of such Options are the following:

a) The Thermodynamics-Fluid Mechanics 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. Students can structure curricula for specialization in combustion and energy conversion, internal flows with heat and mass transfer, turbomachinery and fluid control systems or for a broader exposure to these and other areas.

b) Solid Body Mechanics and Mechanical Design Option:
The courses offered in this option range from those which provide the mathematical and physical basis of the subject matter through to those which are largely applied. Subjects treated are: mechanics (including vibrations); theories of elasticity, plasticity and fracture; choice of working stress, mechanical design and design optimization. Students taking this option will be prepared for careers in design and development.

c) Production/Industrial Option:
Is designed to provide the student with an understanding of industry from the viewpoint of its organization, its processes, economics and the application of mathematics to its operation. It is suggested for those students primarily interested in industrial and manufacturing aspects of mechanical engineering.

d) Engineering Materials Option:
Comprehensive series of courses in Physical Metallurgy, Ceramics, Industrial Polymers and Composite Materials offers the necessary versatility for work in Industry and Research.

e) Geophysical (Environmental) Fluid Dynamics Option:
For students interested in the control of air and water pollution and noise abatement, or who wish to embark later on a research career in meteorology, oceanography, ocean engineering, weather modification, pollution problems or related fields.

f) General Mechanical Engineering Option:
The General Mechanical Engineering Option is designed to give the student a general background rather than specialize in any particular option. The course material has been carefully chosen to equip the student for a broad range of Mechanical Engineering practice.

A) Core Programme
a) Credit courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIE14</td>
<td>Electrical Engineering 1</td>
</tr>
<tr>
<td>EIE32</td>
<td>Electrical Engineering 2</td>
</tr>
<tr>
<td>ME1</td>
<td>Advanced Calculus</td>
</tr>
<tr>
<td>ME3</td>
<td>Ordinary Differential Equations</td>
</tr>
<tr>
<td>ME4</td>
<td>Numerical Analysis</td>
</tr>
<tr>
<td>ME5</td>
<td>Partial Differential Equations</td>
</tr>
<tr>
<td>ME12</td>
<td>Dynamics</td>
</tr>
<tr>
<td>ME15</td>
<td>Structure and Properties of Matter 1</td>
</tr>
<tr>
<td>ME19</td>
<td>Mechanics of Deformable Solids 1</td>
</tr>
<tr>
<td>ME20</td>
<td>Mechanics of Deformable Solids 2</td>
</tr>
</tbody>
</table>
M E21 Kinematics and Dynamics of Machines
M E30 Structure and Properties of Matter 2
M E40 Manufacturing Processes
M E44 Production Engineering
M F50 Thermodynamics
M E51 Fluid Mechanics 1
M E53 Heat Transfer 1
M E60 Introduction to Control Systems
M E62 Fluid Mechanics 2
M E82 Mechanical Engineering Projects
M E560 Instrumentation
M ScI21 Probability and Statistics 1
M ScI23 Managerial and Engineering Economics 1
M E200 Introduction to Mechanical Engineering 1
M E300 Introduction to Mechanical Engineering 2
M E400 Introduction to Mechanical Engineering 3

B Elective Courses

a) General Studies Electives: Students entering the programme will take three General Studies electives. The marks obtained in these courses will be included in the calculation of term averages.

b) Technical Electives. Nine elective courses are required in addition to the core courses listed above to fulfill the requirements of the Mechanical Engineering programme. Also each student will complete a two-term Mechanical Engineering Project (M E82). Electives should be chosen largely from a single option and the choice must be approved by a designated faculty member. The offering of certain elective courses will be contingent on demand and/or availability of teaching resources.

a) Thermodynamics – Fluid Mechanics Option
M E52 Air Conditioning
M E64 Thermodynamics 2
M E56 Heat Transfer 2
M E58 Internal Combustion Engines
M E59 Energy Conversion
M E555 Thermodynamics 3
M E557 Combustion 1
M F561 Fluid Control Systems
M E563 Turbomachines
M E565 Gas Dynamics 1
M E566 Fluid Mechanics 3
M E568 Noise Analysis and Control
M E569 Fluid Mechanics-Design Topics

b) Solid Body Mechanics and Mechanical Design Option
M E22 Mechanical Design 1
M E63 Tribology (Friction, Lubrication and Wear)
M E523 Mechanical Design
M E525 Mechanical Vibrations
M E527 Mechanics of Deformable Solids 3
M E528 Experimental Mechanics
M E562 Introduction to Automation
M E626 Fatigue and Brittle Fracture
Sy De 543 Human Factors Engineering
Sy De 544 Ergonomics

c) Production/Industrial Option
M E46 Polymer Processing
M E48 Analysis and Design of Manufacturing Systems 2
M E63 Tribology (Friction, Lubrication and Wear)
M E541 Deformation Processes
M E542 Mechanics of Matching Processes
M E543 Metal Casting Processes
M E544 Welding Processes
M E548 Numerical Control of Machine Tools 1
M ScI31 Probability and Statistics 2
M ScI43 Managerial Economics 2
M ScI44 Organizational Behaviour 1
M ScI46 Operations Research 1
M ScI47 Operations Research 2
M E22 Mechanical Design 1
M E35 Industrial Metallurgy
M E534 Properties of Polymers
M E562 Introduction to Automation

d) Engineering Materials Option
M E32 Physical Metallurgy 2
M E33 Experimental Materials Science
M E35 Industrial Metallurgy
M E531 Physical Metallurgy 1
M E534 Nonmetallic Materials

Suggested electives from other options and departments
M E22 Mechanical Design 1
M E541 Deformation Processes
M E543 Metal Casting Processes
M E527 Mechanics of Deformable Solids 3
M E544 Welding Processes
Civ E560 Mechanical Behaviour of Materials

3) Geophysical (Environmental) Fluid Dynamics Options
M E69 Introduction to the Environment Studies
M E566 Fluid Mechanics 3
M E568 Noise Analysis and Control
M E570 Geophysical Fluid Dynamics 1
M E571 Air Pollution 1

Graduate courses in this field may also be available to selected undergraduate students.

f) General Mechanical Engineering Option Programme should include all of the following courses:
M E22 Mechanical Design 1
M E35 Industrial Metallurgy
M E541 Deformation Processes
M E54 Thermodynamics 2
M E63 Tribology (Friction, Lubrication and Wear)
M E528 Experimental Mechanics
M E563 Turbomachines
**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 B. L. Wills  
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**
¹B.A.Sc. Bachelor of Applied Science  
²M.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.)
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)
- SyDe101 Tutorial
- SyDe111 Calculus 1
- SyDe113 Linear Algebra
- SyDe121 Digital Computation
- SyDe131 Engineering Economics
- SyDe161 Systems Behaviour
- SyDe181 Statics
- SyDe183 Graphics and Design

1B (Spring Term)
- SyDe102 Tutorial
- SyDe112 Calculus 2
- SyDe114 Theory and Application of Probability
- SyDe142 Introduction to Ergonomics
- SyDe162 Systems Design Methodology
- SyDe182 Dynamics
- SyDe184 Electricity and Magnetism

2A (Winter Term)
- SyDe201 Tutorial
- SyDe211 Applicable Mathematics for Systems Design 1
- SyDe213 Theory and Applications of Statistics
- SyDe221 Numerical Analysis and Computation
- SyDe261 Systems Design Workshop 1
- SyDe281 Mechanics of Deformable Solids
- 1 General Studies Programme elective

2B (Fall Term)
- SyDe202 Tutorial
- SyDe212 Applicable Mathematics for Systems Design 2
- SyDe252 Physical Systems 1
- SyDe262 Systems Design Workshop 2
- SyDe282 Thermodynamics
- SyDe284 Fluid Mechanics
- SyDe292 Systems Design Laboratory 2
- 1 General Studies Programme elective

3A (Spring Term)
- SyDe301 Tutorial
- SyDe311 Systems Operations 1
- SyDe361 Systems Design Workshop 3
- SyDe381 Materials Engineering
- SyDe383 Introduction to Biochemical and Polymer Systems
- SyDe391 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

3A
 6 mandatory courses
 1 technical elective course
 1 free elective course

3B
 5 mandatory courses
 1 technical elective course
 1 free elective course

4B
 3 mandatory courses
 3 technical elective courses
 1 General Studies Programme elective

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,
bioengineering, 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

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.
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:

### Academic Term

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>F</td>
</tr>
<tr>
<td>1B</td>
<td>S</td>
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<tr>
<td>2A</td>
<td>W</td>
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<tr>
<td>2B</td>
<td>F</td>
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<tr>
<td>3A</td>
<td>S</td>
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<tr>
<td>3B</td>
<td>W</td>
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</tbody>
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### Option in Management Sciences

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>4A</td>
<td>F</td>
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<tr>
<td>4B</td>
<td>W</td>
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</table>

**Academic Term**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>SyDe</td>
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<tr>
<td>MSci43</td>
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<tr>
<td>MSci44</td>
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<tr>
<td>MSci53</td>
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</tbody>
</table>

**Option in Management Sciences**

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>Experimental Design Management &amp; Engineering Economics 2</td>
</tr>
<tr>
<td>1 other technical elective</td>
</tr>
<tr>
<td>Systems Operations 2</td>
</tr>
<tr>
<td>Organizational Behaviour 1</td>
</tr>
<tr>
<td>1 other technical elective</td>
</tr>
<tr>
<td>Organizational Behaviour 2</td>
</tr>
<tr>
<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.
Faculty of Environmental Studies

Co-op student edits films in audio-visual lab
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.

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 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 including all courses passed and failed 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.

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) Appeals against faculty decisions made under these regulations may be made in writing to the Undergraduate Affairs Committee of the Faculty through the appropriate Undergraduate Affairs Officer. Forms of examination are at the discretion of the individual faculty member. Where final written examinations are required they are held in December, April, or August. Oral examinations may be required at the discretion of individual departments. The normal duration for written examinations is three hours.

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-. 

Environmental Studies
Examinations and Standing
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 no 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 no 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) A student who has been required to withdraw for academic reasons may be eligible to apply for re-admission after one year's absence.

3) Additional Regulations, School of Architecture

Examinations and Promotions

To pass from one term to the next in the B.E.S. and B.Arch. programmes it is necessary for the student to:

a) obtain an average of (65.0) at the end of first year, (70.0) average for each term from 2A through to 3B, and an average of (60.0) for each term from 4A through to 5B.

b) pass the studio course. If any studio course (Arch 192, 193, 292, 293, 392, 492, 493, 592, 593) is failed, the student may not proceed to the studio course of the next term, until the studio course is passed.

c) fail not more than two half courses in any single term; a minimum passing grade in any course is D-.

Normally students of the School are permitted to take only one more or one fewer half-courses (academic weight 0.50) 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

Appeals against School decisions concerning grades and promotions made under these regulations may be submitted in writing to the Chairperson of the Appeals Committee of the School. The Appeals Committee sits once each term, and the student is advised to contact the School as soon as possible to determine the next sitting of the Appeals Committee.

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 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) After these periods, students will be allowed to add 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 EnvSt200, should study their scheduling carefully to ensure that the courses can be fitted, at some time, into their undergraduate programme.

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
EnvSt200 Ecology
Geog/ Plan357 Conservation and Resource Management
Arch385 Resources & Design
Biol130 Biosphere (non lab)

Biol131 Biosphere (lab)
Biol236 Biosphere Natural
EnvSt417 Land Use History and Landscape Change 1
EnvSt418 Land Use History and Landscape Change 2

Physical
Geog102 Physical Geography
Geog201 Physical Geography
Geog300 Geomorphology of Southern Ontario
Geog301 Climatology
Geog302 Geomorphology
Geog303 Water
M Env356 Canadian Non-Renewable Resources
Geog408 Hazards
Geog460 Land Dereliction
Earth130 Lithosphere-products and processes
Earth438 Lithosphere-geology and engineering

Human
(Economic, Social, Policy)
M Env357 Resource Use
M Env331 International Environment
Geog356 Resource Management
Geog410 Recreation
Geog411 Investment & Resources
M Env445 Technology and Policy
Geog413 Behavioural
Geog414 Resource Management
M Env410 Environmental Assessment
EnvSt417 Land Use History and Landscape Change 1
EnvSt418 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.

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
Architecture, traditionally, is the art, science and technique of modifying the physical environment to satisfy the needs and aspirations of people. The School, therefore, endeavours to engender in the student of architecture an awareness of the need to understand the diverse, dynamic and, often, contradictory demands of a society and its individuals.

Equally stressed, is the need to comprehend the implications of those demands in relation to the existing environment. That is, the School also endeavours to foster in the students of architecture an acceptance of responsibility for the influence of their action upon the environment they modify and the realization that, in so doing, students require consultation and collaboration with others of a variety of disciplines involved in the study of human ecology.

The intention of the programme of study is to impart to the student of architecture an understanding of a process of responsible environmental modification for man's use and to enable the student, as an architect, to contribute to that process. This requires a broad base for architectural studies and promotes an interdisciplinary approach to studies in the University and especially, within the Faculty of Environmental Studies. The full, 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 School of Architecture offers two undergraduate programmes: a pre-professional, three-year Bachelor of Environmental Studies programme and 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.). This degree indicates appropriate preparation for four subsequent academic terms of study and two co-operative work terms*, one of four months and one of eight months, 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 pre-professional 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 a historical process. The programme helps the student to predict the effect of science, technology and man's creations on the environment, and to understand that continuing studies will help the future architect to become sensitive to the needs of mankind in a never-ending cycle of change. The programme is founded on four broad study themes:

1) the design studio, theories and methods, and a workshop for application and experimentation of theories

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 134. See Chapter 14 for course descriptions.
Bachelor of Architecture Programme
The purpose of the Bachelor of Architecture programme is to permit a student who has successfully completed the Environmental Studies (Pre-professional Architecture) degree or equivalent to pursue, in parallel with a prescribed design studio programme, courses of study selected by the student and appropriate to his/her capabilities and interests. The final two terms of the programme are normally devoted to the undertaking of a studio project problem selected and programmed by the student. Students' presence is required at studio courses.

Note
Students are expected to defray costs of materials in connection with studio projects.

See Recommended Core Programme for course arrangement, page 135. 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 eight months each.

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.
# Programme for the Degree of Bachelor of Environmental Studies

(Pre-Professional Architecture)

<table>
<thead>
<tr>
<th>Year/Term</th>
<th>Systems and Measures Theme Area</th>
<th>Ecology Theme Area</th>
<th>Culture Theme Area</th>
<th>Design Theme Area</th>
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<tbody>
<tr>
<td>1-A</td>
<td></td>
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<tr>
<td>Fall</td>
<td>Arch 102 Math 101</td>
<td>Env St 195A</td>
<td>Arch 142 Iconography 1</td>
<td>Arch 192 Design Fundamentals (1 credit)</td>
</tr>
<tr>
<td>Sept-Dec</td>
<td>CS 119 (Arc)</td>
<td>Introduction to Environmental Studies</td>
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<td>1B</td>
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<tr>
<td>Winter</td>
<td>Arch 103 Statistics</td>
<td>Arch 143 Iconography 2</td>
<td>Arch 193 Design Fundamentals and Studio (11/2 credits)</td>
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<tr>
<td>Jan-Apr</td>
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<tr>
<td>Off-Term</td>
<td>Arch 163 Statistics</td>
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<td>Spring</td>
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<tr>
<td>May-Aug</td>
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<tr>
<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>
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<td>2-A</td>
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<tr>
<td>Fall</td>
<td>Arch 212* Computer Science</td>
<td>Env St 200**</td>
<td>Arch 246 Foundations of Europe</td>
<td>Arch 292 Design Concepts and Studio (11/2 credits)</td>
</tr>
<tr>
<td>Sept-Dec</td>
<td>Simulation or FE</td>
<td>Ecology and the Ecosystem or TE</td>
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<tr>
<td>2-B</td>
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<tr>
<td>Spring</td>
<td>Arch 213* Computer Generated Design or FE</td>
<td>Arch 223** Human Ecology or TE</td>
<td>Arch 247 Renaissance to Revolution</td>
<td>Arch 293 Design Concepts and Studio 11/2 credits</td>
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<td>May-Aug</td>
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<tr>
<td></td>
<td>Arch 263 Theory of Structures 1</td>
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<tr>
<td>Co-op Work Term 1</td>
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<tr>
<td>Winter</td>
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<tr>
<td>Jan-Apr</td>
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<tr>
<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>
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<td>3-A</td>
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<tr>
<td>Winter</td>
<td>Arch 372 Mechanical Systems 1</td>
<td>F.E.*</td>
<td>Arch 346* Romanticism and 20th Century or FE</td>
<td>Arch 392 Design Concepts and Studio (2 credits)</td>
</tr>
<tr>
<td>Jan-Apr</td>
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<tr>
<td>Co-op Work Term 3</td>
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<tr>
<td>Spring</td>
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<td>May-Aug</td>
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<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>
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<td>3-B</td>
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<tr>
<td>Fall</td>
<td>Arch 303* Economics or FE</td>
<td></td>
<td>Arch 393 Design Concepts and Studio (2 credits)</td>
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<tr>
<td>Sept-Dec</td>
<td>Arch 313* Computer Generated Design or FE</td>
<td>Arch 363 Theory of Structures 2</td>
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</table>
Programme for the Degree of Bachelor of Architecture

<table>
<thead>
<tr>
<th>Year/Term</th>
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<tr>
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<td>Theme Area</td>
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<tr>
<td><strong>Co-op Work Terms</strong></td>
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<tr>
<td>4 &amp; 5 Winter and Spring</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 co-op terms.</td>
<td>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>
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<tr>
<td>4-A Fall Sept-Dec</td>
<td>Arch 452 Specifications</td>
<td>Arch 492 Design Studio (2 credits)</td>
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<td>Arch 462 Structural Synthesis 1</td>
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<td>Arch 472 Mechanical Systems 2</td>
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<tr>
<td>4-B Winter Jan-Apr</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>
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<td>Arch 463 Structural Synthesis 2</td>
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<tr>
<td><strong>Co-op Work Terms</strong></td>
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<tr>
<td>6 &amp; 7 Spring and Fall</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>
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<tr>
<td>5-A Winter Jan-Apr</td>
<td>Arch 554* Development and Financing or FE</td>
<td>Arch 592 Design Studio (3 credits)</td>
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<tr>
<td>5-B Spring May-Aug</td>
<td>Arch 555 Architectural Practice</td>
<td>Arch 593 Design Studio (3 credits)</td>
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</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.
## Class Terms Chart

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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 (B.E.S.) 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. 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 provides 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 programme 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, it permits a student to specialize in one of four major aspects of the discipline: applied physical, economic-urban, resources or cultural-regional geography. Advanced elective courses are available in each of these four streams, and further concentration is possible by careful selection of courses from related fields in other parts of the University.

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 all 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 work terms required for a Co-operative degree is normally four. 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 Arts will receive a B.A. (Bachelor of Arts) degree and those in the Faculty of Environmental Studies will receive a B.E.S. (Bachelor of Environmental Studies) 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
(Honours Geography Programme)

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 Arts (B.A.) and the Faculty of Environmental Studies (B.E.S.). Joint honours programmes with most subjects in the University may be arranged subject to approval. Some examples of such programmes may be seen under the Faculty of Arts programme section earlier in the calendar.

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. 288) will be included with geography courses in the calculation of their major average and will be counted in the determination of minimum and maximum courses in the geography programme. (See Honours programme, note 2, General programme, note 2).

Honours Geography

Year 1
Geog 102 Introduction to Physical Geography

and one but no more than three of:

- Geog 101 Introduction to Human Geography
- Env St 195 Introduction to Environmental Problems
- Geog 110 Tutorial in Geography
- Geog 125R Introduction to the Third World
- Geog 126R Development in the Third World
- Geog 127 Regional Problems of Europe

Additional credits should be chosen so that the student has 6 full course credits.

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
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

Note that it is not necessary for all three techniques courses to be taken during the second year.

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

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

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

and one of:

- Geog 316 Multivariate Statistics
- Geog 317 Nonparametric Statistics
- Geog 318 Spatial Analysis

Two course credits of geography electives
Two course credits chosen after consultation with the Department

Year 4
Geog 490 Senior Honours Research Essay

and additional course credits so that a student should have a minimum of 21 full credits of which at least 5 should be outside the Faculty of Environmental Studies.

Note 1
While twenty-one full course credits is the minimum required for the degree of Bachelor of Environmental Studies (Honours Geography) students may take an enriched programme of up to twenty-four course credits maximum.

Note 2
The minimum and maximum number of full course credits in Geography courses in the programme are nine and thirteen of which seven must be designated as Geography courses. If a student takes an enriched programme the additional electives may all be in Geography.

Note 3
Students must take a minimum of five full course 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. 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
It is recommended that all honours students specialize at third and fourth year levels. The Department offers specialized streams in (a) Applied Physical Geography (b) Economic Geography (industrial resources, rural, and urban aspects) (c) Comparative Regional Themes (d) Resources Management. Additional courses in areas of specialization can be obtained from other disciplines in the University.
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.

Students intending to teach in Secondary Schools are advised to take at least two course credits (or equivalent) of Regional Geography.

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.

All Geography students 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. This note does not apply to the Co-op Geography students who will gain employment experiences as part of their degree requirements.

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. 296).

No more than 1 1/2 reading courses may be taken in Geography.

Year 1
Fall Term Core Courses
Geog 102 Intro. to Physical Geography
Geog 110 Tutorial in Geography
Geog 280 Intro. to Cartography & Map Analysis
Math 105 Math for Environmental Studies (If no Year 5 Math)

Theme Courses
one course in one of the following areas – Business, Economics, Languages, Earth Sciences, Biology

Electives
one course if Year 5 Math not obtained, otherwise two courses

Winter Term Core Courses
Geog 201 Some Basic Topics of Physical Geography
Geog 202 Basic Topics of Economic & Urban Geography
Plan 156 Intro. to Urban & Regional Planning Concepts

Theme Courses
one course in one of the following areas – Business, Economics, Languages, Earth Sciences, Biology

Electives
two courses

Year 2
Fall Term 2A Core Courses
Geog 275 Intro. to Air Photo Analysis & Remote Sensing
EnvSt 200 Field Ecology
EnvSt 271 Intro. to Quantitative Research Methods
Eng 120 Report Writing

Theme Courses
none

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
one course

Fall Term
Work Term 2

Year 3
Winter Term 3A Core Courses
Geog 381 The Nature of Geography
EnvSt 272 Computer Programming in Environmental Studies
Environmental Studies
Geography

Theme Courses
three courses of which two courses must be in the continuing theme.

Electives
none

Spring Term
Work Term 3

Fall Term 3B Core Course
Geog 391 Field Research or equivalent
Geog 390 Senior Honours Essay Research Proposal

Theme Courses
same as Winter Term 3A

Electives
none

Year 4
Winter Term
Work Term 4

Spring Term 4A Core Course
Geog 490 Senior Honours Research Essay

Theme Courses
at least two courses of which a maximum of one course is in the continuing theme

Electives
two courses

Fall Term
Work Term 5

Winter Term 4B Core Course
Geog 490 Senior Honours Research Essay

Theme Courses
same as 4A

Electives
same as 4A

Note
1) All courses are term courses except Geog 490 and Geog 220.
2) Effective in the Fall term 1977 all students in the Honours Geography Programmes will be required to take one of the following courses to complete the geography requirements for graduation:

Geog 316 Multivariate Analysis
Geog 317 Nonparametric Statistics
Geog 318 Spatial Analysis

3) To satisfy Departmental requirements for graduation in the Honours Geography Programmes, a student must have a minimum of nine full courses designated as Geography (Geog) and/or Environmental Studies (Env St) courses. A minimum of seven full courses must be in courses designated as Geography courses.

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, Earth Sciences, Economics, English, French, German, History, Man-Environment Studied, Mathematics, Political Science, Recreation and Russian. The programme "Geography with Biology" is not a Joint Honours Programme. 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:

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<th>B.E.S. or B.A.</th>
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<td>Environment Studies,</td>
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<td>Mathematics, Political Science, Recreation, Russian</td>
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<th>B.E.S. or B.Sc.</th>
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The Department of Geography is prepared to work out other programmes for keenly interested students who meet Honours standards.

Students enrolled in these programmes are required to obtain at least seven course credits in Geography with the exception that five are required in the joint programme with Earth Sciences; those intending to qualify for Type "A" certificate for teaching secondary school require a minimum of nine course credits in Geography, unless they intend offering 2 specialized fields, in which case, 14 credits in these 2 fields are required of which there must be a minimum of 6 in each field.

Geography course requirements in joint programmes are otherwise identical with those of the Geography Honours 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; students should obtain clarification from the Undergraduate Officers of the respective departments before registration.

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 5 credits.

General Geography Programme

Year 1
Geog 102 Introduction to Physical Geography
and one of, but not more than three of:
   Geog 101 Introduction to Human Geography
   Env St 195 Introduction to Environmental Problems
   A or B
   Geog 110 Tutorial in Geography
   Geog 125R Introduction to the Third World
   Geog 126R Development in the Third World
   Geog 127 Regional Problems of Europe
Four course credits selected in consultation with the Department.

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
one of:
   Geog 203 Some Basic Topics of Cultural and Regional Geography
   Geog 204 Soviet Geography
   Geog 205 Africa
   Geog 220 World Regional Geography
and additional credits so that a student should have completed by the end of the second year 10 full course credits.

Year 3
Geog 361 The Nature of Geography
One and one-half courses of Geography electives
Three courses selected in consultation with the Department.

Note 1
Fifteen course credits is the minimum requirement for the degree of Bachelor of Environmental Studies (General Geography). However, an enriched programme of up to eighteen course credits may be arranged.

Note 2
A minimum of five course credits in Geography and Environmental Studies, of which four must be designated as Geography courses constitutes a Geography Major but up to eight geography course credits may be taken in this programme. Students taking an enriched programme may choose additional geography electives.

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 an average of C (65.0) in their Geography/Environmental Studies courses.
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 inter-relationships, 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 B.E.S. degree in Man-Environment Studies have found employment in a range of government agencies in fields such as natural resource 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 24 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 B.E.S. 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 1**

- **Env St 195A** Introduction to Environmental Studies
- **M Env 130 (Y)** Environmental Issues and the Social Sciences
- **M Env 150 (Y)** Environmental Issues: Methods and Techniques
- **M Env 190 (Y)** Seminar-Workshops
- Electives: Two and a half full credits: five half-year courses or equivalent

**Year 2**

- **Env St 200** Field Ecology
- **M Env 241** Social Change, or one other half-year course in social sciences
- **Env St 271** Introduction to Quantitative Research Methods, or one other introductory methods course approved by the Department (see Undergraduate Officer)
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>Plan 100 - Introduction to Urban Planning Concepts and Techniques</td>
<td>One-half credit from each of the eight categories in the list of Year 1 Required Elective Courses (see below)</td>
<td>Plan 159 - Graphics for Planning</td>
<td>Students may select other electives from any of the University Year 1 offerings - Required and Elective Courses together must total 6 credits</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
- Biol 131 Introduction to Biology
- Earth 101/112 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 105F Anthropology Through Science Fiction
- Arch 142 Iconography 1
- Arch 194 Visual Interdisciplinary Language
- Engl 108B Utopia and Anti-Utopia
- Fine 120 Fundamentals of Visual Art
- Plan 159 Graphics for Planning

4 Habitat
- Anth 105A 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
- 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
- Gen E 120 Engineering Synthesis
- Engl 150/151 English as an Instrument of Thought
- Math 105 Math for Environmental Studies
- Phil 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 101R Western Civilization
- Hist 105 The Meaning of Civilization
- Phil 125 Fundamentals of Social and Political Philosophy
- Phil 140 Fundamentals of Logic
- Phil 150 Knowledge and Reality
### Environmental Studies
#### Urban and Regional Planning

<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> (Prerequisite: Env St 271)</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 &quot;Non-Planning Suggested Electives&quot; obtainable from Undergraduate Officer</td>
</tr>
<tr>
<td>and at least 2 of:&lt;br&gt;<strong>Plan 255 - Planning Surveys and Analysis</strong>&lt;br&gt;<strong>Plan 356 - Regional Planning and Development</strong>&lt;br&gt;<strong>Plan 357 - Conservation and Resource Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 3</td>
<td><strong>Plan 300 - Seminar/Workshop Project in Urban and Regional Planning</strong>&lt;br&gt;<strong>Plan 307 - Social Survey Techniques</strong>&lt;br&gt;<strong>Plan 391 - Field Research Methods and Projects</strong></td>
<td>Two full credits from list of Required Elective Courses (see following page)</td>
<td><strong>Geog 352 - Rural Urban Fringe of Canadian Cities</strong>&lt;br&gt;<strong>Plan 301 - Planning Design</strong>&lt;br&gt;<strong>Plan 316 - Multivariate Statistics</strong>&lt;br&gt;<strong>Plan 317 - Nonparametric Statistics</strong>&lt;br&gt;<strong>Plan 318 - Spatial Analysis</strong>&lt;br&gt;<strong>Plan 319 - Regional Planning Techniques</strong>&lt;br&gt;<strong>Plan 330 - Urban Social Planning</strong>&lt;br&gt;<strong>Plan 332 - The Sociology of Regions</strong>&lt;br&gt;<strong>Plan 333 - The Sociology of Regional Planning</strong>&lt;br&gt;<strong>Plan 344 - Principles of Recreation Planning</strong>&lt;br&gt;<strong>Plan 360 - Technology in Urban and Regional Planning</strong>&lt;br&gt;<strong>Plan 370 - Land Development Planning</strong></td>
<td>Required and Elective Courses together to total 6 full credits&lt;br&gt;List of &quot;Non-Planning Suggested Electives&quot; obtainable from Undergraduate Officer</td>
</tr>
<tr>
<td>Year 4</td>
<td><strong>Plan 456 - Political and Administrative Processes in Urban and Regional Planning</strong>&lt;br&gt;<strong>Plan 480 - The Philosophy and Methodology of Urban and Regional Planning</strong>&lt;br&gt;<strong>Plan 490 - Senior Honours Essay</strong> (2 full course credits)</td>
<td>One full credit from list of Required Elective Courses (see following page)</td>
<td><strong>Env St 401 - Environmental Law</strong>&lt;br&gt;<strong>Env St 402 - Planning Law</strong>&lt;br&gt;<strong>Plan 414 - Housing Policies</strong>&lt;br&gt;<strong>Plan 430 - Social Policy Planning</strong>&lt;br&gt;<strong>Plan 431 - Citizen Involvement, Social Action Strategies, and Social Change</strong>&lt;br&gt;<strong>Plan 470 - Concepts and Ideas in Contemporary Urban Planning</strong>&lt;br&gt;<strong>Plan 475 - Projects, Problems and Readings in Planning</strong></td>
<td>Required and Elective Courses together to total 6 full credits&lt;br&gt;List of &quot;Non-Planning Suggested Electives&quot; obtainable from Undergraduate Officer</td>
</tr>
</tbody>
</table>
### Year 2-4 Required Elective Courses

<table>
<thead>
<tr>
<th>Urban Theme</th>
<th>Regional Theme</th>
<th>Resource Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>These courses are subject to availability</td>
<td>These courses are subject to availability</td>
<td>These courses are subject to availability</td>
</tr>
</tbody>
</table>

#### Year 2

- Plan 230 The Small Group in the Planning Process
- EnvSt 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 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
- CivE 342 Urban Transport Planning 1
- CivE 393 Environmental Engineering
- Econ 343 Urban Economics
- Geog 350 Regional Urban Systems 1
- PSci 343 Urban Politics 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
- EnvSt 400 Environmental Law
- Geog 450 Regional Urban Systems
- Arch 554 Development and Financing
- CivE 543 Land Use Models

- Plan 430 Social Policy Planning
- EnvSt 401 Environmental Law
- EnvSt 402 Planning Law
- Geog 412 Industrial Geography
- Geog 422 Canada
- Geog 450 Regional Urban Systems 2
- CivE 543 Land Use Models

- EnvSt 401 Environmental Law
- EnvSt 402 Planning Law
- Geog 408 Special Topics in Climatology and Natural Hazards
- Geog 410 Recreation Geography
- Geog 411 Resource Studies
- Geog 414 Resources Management Workshop
- MEnv 410 Honours Seminar: Environmental Management
- PSci 435 Politics of Canadian Resource Development
- Rec 410 Planning of Recreation Facilities
- Rec 434 Advanced Park Management
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 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 5 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 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 ES 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 for 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.
Kinesiology students conduct a testing programme for professional athletes.
Faculty of Human Kinetics and Leisure Studies

The Faculty of Human Kinetics and Leisure Studies was officially formed in the Fall of 1972. This Faculty has gradually evolved from the School of Physical and Health Education (1966-1967) and the School of Physical Education and Recreation (1966-72). Within this Faculty, the Department of Kinesiology, the Department of Recreation, and the Dance Group offer academic programmes and conduct research, whereas the Department of Athletics conducts 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. Six 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. The regular programme has grown to the point where it equals the co-operative programme enrolment. 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.

Kinesiology Programme

The Kinesiology programmes are multi-dimensional studies of human physical movement incorporating the biological, physical, and social sciences. Extensive laboratory facilities enable the students in the programme to be among the few undergraduate students in the world to examine first hand the problems adherent within human physical activity.

A special Honours Programme in Health Studies offers eighteen Health Studies courses. Graduates of this programme are capable of performing in such career areas as Public Health, Community Health Education, Private Health Agencies, Teaching and Research.

The Kinesiology programmes are designed to provide graduates with maximum flexibility in choosing a career. Graduates are already found in a variety of agencies ranging from teaching (the Honours programme meets all requirements for admission to the Type "A" Certificate courses in Physical and Health Education at the Colleges of Education in Ontario), to hospitals for the aged, infirm, retarded, and psychiatric populations, fitness institutes, sports equipment manufacturing outlets, YM-YWCA's, youth centres, university teaching and/or graduate programmes, and related fields.

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, municipalities, schools, national and provincial parks, youth agencies, and university graduate programmes.

Dance Programme

The honours programme in Dance offers 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.

Degrees

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.

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 Geography in their Year 5 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) The faculty constitutes the examining body for all examinations. All examination results are considered by the Undergraduate Affairs Committee and subsequently by the Faculty Council. The 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.

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 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.

c) 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.

d) All examinations which receive a failing grade are automatically re-read.

2) Standing
a) The Faculty has endorsed the letter grade system outlined on page 17 of this calendar.
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 Option)</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>
</tbody>
</table>

*All courses designated Kinesiology or Health Studies will be included in the major average.

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.

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

Department of Kinesiology

Listed below are the course combinations leading to the Honours and General degrees in Kinesiology and the Honours Degrees in Health Studies. 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.

Note

In the case of Physics 103, Physics 104 and Mathematics 106 or Mathematics 107 students may elect to take full year courses in either subject in the appropriate department. Physics 103 is for students not presenting Year 5 Physics for admission. Physics 104 is for students who have taken Year 5 Physics. Mathematics 106 is for students not presenting Year 5 Calculus. Mathematics 107 is for students who have taken Year 5 Calculus.

c) Kinesiology Electives: (9) Nine courses from those offered in the Department in addition to the required courses. These may include Health Studies 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, 452, 453, 456. In lieu of these courses a student may specialize in one of the six streams designated by the Department.
**Electives: (12)**

The remaining twelve term courses required for the degree are to be elected as follows:

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 Kinesiology, Dance 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:

- The remaining twelve term courses required for the degree are to be selected as follows:
  - a) Required Kinesiology Courses (11) 102, 103, 200, 222, 252, 255, 300, 317, 321, 335, 354.
  - b) Required Courses from other departments (6) Physics 103 or Physics 104, Biology 151, Biology 152, Math 106 or 107, Computer Science 118, Psychology 101, Sociology 101.
  - c) Kinesiology Electives (9) The nine elective courses in Kinesiology may be made up of any combination of Kinesiology and/or Health Studies courses.
  - d) Electives (12) The remaining twelve term 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 Kinesiology, Dance and Recreation.

**Course Sequence – Honours and General Programmes**

**Year 1**

(Common to regular and co-operative programmes)

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kin 102</td>
<td>Kin 116</td>
</tr>
<tr>
<td>Kin 103</td>
<td>Kin 255</td>
</tr>
<tr>
<td>Biol 151</td>
<td>Biol 152</td>
</tr>
<tr>
<td>Math 106 or 107</td>
<td>Phys 103 or 104</td>
</tr>
<tr>
<td>Psych 101</td>
<td>CS 118</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

**Regular Programme**

**Year 2**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kin 200</td>
<td>Kin 252</td>
</tr>
<tr>
<td>Kin 222</td>
<td>Kin 321</td>
</tr>
<tr>
<td>Soc 101</td>
<td>Kin 335</td>
</tr>
<tr>
<td>Phys 105</td>
<td>Kin 354</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

**Year 3**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kin 300</td>
<td>Kin 330†</td>
</tr>
<tr>
<td>Kin 317</td>
<td>4 Electives</td>
</tr>
<tr>
<td>3 Electives</td>
<td></td>
</tr>
</tbody>
</table>

**Year 4**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kin 431†</td>
<td>Kin 432†</td>
</tr>
<tr>
<td>5 Electives</td>
<td>Kin 470†</td>
</tr>
<tr>
<td>4 Electives</td>
<td></td>
</tr>
</tbody>
</table>

**Co-Operative Programmes**

<table>
<thead>
<tr>
<th>2A Fall</th>
<th>2B Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kin 200</td>
<td>Kin 252</td>
</tr>
<tr>
<td>Kin 222</td>
<td>Kin 321</td>
</tr>
<tr>
<td>Soc 101</td>
<td>Kin 335</td>
</tr>
<tr>
<td>Phys 105</td>
<td>Kin 330†</td>
</tr>
<tr>
<td>Elective</td>
<td>Kin 354</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3A Winter</th>
<th>3B Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Electives</td>
<td>Kin 300</td>
</tr>
<tr>
<td>Kin 317</td>
<td>3 Electives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4A Spring</th>
<th>4B Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kin 431†</td>
<td>Kin 432†</td>
</tr>
<tr>
<td>5 Electives</td>
<td>Kin 470†</td>
</tr>
<tr>
<td>4 Electives</td>
<td></td>
</tr>
</tbody>
</table>

*Note

All students in Year 1 are honours students.
† for honours students only.
Honours Health Studies

Students may apply for admission directly into the Honours Health Studies Programme, co-op or regular.

In order to receive the honours BSc degree the student must successfully complete 44 term courses including the following requirements:

**Degree Requirements**

a) Required Health Studies courses: (10)

b) Required Kinesiology courses: (5)
   - Kinesiology 116, 200, 222, 317, 330

c) Required courses from other departments: (6)
   - Biology 132 (Y), 342 (Y)
   - Psychology 101
   - Sociology 101

d) Restricted electives: (8)
   - One of: Math 106/107, CS 118 (Recommended before Year 4)
   - One of: Phil 226, 256 (Recommended in Year 4)
   - One of: Kin 442, Health 443, Mthel 402a, 402b (Recommended in Year 4)
   - Two of: Bio1239, 245, 246, 340, 343, 434, Health 302, 303
   - Three of: Health 340, 346, 410, Kin 300

e) Free electives: Fifteen (15) term courses selected in consultation with the student’s advisor.

**Course Sequence**

**Year 1 (Co-op and Regular)**

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Health 140</td>
</tr>
<tr>
<td></td>
<td>Psych 101</td>
</tr>
<tr>
<td></td>
<td>Soc 101</td>
</tr>
<tr>
<td></td>
<td>Biol 132</td>
</tr>
<tr>
<td></td>
<td>2 electives</td>
</tr>
<tr>
<td>Winter</td>
<td>Health 141</td>
</tr>
<tr>
<td></td>
<td>Biol 132</td>
</tr>
<tr>
<td></td>
<td>3 electives</td>
</tr>
</tbody>
</table>

**Regular Programme**

**Year 2**

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Kin 200, 317</td>
</tr>
<tr>
<td></td>
<td>Biol 342</td>
</tr>
<tr>
<td></td>
<td>2 electives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 3</td>
<td>Health 349</td>
</tr>
<tr>
<td></td>
<td>Kin 222</td>
</tr>
<tr>
<td></td>
<td>3 electives</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 4</td>
<td>Health 442, 431</td>
</tr>
<tr>
<td></td>
<td>4 electives</td>
</tr>
</tbody>
</table>

Co-operative Programme

**Year 2**

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A (Fall)</td>
<td>Kin 200, 317</td>
</tr>
<tr>
<td></td>
<td>Biol 342a</td>
</tr>
<tr>
<td></td>
<td>2 electives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 3</td>
<td>Health 245, 348</td>
</tr>
<tr>
<td></td>
<td>Kin 330</td>
</tr>
<tr>
<td></td>
<td>3 electives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A (Winter)</td>
<td>Biom 342b</td>
</tr>
<tr>
<td></td>
<td>Health 442</td>
</tr>
<tr>
<td></td>
<td>Kin 222</td>
</tr>
<tr>
<td></td>
<td>3 electives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 4</td>
<td>Health 431</td>
</tr>
<tr>
<td></td>
<td>Biom 432, 445</td>
</tr>
<tr>
<td></td>
<td>4 electives</td>
</tr>
</tbody>
</table>

**Academic Programme**

**Honours Dance**

Forty-four term courses are required for the honours BSc degree in Dance.

**Degree Requirements:**

a) Required Dance Courses (10):

b) Required Kinesiology Courses (6):

c) Required Courses from other Departments (10):
   - Biol 110 or Kin 102, Phys 103, Psych 101, Soc 101, Phil 100 or two term courses in philosophy, Music 150G, 151G, and two courses from Drama or Fine Arts.

d) Six electives in Dance to be selected from:

e) Other Electives: The remaining 12 term courses must include at least 8 term courses outside the Faculty of Human Kinetics and Leisure Studies. The remaining 4 term courses may be taken in any department of the University.

**Course Sequence**

**Year 1**

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Dance 162</td>
</tr>
<tr>
<td></td>
<td>Kin 200</td>
</tr>
<tr>
<td></td>
<td>Biol 110</td>
</tr>
<tr>
<td></td>
<td>Math 106/107</td>
</tr>
<tr>
<td></td>
<td>Psych 101</td>
</tr>
<tr>
<td></td>
<td>Soc 101</td>
</tr>
<tr>
<td></td>
<td>Biol 132</td>
</tr>
<tr>
<td></td>
<td>2 electives</td>
</tr>
<tr>
<td>Winter</td>
<td>Dance 163</td>
</tr>
<tr>
<td></td>
<td>Kin 200</td>
</tr>
<tr>
<td></td>
<td>Psych 101</td>
</tr>
<tr>
<td></td>
<td>Soc 101</td>
</tr>
<tr>
<td></td>
<td>Biol 132</td>
</tr>
<tr>
<td></td>
<td>2 electives</td>
</tr>
</tbody>
</table>
It is recommended that students wishing to elect Drama 101 or Fine Arts 120 or Philosophy 100 consider taking these courses in first year.

**Year 2**
- Dance 262
- Dance 264
- Elective
- Elective
- Elective
- Elective

By the end of second year students must have completed at least one term course requirement in Drama or Fine Arts.

**Year 3**
- Dance elective
- Dance elective
- Kin 222
- Kin 390
- Phil requirement or elective

By the end of third year students must have completed two term courses in Philosophy plus any two term courses (as outlined) in Drama or Fine Arts.

**Year 4**
- Dance 461
- Dance 464
- Elective
- Elective

Note

Students should plan their programme with a faculty advisor so that courses are elected in the appropriate sequence and electives chosen to suit the student's needs and interests.

Note

An Honours B.A. programme in Dance is presently being proposed for implementation in the fall of 1978. Details of the programme may be obtained by writing to the Dance Group.

### 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):
       - 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, Kinesiology 200, Economics 101, Geography 101/Environmental Studies 195, Planning 156 or a course in the Fine or Performing Arts.

2) **Electives:** (14)

**C) Additional Requirements**

Practical Experience. All students must complete a faculty approved work term, normally of at least three months duration, or successfully petition the Department for exemption on the basis of experience.
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, Kinesiology 200, Economics 101, Geography 101/Environmental Studies 195, Planning 166
  - A course in Fine Arts

**Year 2**
- Recreation 210, 270
- 4 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 (10)**
- 100 Introduction to the Study of Leisure & Recreation
- 101 Introduction to Leisure Services
- 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 (10):**

Students must elect any ten 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.
c) Eight (8) Business/Economics Courses which must include Business 121, 212R, 383R, 388, 398 and 471R.
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 (10-13)**
- 100 Introduction to the Study of Leisure & Recreation
- 101 Introduction to Leisure Services
- 210 Organization and Administration of Recreation Services
- 230 Introduction to Outdoor Recreation & Education
- 250 Introduction to Recreation for Special Populations
- 270 Statistical Techniques Applied to Leisure Studies
- 371 Research Design Applied to Leisure Studies & Services
400 Seminar in Recreation & Leisure
T 470 Research Project
T 471 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 Field Ecology
241 Social Change, or other half-year course in social sciences (Sociology 101)
T 271 Introduction to Quantitative Research Methods, or one other introductory methods course approved by the Department
290 (Y) Seminar Workshop
390 (Y) Seminar Workshop
T 490 (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 (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)

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 (7-8)
- 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/Environmental Studies 195, Planning 156, or a course in Fine or Performing Art.

† 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 (10-13)
100 Introduction to the Study of Leisure & Recreation
101 Introduction to Leisure Services
210 Organization and Administration of Recreation Services
230 Introduction to Outdoor Recreation
250 Introduction to Recreation for Special Populations
T 270 Statistical Techniques Applied to Leisure Studies
371 Research Design Applied to Leisure Studies & Services
400 Seminar in Recreation & Leisure
T 470 Research Project
T 471 Research Project

Required Geography Courses (10-13)
102 Introduction to Physical Geography
195 Introduction to Environmental Problems
200 Field Ecology
201 Some Basic Topics of Physical Geography
202 Some Basic Topics of Economic and Urban Geography
260 Introduction to Cartography and Map Analysis
T 271 Introduction to Quantitative Research Methods
275 Introductory Air Photo Analysis and Remote Sensing
391 Field Research, or other half-year courses in Geography
381 The Nature of Geography
T 490 (Y) Senior Honours Geography

Plus one of Geog 203, 204, 205, 220.
**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)

**Geography Electives**

Students must elect additional upper division courses in Geography to obtain a minimum of 14 term courses in Geography.

**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.
Integrated Studies

Campus scene
An Alternative in University Education
An Opportunity to Develop an Individual Programme of Learning

Integrated Studies is a small undergraduate programme of less than 100 students, an opportunity established within the University of Waterloo in 1969 for students able to structure and pursue their own programmes of study. This alternative in undergraduate education is distinctive in that the students develop their own programmes which are to some degree both integrated and independent, and the students play a predominant role in the operation of the overall programme.

Integration
By integration, it is primarily meant that students explore interdisciplinary study, particularly in a theme or project approach. Student programmes are expected to cross the boundaries of traditional disciplines bringing a variety of subject matter together in a distinctive focus. Students are encouraged to seek out connections among disciplines in ways not specifically promoted by regular university programmes.

Other aspects of integration are also of concern within the programme. Most students consciously attempt to integrate their learning with their life situation and interests; normally their studies directly reflect this interest. Attempts are also made to integrate a wide variety of approaches to available resources. In addition, many seek to overcome the apparent separation of the university and community. Finally, students are integrated with faculty and staff in the programme's shared decision making process.

Independence
By independence, it is not intended that students work in isolation; indeed we hope for an active community of learning. Students are expected, however, to have the independence to provide the basic thrust for the structure of their studies and to devise programmes utilizing more than the course offerings of the various faculties of the University.

Shared Decision Making
The operation of the programme, with the exception of matters pertaining to the degree, is handled by Operations Council which consists of all members of the programme, its students, Resource Persons and staff. It is responsible for such items as budget development, student project assistance, recommendations for the hiring of personnel, admission of students and year end reviews. Council normally meets every second week. To make Council functional, in view of its potential size, volunteer committees examine issues of concern and submit recommendations for Council's decisions.

Approach to Resources
In designing their studies, the students have access to the wide resources 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. That might entail taking no formal courses at all, or perhaps auditing several and taking some for credit, or a variety of other combinations. The students might work on an individual basis with professors or graduate students from the many University departments or with the programme's own Resource Persons. Groups of students may also work together in a common approach to any given subject or theme. Then, students are also free to pursue studies privately utilizing the libraries and other facilities.

Resource Person
The programme's Resource Persons serve as tutors or advisors to assist the students with the development of their studies. As they are normally broadly experienced in interdisciplinary study, they are capable of delineating connections among areas of knowledge. From their knowledge of the University and the community they can direct students to specialized areas of expertise or particular facilities which might serve to further the students' interests.

Resource Persons 1977-1978
I. H. Angus
C. Brooks
R. Clarke
J. M. Jamieson
L. Kendall
H. Miller

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 to the programme on this development indicating the nature of their studies, resources used (personnel, facilities and materials) and to provide a critical evaluation of their educational year indicating particular achievements and difficulties. They are also encouraged to include examples of their work and evaluations by others.

Programmes of Study
The following are examples of some approaches to study interests:

Ray focussed his studies on drama as a system of education by drawing upon architecture, sociology, developmental psychology, philosophy of education, and theatre practice. He worked independently with advice from faculty in the Drama Department and the Ontario Institute for Studies in Education and a programme Resource Person. He took regular drama courses in criticism and literature and, as a particular application of his concern to 'learn by doing', he was the director of an alternative educational resource centre.
...After travelling in Europe and working in a science laboratory in Toronto, Dale returned to the programme, where he had spent two years, to commence his degree studies concentrating primarily on Finnish culture, history and language. This led to a scholarship in Helsinki where he continued his studies.

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.

Raphe's studies in contemporary problems and theories in economics made use of the libraries of this University and of Wilfrid Laurier University, original government and industry 'fact sheet' publications, and courses in the Department of Economics. Three economics professors (one from Wilfrid Laurier) guided and evaluated his programme. He is currently in a graduate programme in business administration.

Ben's time in the Faculty of Engineering provided the background for his programme studies of ice/water pollution. After graduation he was able to continue this interest through employment with the federal government.

Shirley found in her first year's study of religion and philosophy that her interest in these subjects was often, in fact, an interest in language and communication. This realization prompted a revival of her interest in writing and literature. She organized an informal writers' conference which was attended by writers, both aspiring and successful, by several publishers and by a variety of interested people from the K-W area. She has worked with the programme's Resource People and has taken several literature courses. Shirley's work in literature is largely directed by her interest in writing her own poetry and short stories.

David's study of the science of music has taken him into such areas as systems design, psychology, computer science, and electrical engineering. He has taken courses, done a wide range of projects, prepared musical compositions and given public recitals. He has also attended conferences (presenting a paper at one of them) and gave a course of his own to the University community.

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.

Brian transferred from a general science programme in order to broaden his university education. In addition to courses in such areas as architecture, computer science and political science, he undertook two major political surveys: one on the membership of the federal Progressive Conservative Party, the other on the use of the federal government's constituency offices. His degree programme was supervised by faculty in the Political Science and Psychology Departments and has led to employment with a major computer company.

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 O.I.S.E. 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 O.I.S.E.

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 reading, individual work with Resource People from Integrated Studies and other faculty of the University at large, credited courses and discussion.

Marty initially pursued his interest in social justice, prisons and the law through intervention work in the adult criminal courts coupled with related academic study in such areas as sociology and political science. Relevant courses were used primarily as skills' training in community organizing. Subsequently he began child advocacy work studying community approaches to child abuse and troubled children with the assistance of a family court judge, and taking courses which provided him with a theoretical and reflective balance.

Other programmes have dealt with such areas as social and psychological theory, Canadian literature, government in the Caribbean, alternatives in education, philosophy of science, community based treatment facilities, and microsystems design.

Degree Process

While some of the student programmes last only a year or two (this is an excellent opportunity to explore a particular but limited interest), an increasing number of students work towards a bachelor's degree.

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 (B.I.S.) 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.

Academic Board for Integrated Studies
T. L. Batke (Chemical Engineering & Philosophy)
Chairperson
M. Breidenbaugh (Psychology)
T. E. Bunting (Geography)
S. K. Johannesen (History)
S. M. Smith (Biology)
D. M. R. Taplin (Mechanical Engineering)

After Graduation
The responsibility students in this programme must assume for the pursuit of 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. Graduates of Integrated Studies have gone on to teachers college, graduate study, employment with the government and business and, as would be expected, a variety of other unconventional opportunities.

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 programme handbook, contact T. W. Smyth, Coordinator.
Faculty of Mathematics

Mathematics and computer building
Faculty of Mathematics

Mathematics at the University of Waterloo was established as a separate faculty in 1967. General and Honours programmes in Mathematics had been offered through the Faculties of Arts and Science for a number of years and the continued growth and development of these programmes made it natural to unite them under one faculty. At the same time, this unification has led to greater flexibility in the choice of overall programmes.

The Faculty of Mathematics is a close association of the departments of Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics, and Statistics. Students may specialize in General and Honours programmes in various areas within these departments and may obtain the degree of Bachelor of Mathematics (B.Math) upon successful completion of a three-year Pass degree programme, a four-year General degree programme, or a four-year Honours degree programme.

The Faculty offers both regular and co-operative programmes in mathematics. The co-operative mathematics programmes, available to Honours and General students, involve re-arrangements in the scheduling of academic terms so as to permit considerable practical experience.

Applicants may also register for the regular programme (not the co-operative programme) through St. Jerome’s College. St. Jerome’s offers some of the courses leading to a B.Math degree in conjunction with the University.

The graduate school in the Faculty of Mathematics is very strong. Many graduate degrees are conferred each year and active research is carried on in many areas. For information concerning graduate programmes in Mathematics, please consult 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 Associate Dean or Assistant Registrar, Faculty of Mathematics.

Applied Mathematics Department

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.

The Applied Mathematics Department offers only an honours programme which is made up of courses chosen from AM266, 270, 340, 362, 365, 371, 372, 381, 391, 395, 461, 462, 463, 465, 466, 468, 472, 473, 476, 481, 482, 485, 486, 486, 495.

For those students who wish a strong emphasis on Physics, the Department offers the programme "Honours Applied Mathematics with Physics Minor."
Computer Science Department

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, automata theory, computability theory, formal languages, 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 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); Logic and Foundations.

The following undergraduate courses are offered by the department. Note that some of the analysis and the differential geometry courses are offered in conjunction with the Applied Mathematics Department.

Introduction to Pure Mathematics 230a/b
Algebra 341a/b, 443, 444a/b, 445a/b, 446a/b, 447a/b, 464
Analysis 351a/b, 352a/b, 451a/b, 452a/b
Topology 367, 467
Functional Equations 470
Number Theory 441a/b
Logic and Foundations 430a/b, 432a/b

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 requirements relate specifically to programmes in the Faculty of Mathematics.

Applicants from Ontario Year 5
Applicants will normally include Relations and Functions, Calculus, and Algebra in their six Year 5 credits offered for admission. To be considered for admission to the regular programme a minimum average of 60% is required; a somewhat higher average is required for the co-operative programme.

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, 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 a course 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 taken in a section 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 six transfer credits per academic year previously taken will normally be given.

Students admitted with a previous Bachelors degree will normally be given six elective (non-math) 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 Math Faculty 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 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 the equivalent of two full 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 B.Math degree requirements.

The B.Math Pass degree may be obtained entirely by part-time studies; the B.Math General degree requires at least two terms on campus; the B.Math 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 17 for more details of this programme; a separate brochure is available.)

Fees, Financial Assistance
See Chapters 3 and 4.
Mathematics
Standings and Promotions

Standings and Promotions

Degrees
The Faculty of Mathematics offers several programmes leading to the following degrees: Bachelor of Mathematics (Pass), Bachelor of Mathematics (General) and Bachelor of Mathematics (Honours); details of these programmes appear in a later section. The student who wants a modest amount of mathematics and an approximately even balance between mathematics and non-mathematics courses will usually choose the Pass programme, the student who wants a wider coverage of mathematics but does not intend to be a specialist will normally elect the General programme, while the person who wishes to concentrate on mathematics and possibly go on to graduate school will require an Honours degree.

Degree Requirements
A summary of the various degree requirements is presented in the following table.

<table>
<thead>
<tr>
<th>Minimum total credits(^1)</th>
<th>Pass</th>
<th>General</th>
<th>Honours</th>
<th>Honours*</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>21</td>
<td>24</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Minimum math credits(^2)</td>
<td>6</td>
<td>12</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Minimum elective credits(^3)</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Minimum math average(^4)</td>
<td>60%</td>
<td>60%</td>
<td>70%</td>
<td>70%</td>
</tr>
<tr>
<td>on 6 credits</td>
<td>on 12 credits</td>
<td>on 15 credits</td>
<td>on 12 credits</td>
<td></td>
</tr>
<tr>
<td>Maximum full course attempts (or equivalent)(^6)</td>
<td>22</td>
<td>27</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Maximum full course failures (or equivalent)(^7)</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
<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-credit 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.

\(^2\) Elective courses are normally non-mathematics courses. Some courses are also offered by the Math faculty as electives for math students.

\(^3\) 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 Co-op Chartered Accountancy, Management Accounting and Business Administration options require only 14 math credits; Honours Applied Mathematics with Physics Minor requires 14.5 credits), only those required credits will be included in the average.

\(^4\) 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.

\(^5\) 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.

\(^6\) 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.

\(^7\) 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.

\(^8\) A complete term is normally one in which a student successfully completes at least five half-courses, 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. Math and Psychology, Math 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.
1) Examining Body
The Faculty constitutes the examining body for all examinations. All examination results are considered by the Faculty Committee on Standings and Promotions, subsequently by the Faculty Council, and then issued to individual students by the Registrar.

2) Year Classification
For convenience, all students will be classified by year on the basis of the number, N, of successfully completed credits, according to the following scheme:

<table>
<thead>
<tr>
<th>Year</th>
<th>First year</th>
<th>Second year</th>
<th>Third year</th>
<th>Fourth year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>16</td>
</tr>
</tbody>
</table>

3) Grade Designations
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), NCR (No credit granted), NMR (No mark reported) and DNW (Did not write examination, no credit granted) may be used. All grades are calculated on a curve. A complete course carries 4 credits, and grades are recorded as INC, NCR, NMR and DNW will count as failures for the purpose of course-attempt and failure counts.

4) 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. Full-time load during Summer School is two full credits, although students are advised in most instances to limit themselves to at most one math credit during this six-week period. Most mathematics courses offered during Summer School are on a Correspondence basis.

Co-op students may also take courses on a part-time basis during work terms if they are within commuting distance of the university. Care should be taken, however, to make sure that involvement with part-time studies does not interfere with satisfactory work-term performance. Continuation in all co-operative programmes is very definitely contingent upon satisfactory performance on work 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.

5) Course Upgrading
If a student is pursuing a Pass or General degree and takes the General version of a course instead of the Honours version (e.g. Math 220a/b instead of 230a/b in 2nd year), but at a later date decides that he/she wishes to pursue an Honours degree, he/she 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.

The above does not pertain to Math 120a/b and 124a/b. Special provisions have been made for these courses. A grade of 80% or higher in one of the General courses may be substituted as the equivalent of the corresponding Honours level course in fullfilment of the Honours degree requirements. This provision exists only for first-year courses and does not extend into upper years. It is intended to allow a very good student who has chosen the Pass or General programme in Year 1 to make a change in programme and continue into second year Honours.

Students admitted from Ontario Year 5 with a Mathematics average and/or overall average less than 75% are strongly advised to take Math 120a/b and 124a/b.

6) Honours/General Equivalents
A student pursuing a Pass or General degree may substitute the Honours level equivalent course(s) for any required General level math course(s).

7) 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 enrol 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.
8) 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. However, students in Years 1 and 2 must have an academic record of sufficiently high calibre to take more than 6 courses. 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 70%. 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 achieved to date according to the current scheme adopted by the Math Faculty (see (2) earlier).

9) Letters of Permission
Students in good academic standing are normally permitted to take elective courses at other universities on a part-time basis (e.g. summer school or co-op work term) 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 for the Faculty of Mathematics. Please note that permission must be obtained in advance of taking the course. The Committee will not 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 fully accountable 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 NMR (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).

10) 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 B.Math 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 by on-campus courses. Any additional electives, whether mathematics or non-mathematics courses, 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).

11) Grade Appeals
Any student wishing to appeal a mark must do so by contacting the Assistant Registrar for Mathematics within one month of the official announcement of the grade. There will be a charge of $5.00 per grade appealed, to be refunded if the mark is raised. Please note, however, that a mark may be lowered if a re-examination of the student’s situation in response to a mark appeal leads to the discovery of an earlier error in favour of the student.
12) 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 again (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.

13) 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.

14) 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.

15) Illness or Incapacity
Students missing academic work or examinations for medical or other special reasons should so inform their instructors and provide official documentation to the Assistant Registrar for Mathematics as soon as possible. In cases where extra consideration is deemed warranted, special arrangements can normally be made with the instructors in question.

16) 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 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 NMR 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 of course, upon the date of withdrawal.

17) 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 the following requirements.
(i) an overall cumulative average $\geq 55%$.
(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.

18) Required Withdrawal from Honours
When an Honours student has exceeded 4 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 19) 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.

19) 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:
A) exceeded 5 full-course failures (or equivalent)
B) by the end of the first term in which the student has accumulated 22 or more full course attempts (or equivalent), failed to achieve an average of 60% on six distinct math credits, including those required for the Pass Degree (i.e. first year Algebra, Calculus and Computer Science).
C) 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.

20) Intent to Graduate
Under the Math Faculty's credit system and degree requirements, the onus will be on the student to be aware of the various regulations pertaining to his/her programme of study. When the student has satisfied the requirements for a particular degree, it will be his/her responsibility to submit an "Intent to Graduate" form at the Registrar's Office.

21) Exceptional Cases
All of the degree requirements described in this section apply except under "exceptional" circumstances. The Faculty Standings & Promotions Committee is the only authorized body which can approve exceptions to normal degree requirements.
Academic Programmes

General Remarks
In addition to the Pass, General and Honours programmes in which regular students enrol there are special co-operative programmes (Teaching Option, Chartered Accountancy, Management Accounting and Business Administration Options) which are available in both General and Honours versions: for details see pp. 176. Furthermore, double and joint honours programmes with other Faculties are possible; for details see pp. 175.

A first year student will be registered in one of the above-mentioned programmes but is not hereby irrevocably committed; in subsequent years it is quite possible to move from one programme to another provided that the prerequisites of the new programme are met.

The first year programme is such that a student can transfer to other Faculties in second year if he/she has chosen his/her electives judiciously.

In the first two years students are not associated with any department but at the beginning of the third year Honours students must select the department in which they intend to do their major work; Pass and General students may associate themselves with a department—a procedure that allows them to turn to the departmental undergraduate officer for advice but does not subject them to departmental regulations.

Three Year Pass Programme
Required courses: Math 120a/b; Math 124a/b; CS 116/117 or two of CS 140, CS 180, CS 240, CS 250.

Typical Programme

<table>
<thead>
<tr>
<th>Year</th>
<th>Mathematics</th>
<th>Electives</th>
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<tbody>
<tr>
<td>1</td>
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<td>2</td>
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<td>3</td>
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<td>3</td>
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</tbody>
</table>

Four Year General Programme
Required* courses: Math 120a/b; Math 124a/b; two of CS 140, CS 180, CS 240, CS 250; Math 220a/b; Math 221a/b; Math 321a/b; Math 322b; one of Math 322a, CS 370, CS 371.

*These requirements do not apply to the Co-op Chartered Accountancy, Business Administration or Management Accounting Options: for details see p. 176.

Typical Programme

<table>
<thead>
<tr>
<th>Year</th>
<th>Mathematics</th>
<th>Electives</th>
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<tbody>
<tr>
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<td>2</td>
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<tr>
<td>4</td>
<td>3</td>
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</tbody>
</table>

Students interested in the following areas are encouraged to take any or all of the courses listed:

**Actuarial Science**
Stat 273, 284, 230/231, 373, 374, 384; 470, 475, 476, 477, 480, 486, 487, Math 305a/b

**Computer Science**
CS 140, 180, 240, 250, 370, 371, 330, 331, 340, 350, 360, 369, 446, 450, 454, 482, 484.

**Combinatorics and Optimization**
Stat 220/221, C & O 239a/b, 249b, 351a/b, 352a/b, 353a, 360a/b, Math 380a/b, C & O 437a/b, 438a/b, 450a/b—through 460a/b

**Pure Mathematics**
P Math 230a, 361, 362, 383, C & O 351a/b, P Math 367, P Math 430a/b, 441a/b, C & O 446a/b

**Statistics**

Four Year Honours Programmes
Required (core)* courses:
Math 130a/b; Math 134a/b; two of CS 140, CS 180, CS 240, CS 250; Math 230a/b; Math 231a/b; Stat 230/231; Math 331a/b or P Math 341a/b; Math 332b or P Math 352a/b; one of Math 332a, P Math 351a/b, CS 370, CS 371, CS 472, CS 474. *These requirements do not apply to programmes in Computer Science, Pure Math with Computer Science Minor, Chartered Accountancy, Business Administration and Management Accounting. For details see page 174, 176 and 177.

Typical Programme

<table>
<thead>
<tr>
<th>Year</th>
<th>Mathematics</th>
<th>Electives</th>
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<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>3</td>
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<tr>
<td>2</td>
<td>4</td>
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<td>3</td>
<td>4</td>
<td>2</td>
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<tr>
<td>4</td>
<td>4</td>
<td>2</td>
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</tbody>
</table>

**Applied Mathematics**
Core requirements and at least four credits from departmental third and fourth year courses; at least one credit must be at the 400 level. AM 260, AM 270 are recommended courses.


Combinatorics and Optimization
Core requirements and an additional 6 mathematics credits at the 300 or 400 level, including at least one credit from one of the other four departments. Term courses (half-credits) must include at least 2 of C&O 351a, C&O 360b, and at least 4 of C&O 437a through C&O 460b.

Computer Science
The following portion of the faculty core requirements: Math 130a/b, Math 134a/b, Math 230a/b, Math 231a/b, Stat230/231, CS 140, CS 240, CS 250. Computer Science departmental core requirements: CS 340, 350, 360, 369, 370, 371. In addition to the above, a student must take four more Computer Science term courses at the fourth year level, and at least five term courses chosen from the following list (Math 331a must be included): Math 331a, b (or P Math 341a, b), Math 332a (or P Math 351a, b); Math 332b (or P Math 352a, b), Stat 333, Stat 340, Stat 341, AM 381, AM 391, C&O 351a, b, C&O 360b, P Math 430a, b (or P Math 432a, b), or any fourth year (non-Computer Science) term course for which one of these or the departmental core term courses are explicit prerequisites.

Pure Mathematics
Core requirements including P Math 341a/b, 351a/b, 352a/b; also P Math 357 and four 400 level mathematics credits, at least two of which must be in Pure Mathematics. Not all of P Math 341a/b, 351a/b, 352a/b, 367 need be taken in third year.

Pure Mathematics with Computer Science Minor
Faculty core requirements for 100 and 200 level courses, plus the following: P Math 341a/b, 351a/b and 352a; CS 240, 250, 340, 350, 360, 369, 370, 371; two half courses: P Math 352b, P Math 367, CO 351a/b, Math 380a/b; four half credits (at least two in P Math) from the 400 level P Math courses and a list of 400 level CS courses available from the undergraduate officer. Students will normally delay taking some of the 300 level required courses until their fourth year.

Statistics
Core requirements and Stat 340/341, 350/351, 450, 451, 452, 454. At least 3 mathematics credits at the 400 level and a total of 8 at the 300 or 400 level are required.

Actuarial Science
Core requirements and Stat 273, 284, 374, 384, 475, 477, 487; two half courses from Stat 373, 383, 470, 474, 476, 480, 486. At least 4 mathematics credits at the 400 level and a total of 8 at the 300 or 400 level are required. Mthel 305a/b is recommended in Year 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 and 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 courses in Computer Science.

Computer Science and Statistics
Statistics requirements are at least four half-courses in Probability and Statistics at the third or fourth year levels, including Stat 331 or 351; Stat 332 or 454; Stat 430 or 452.

Computer Science and Computer Science
Computer Science requirements are CS 140, 240, 250, 446, 370/371; an additional half course in Computer Science at the third or fourth year level.

Join Honours Programmes with other Faculties
Joint Honours leading to a degree in Mathematics

Mathematics and Economics
Mathematics and French
Mathematics and Geography
Mathematics and German
Mathematics and Philosophy
Mathematics and Psychology
Mathematics and Russian
Mathematics 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 required math credits is reduced from 15 to 12 provided the faculty and departmental requirements for an Honours programme are satisfied. These programmes must be approved by both departments involved.

Requirements in the minor subject are as follows:

Economics
101, 102, 201, 202, 231, 301, 302, 311, 321, 401, 402, 421, 422. One additional term course in Economics.

French
190 Group B: seven additional full courses in French with three at the second-year level, two at the third-year level, and two at the fourth-year level.
Co-operative Mathematics Programmes

For general information on the co-operative programmes, please read Chapter 5 of this calendar. All students should carefully read the Handbook for Students in Co-operative Mathematics Programmes, as provided by the Department of Co-ordination.

The academic requirements in the co-operative programmes in Actuarial Science, Computer Science, Optimization, and Statistics, are identical with those outlined under the corresponding regular programmes. In this section we outline the requirements for certain special options.

Applied Mathematics
(with elective courses from the Faculty of Engineering)

Year 1
Math 130a/b, 134a/b, CS 140/250
Phys 121/122, two electives

Year 2
Math 230a/b, 231a/b, Stat 230/231,
AM 260/270
One course each term from options A, B, C,
D or E
One course each term (math or elective)

Year 3
Math 332b, AM 381 1391, AM 371
Four term courses in mathematics from
AM 340, AM 355, CS 370, CS 371,
Math 391, Math 332a
One course each term from options A, B, C,
D or E
One course each term (math or
ingineering)

Year 4
Two courses each term (at least one full
course at the 400 level) to be selected
from: AM 395, 461, 466, 468, 476, 478,
481, 482, 485
One course each term from options A, B, C,
D or E
Three additional courses each term chosen
to satisfy the requirements of four AM
credits, 15 math credits and 8 electives.

Option A
ME 19, 20, CE 303, 304, ME 527 and/or
ME 525
One or more of CE 518, 522, 526, ME 626

Option B
Sy De 261 and/or 282, 543, 555
Three or more of Sy De 352, 372, 434, 442,
485, 535, 544, 465, 567

Option C
ME 19, 50, 51
Three or more of ME 25, 54, 56, 59, 59,
557, 563, 570

Option D
EI E 233 and/or 241, 271
Four or more of EI E 342, 351, 352, 372, 418,
419, 434, 435, 436, 453, 454

Option E
EI E 241, 261
Four or more of EI E 342, 362, 372, 380, 463,
484, 481, 482
### Business Administration Option

**Honours Programme | General Programme**

<table>
<thead>
<tr>
<th>Year 1</th>
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</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>Math 130a/b, 134a/b, CS 140, Econ 101, 102, 191, 192, Bus 111, 121</td>
<td>Math 120a/b, 124a/b, CS 140, Econ 101, 102, 191, 192, Bus 111, 121</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
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<tbody>
<tr>
<td>Year 2</td>
<td>Math 230a/b, 231a/b, Stat 230, 231, Two of CS 250, Stat 270, C &amp; O 239b, Bus 352, 362</td>
<td>Math 220a/b, 221a/b, Stat 220, 221, Bus 352, 362, One elective credit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
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<tbody>
<tr>
<td>Year 3</td>
<td>+CS 330, 331 and 332 or 330</td>
<td>Two of C &amp; O 239b, 352a, 352b, 456a</td>
</tr>
<tr>
<td>Year 3</td>
<td>+C &amp; O: two of 352a/b, 353a, 456a</td>
<td>Two of CS 250, 330, 331</td>
</tr>
<tr>
<td>Year 3</td>
<td>Bus 388, 398</td>
<td>Two of Stat 270 or 273, 331</td>
</tr>
<tr>
<td>Year 3</td>
<td>One math credit††</td>
<td>One elective credit</td>
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<tr>
<th>Year 4</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Year 4</td>
<td>Three math credits††</td>
<td>Three math credits††</td>
</tr>
<tr>
<td>Year 4</td>
<td>Bus 481, 491</td>
<td>Bus 481, 491</td>
</tr>
<tr>
<td>Year 4</td>
<td>Two elective credits</td>
<td>One elective credit</td>
</tr>
</tbody>
</table>

**Notes**

1. †These three credits constitute the core requirements for this option. One of these credits may be delayed to Year 4 and certain substitutions can be made with special permission.

2. ††Recommended courses are:
   - Comb. & Opt.: C & O 451a/b, 452a/b, 453a, 454a/b
   - Comp. Sci: CS 240, 370, 371, 484
   - Statistics: Stat 340, 430, 440, 442
   - Actuarial Science: Stat 373, 383, 374, 384, 475, 485, 476, 480

3. At least six 300 or 400 level credits must be included in the honours programme with at least two credits at the 400 level.

### Chartered Accountancy Option

**Honours Programme | General Programme**

<table>
<thead>
<tr>
<th>Year 1</th>
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<tbody>
<tr>
<td>Year 1</td>
<td>See Bus. Admin.</td>
<td>See Bus. Admin.</td>
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<thead>
<tr>
<th>Year 2</th>
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<tbody>
<tr>
<td>Year 2</td>
<td>Math 230a/b, 231a/b, Stat 230, 231, Two of CS 250, Stat 270, C &amp; O 239b, Econ 291, 292</td>
<td>Math 220a/b, 221a/b, Stat 220, 221, Bus 352, 362, One elective credit</td>
</tr>
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<table>
<thead>
<tr>
<th>Year 3</th>
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<tbody>
<tr>
<td>Year 3</td>
<td>+CS 330, 331 and 332 or 330</td>
<td>Two of C &amp; O 239b, 352a, 352b, 353a, 453a, 456a</td>
</tr>
<tr>
<td>Year 3</td>
<td>+C &amp; O: two of 352a/b, 353a, 456a</td>
<td>Two of CS 250, 330, 331</td>
</tr>
<tr>
<td>Year 3</td>
<td>Bus 388, 398</td>
<td>Two of Stat 270 or 273, 331</td>
</tr>
<tr>
<td>Year 3</td>
<td>One math credit††</td>
<td>One elective credit</td>
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<tr>
<th>Year 4</th>
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<tbody>
<tr>
<td>Year 4</td>
<td>Three math credits††</td>
<td>Three math credits††</td>
</tr>
<tr>
<td>Year 4</td>
<td>Econ 393, 394, 491</td>
<td>Econ 393, 394, 491</td>
</tr>
<tr>
<td>Year 4</td>
<td>Bus 357</td>
<td>Bus 357</td>
</tr>
<tr>
<td>Year 4</td>
<td>One elective credit</td>
<td>One elective credit</td>
</tr>
</tbody>
</table>

**Notes**

1. †These three credits constitute the core requirements for this option. One of these credits may be delayed to Year 4 and certain substitutions can be made with special permission.

2. ††Recommended courses are:
   - Comb. & Opt.: C & O 451a/b, 452a/b, 453a, 454a/b
   - Comp. Sci: CS 240, 370, 371, 482, 484
   - Statistics: Stat 340, 430, 440, 442
   - Actuarial Science: Stat 373, 383, 374, 384, 475, 485, 476, 480

3. At least six 300 or 400 level credits must be included in the honours programme with at least two credits at the 400 level.
Management Accounting Option
This option is designed to prepare students for a career in Management Accounting. The programme, created in association with the Society of Industrial Accountants, leads to qualification for the designation R.I.A. (Registered Industrial Accountant). Graduates of the programme can qualify for 12 R.I.A. exam exemptions and may, while still undergraduates, also write 3 R.I.A. Uniform National Examinations.

The programme is identical to the Chartered Accountancy Option except that in Year 3 Business 388 must be included as one-half of the elective credit.

Pure Mathematics with Computer Science Minor
Course requirements are the same as for the corresponding regular programme, except that CS 180 is compulsory. This option is available only in stream 4 (i.e. with no work term between academic terms 4A and 4B). Employment during terms will be in Computer Science areas.

Teaching Option
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 will 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 Programme General Programme

Year 1
Math 130a/b, 134a/b
Math 120a/b, 124a/b
Two of CS 140, 180, 250
Two of CS 140, 180, 250
Three elective credits Three elective credits

Year 2
Math 230a/b, 231a/b
Math 220a/b, 221a/b
Stat 230, 231
Mthet1206a
Psych 241, 242
One math credit One term elective
One term elective

Year 3
One of Math 322a, 370, 371
Math 322b, 321a/b
Two math credits One math credit
Phil 311, 312
Soc 207G
One term elective One term elective

Year 4
Four math credits Three math credits
Two elective credits Two elective credits

Notes
1) All students must complete five of Stat 270, C & O 239a, C & O 239b, C & O 249b, C & O 330a, C & O 330b, C & O 449a, C & O 449b.
2) Honours students are required to complete at least seven 300 and 400 level credits with at least three credits at the 400 level.
3) All students must complete two full credits in Computer Science.
4) These two credits are required of all students in the co-operative Teaching option. Those students obtaining the B.Ed. degree from the Faculty of Education at Western must use these two credits as part of that degree’s requirements. In this case, two additional credits must be taken for the B.Math degree; that is, honours students must complete 26 full year courses, or equivalent, at Waterloo, and general students must complete 23 full year courses, or equivalent.

Honours Statistics – Economics Option

Year 1
Math 130a/b, 134a/b; CS 140, CS 180 or 250
Econ 101, 102
Two elective credits

Year 2
Math 230a/b; 231a/b; Stat 230/231
Two of AM 260, Stat 273, C & O 239a/b, CS 240
Econ 201, 202, 231, 311

Year 3
Math 331a/b; 332b; Stat 350/351
One of Math 332a; CS 472, 474
Two of CS 370, 371, C & O 352a/b
Four half courses in Economics, including 301, 302, 321

Year 4
At least four of Stat 340, 341, 450, 451, 452, 454
At least two additional half courses in Mathematics (CS 330, 331 and 446 are recommended).
Econ 401, 402, 411, 413
Faculty of Science

Chemistry lab
Faculty of Science

Introduction
The first students were enrolled in the Faculty of Science in the autumn of 1959. By the autumn of 1977, approximately 2,000 full-time students, of which 200 are graduate students, are taking programmes within the Faculty.

There are five teaching departments in the Faculty of Science: Biology, Chemistry, Earth Sciences, Physics, and the School of Optometry. Extensive instruction is also given by members of the University’s Faculties of Arts and Mathematics. Astronomy and Biophysics are taught in the Physics Department; Biochemistry is offered in the Chemistry Department; Botany, Microbiology and Zoology and certain courses embracing these fields together (e.g. Genetics, Cell Biology and Ecology) are taught in the Department of Biology. A programme specializing in Psychology is also available. All the departments as well as the School of Optometry offer post-graduate programmes and research facilities and descriptions are published in a separate Graduate Calendar. In addition, courses are provided for students in five other faculties.

The School of Optometry offers a 4-year professional programme leading to the degree of Doctor of Optometry (O.D.). Further information appears on p. 201.

Most Science students are enrolled on a full-time basis studying two terms in a conventional academic year. The Applied Physics and Applied Chemistry programmes are given exclusively on a co-operative basis with alternating terms of academic and industrial work; Refer to Chapter 5 for further information on the co-operative programmes.

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 (B.Sc.) 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 B.Sc. will be awarded on completion of the General Science Programme in either the three or four-year option. The honours degree, B.Sc. (Honours), will be awarded on completion of any of the honours programmes. M.Sc. and Ph.D. degrees are discussed in the Graduate Calendar.

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
Applicants must present the following Year 5 credits:
Two Science courses, one of which must be Physics or Chemistry. Both Physics and Chemistry are strongly recommended. Calculus and One of Functions & Relations or Algebra, preferably Functions & Relations.

Advanced-Standing
Students applying to co-operative programmes in the Faculty of Science will not normally be admitted above the Year 2 Term B level.

Students within the University and from other Universities or accredited institutions desiring to transfer into the Faculty of Science will be given admission credits for relevant courses based on the grades obtained and the number of transfer credits permitted. See p. 183 Transfer Students.

Admission as an Adult Student
It is recommended that applicants obtain standing in Ontario Year 5 (Grade 13) Mathematics and Science courses 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.

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 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) Standing

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.

Terminology

INC (either term work, lab work, examinations, 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.

"Course" may refer to a lecture course, a laboratory course, or a lecture-laboratory course which includes both lecture and laboratory.

A "Course-credit" refers to a lecture, or lecture-laboratory course which extends for one-full academic year. A one-term lecture-course is given 0.5 of a "course-credit".
Laboratory courses as designated by the letter L following the course number, are generally one-term courses, and carry 0.25 of a "course-credit" for a 3 hr/week or alternate week laboratory and 0.50 of a course-credit for a 6 hr/week laboratory.

"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).

**General Programmes**

- 3 year General
- 4 year General (Major)

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 course-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.

In the 4 year programme a 60% cumulative average must be maintained in the major field of study.

Of the total 15 course-credits required in the 3 year General programme at least 14 must be lecture-course credits. No more than 21 attempts will be allowed.

Of the total course-credits required in the 4 year General programme (20 or greater) at least 18 must be lecture-course credits the number dependent on the programme.

No more than 6 attempts over and above the number of course-credits required will be allowed.

Not more than 4 course-credits offered under the "Science" label may be applied to a general degree.

**Honours Programmes**

**Introduction**

Admission to the Co-operative Applied Chemistry and Physics programmes is at Year 1 (see Chapter 2 for Admission Requirements). All other programmes begin at the Year 2 level, admission to which requires a 60% overall average as well as 60% or better in the field of specialization.

To be eligible for an Honours degree a student must have been enrolled in two out of three of Years 2, 3 and 4 of an Honours Programme, one of which must be Year 4.

**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.
- A 60% cumulative average must be maintained in all courses 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 course-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 course-credits be allowed per academic year and normally a minimum of 3.0 course-credits must be obtained.

**Honours Programmes**

- Honours Biology- regular
- Honours Biology and Chemistry- regular
- Honours Chemistry- regular and co-operative applied
- Honours Earth Sciences- regular and co-operative applied
- 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 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.

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.

**Note**

Students required to withdraw from the Faculty of Science may be eligible to apply for re-admission only after one year's absence.

**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. Students must have a 60% average to proceed to term 2A. Those below this average may be transferred to the General programme (non-co-op) in good standing if possible or may be allowed to repeat the 1B term in Conditional Standing in order to remain in the co-op programme.

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.

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).

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 course-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 full-year course-credits) regardless of the number of transfer credits they present.

Upgrading of B.Sc. 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 B.Sc. or its equivalent to a Waterloo Honours B.Sc. 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.

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.

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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.

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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.
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 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) A student may withdraw from the University as late as the official course drop date without being held responsible for that term's courses.

Academic Programmes

Students entering first year in the Faculty of Science are essentially enrolled in a common year. Year 1 co-operative Applied Chemistry and co-operative Applied Physics are labelled as such but all other students are officially in Year 1 regular Science. Year 1 regular Science students are not designated as Honours or General or according to any specific programme.

(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 any Year 2 programme in Science provided he or she has taken the necessary courses in Year 1 and has achieved the necessary passing average; the only exception to this is in the Optometry programme where enrolment limitation may be necessary in Year 2.

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, 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 recommended Year 1 selections for various Year 2 Honours or General Science-Major programmes follow; in most cases the number of required courses is only two or three with up to two more recommended (but not compulsory). To enter a Year 2 programme a student must achieve the Year 1 average necessary and must have taken the required courses.

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. 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.
## Year 1 Science Programme Selections Leading to Year 2 Honours or Major Programmes

### Regular 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>Biology</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Biology and Chemistry</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Chemistry (Environmental Studies Option)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Chemistry (Mathematics Option)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Chemistry (Physics Option)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Earth Sciences (see Note 5)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Earth Sciences (Geography Option)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Optometry (see Note 4 and p. 201)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Optometry (see Note 1)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Psychology</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>General Science &amp; Business</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
</tbody>
</table>

### 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 (See Note 2)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Applied Physics (See Notes 1 and 3)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Applied Earth Sciences (See Notes 3 and 5)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
<tr>
<td>Applied Earth Sciences (Geotechnical Option) (See Note 3)</td>
<td>Required Courses in Year 1</td>
<td>Recommended Electives in Year 1</td>
</tr>
</tbody>
</table>
**Note 1**
Students desiring the Biophysics option of the Honours Physics programme are advised to include Biology 131 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 El E are advised to select SY De 183 or Gen E 115 (Fall term) and CS 118 (Winter term).

**Note 2**
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.

**Note 3**
All co-operative Applied Physics students take Year 1 as two terms in a row (see page 185).

**Note 4**
Students planning to apply for admission to Year 2 Optometry should note that a year of Chemistry is required for all students lacking a Chemistry background in Ontario Year 5 or its equivalent—for these students Chem 111-112 is recommended rather than 121-122. Phys 162-163 and 162L-163L may be taken instead of Phys 121-122 and 121L-122L.

**Note 5**
Earth science majors planning to enter the co-operative programme and desiring elective courses in Biology should take Biol 131 during their first year.

By the end of Year 2, students must have completed Phy 111-112 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).

**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 Chem 111-112 or 121-122.

**Biology**

**Biology 110**
Introductory Zoology. (Available to students other than those intending to major in Biol or to enter the School of Optometry. Credit will not be given in more than one of Biol 110, 130, 131 or 132).

**Biology 130**
Introduction to Biology. This course is the same as Bio 131 without the laboratory component. (For non-Biology Majors only).

**Biology 131**
Introduction to Biology. This course is the normal selection for those wishing a Biology elective in first year and who are not intending to major in Biology or to enter the School of Optometry. It is for all students whether or not Year 5 Biology was taken in secondary school.

**Biology 132**
Principles of Biology. This course is for those wishing to major in Biology or to enter the School of Optometry. It is for all such students whether or not Year 5 Biology was taken in secondary school.

**Earth Sciences**

**Earth Sciences 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**

**Chemistry 121-122**
Chemical Structure 121 and Chemical Reaction 122 (with the associated laboratories, 121L-122L) are the normal selection for those wishing to major in Chemistry, or those electing a first year Chemistry course.
Chemistry 111-112
For students without Ontario Year 5 Chemistry (or its equivalent) the General Chemistry courses 111 and 112, (with their laboratories 111L and 112L) are recommended.

All these courses involve 3 lectures and 3 hours laboratory per week.

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 185.
(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 Cyto genetics (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-course)

Year 3†† At least two full courses 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 Microbial Form and Function (1.0)
Biol 338 Plant Anatomy & Morphogenesis (0.5)

Plus at least two full courses from
Biol 336 Mycology 1 (0.5)
Biol 340 Molecular Biology (0.5)
Biol 341 Cell Physiology (0.5)
Biol 342 Vertebrate Physiology (1.0)
Biol 343 Histology & Cytology (0.5)
Biol 345 Plant Physiology (0.5)
Biol 346 Population Ecology (0.5)

Plus
Chem 332 Biochemistry 1 (0.5)
Chem 332L Biochemistry 1 Laboratory (.25)
Chem 333 Biochemistry 2 (0.5)
Chem 333L Biochemistry 2 Laboratory (.25)
One Elective (1 full-course or equivalent:
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.
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.

### Year 4

5 full courses of which at least 3 must be Biol400-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.)

### Note regarding Electives

A listing of Science and other electives is found on page 205. 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.

## Honours Biology and Chemistry

### Year 1

Normal Year 1 Science (see page 185) in which Chem 121-121L, 122-122L, Biol 132, Math 113 are required; a first year Physics course is recommended. (Course weight is shown in parentheses)

### Year 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol 231</td>
<td>Concepts of Ecology (0.5)</td>
</tr>
<tr>
<td>Biol 232</td>
<td>Non-Vascular Plants (0.5)</td>
</tr>
<tr>
<td>Biol 234</td>
<td>Vascular Plants (0.5)</td>
</tr>
<tr>
<td>Biol 235</td>
<td>Fundamentals of Microbiology (1.0)</td>
</tr>
<tr>
<td>Biol 237</td>
<td>Introductory Invertebrate Zoology (0.5)</td>
</tr>
<tr>
<td>Biol 238</td>
<td>Introductory Vertebrate Zoology (0.5)</td>
</tr>
<tr>
<td>Biol 239</td>
<td>Cytogenetics (0.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 212</td>
<td>Structure and Bonding (0.5)</td>
</tr>
<tr>
<td>Chem 220</td>
<td>Introductory Analytical Chemistry (0.5)</td>
</tr>
<tr>
<td>Chem 220L</td>
<td>Analytical Chemistry Laboratory 1 (0.5)</td>
</tr>
<tr>
<td>Chem 221L</td>
<td>Analytical Chemistry of Multi-Component Systems (0.5)</td>
</tr>
</tbody>
</table>

### Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol 331</td>
<td>Vertebrate Zoology (0.5)</td>
</tr>
<tr>
<td>Biol 332</td>
<td>Arthropod Zoology (0.5)</td>
</tr>
<tr>
<td>Biol 333</td>
<td>Invertebrate Zoology (0.5)</td>
</tr>
<tr>
<td>Biol 334</td>
<td>The Flowering Plants (0.5)</td>
</tr>
<tr>
<td>Biol 335</td>
<td>Microbial Form and Function (1.0)</td>
</tr>
<tr>
<td>Biol 336</td>
<td>Mycology 1 (0.5)</td>
</tr>
<tr>
<td>Biol 338</td>
<td>Plant Anatomy and Morphogenesis (0.5)</td>
</tr>
</tbody>
</table>

### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol 340</td>
<td>Molecular Biology (0.5)</td>
</tr>
<tr>
<td>Biol 341</td>
<td>Cell Physiology (0.5)</td>
</tr>
<tr>
<td>Biol 342</td>
<td>Vertebrate Physiology (1.0)</td>
</tr>
<tr>
<td>Biol 343</td>
<td>Histology and Cytology (0.5)</td>
</tr>
<tr>
<td>Biol 345</td>
<td>Plant Physiology (0.5)</td>
</tr>
<tr>
<td>Biol 346</td>
<td>Population Ecology (0.5)</td>
</tr>
</tbody>
</table>

### Plus

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 332-333</td>
<td>Biochemistry 1 (0.5) and 2 (0.5)</td>
</tr>
<tr>
<td>Chem 356-357</td>
<td>General Physical Chemistry 1 (0.5) and 2 (0.5)</td>
</tr>
<tr>
<td>Chem 364</td>
<td>Organic Chemistry 2 (0.5)</td>
</tr>
<tr>
<td>Chem 365</td>
<td>Organic Chemistry 3 (0.5)</td>
</tr>
<tr>
<td>Chem 356L-357L</td>
<td>General Physical Chemistry Laboratory 1 (0.25) and 2 (0.25)</td>
</tr>
<tr>
<td>Chem 364L</td>
<td>Organic Chemistry Laboratory 2 (0.5)</td>
</tr>
</tbody>
</table>

### 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.

### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol 419</td>
<td>An Introduction to Transition Metal Chemistry (0.5)</td>
</tr>
<tr>
<td>Chem 419</td>
<td>Biological Aspects of Inorganic Chemistry (0.5)</td>
</tr>
<tr>
<td>Chem 432-433</td>
<td>Biochemistry 3 (0.5) and 4 (0.5)</td>
</tr>
<tr>
<td>Chem 432L-433L</td>
<td>Biochemistry 3 (0.25) and 4 (0.25)</td>
</tr>
</tbody>
</table>

### Note

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.

## Honours Chemistry

This programme fulfills the academic requirements for professional membership in the Chemical Institute of Canada.

### Year 1

Normal Year 1 Science (see page 185) including Chem 121-121L, 122-122L, Math 113 and Phys 121-122, 121L-122L.
### 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 (0.5)
- Chem 254  Physical Chemistry 1 (0.5)
- Math 215  Differential Equations (0.5)

- One elective

**Winter Term**

- Chem 10  Chemistry Seminar
- Chem 221  Analytical Chemistry of Multi-Component Systems (0.5)
- Chem 221L  Analytical Chemistry Laboratory 2 (0.25)
- 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

### 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 (0.5)

- Two electives†

**Winter Term**

- Chem 10  Chemistry Seminar
- Chem 313  Main Group Chemistry (0.5)
- Chem 315L  Inorganic Chemistry Laboratory 2 (0.5)
- Chem 356  Physical Chemistry 4 (0.5)
- Chem 358L  Physical Chemistry Laboratory 2 (0.5)
- Chem 365  Organic Chemistry 3 (0.5)

- Two electives†

### Year 4

- Chem 10  Chemistry Seminar
- Chem 492  Advanced Laboratory (1.0)

- Eight one-term electives†

† 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**

(odd years; next offered Fall 1978) Chem 342

**Fall Term**

(even years; next offered Fall 1979) Chem 440

**Winter Term**

(Odd years, next offered Winter 1979) Chem 409, 416, 456

**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 for 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.

### Year 1

Normal Year 1 Science (see page 185) including

- Chem 121-121L, 122-122L, Math 113 and Phys 121-122 and 121L-122L
### First Group: Commencing with the Fall 1975 intake into year one

*For course details see Hons. Chem. (page 189)*

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 2A</strong></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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Term</th>
<th>Year 3A</th>
<th>Work Term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chem 10, 313, 314L, 358, 355L, 364, 364L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Electives†</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Term</th>
<th>Year 3B</th>
<th>Work Term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chem 10, 312, 315L, 355, 358L, 365, 365L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Electives†</td>
<td></td>
</tr>
</tbody>
</table>

**Year 4**
Chem 10, 492
Eight Electives†

### 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></td>
<td>Chem 10, 220, 220L, 254, 264, 264L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Math 215</td>
<td></td>
</tr>
<tr>
<td></td>
<td>One Elective</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Term</th>
<th>Year 2B</th>
<th>Work Term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chem 10, 212, 255, 364, 364L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phys 243, 243L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>One Elective</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Term</th>
<th>Year 3A</th>
<th>Work Term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chem 10, 221, 221L, 312, 314L, 355L, 365</td>
<td></td>
</tr>
<tr>
<td></td>
<td>One Elective†</td>
<td></td>
</tr>
</tbody>
</table>

**Year 4**
Chem 10, 492
Eight Electives†

†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, 354, 363, 416, 420, 421, 453, 457, 454, 455, 456. Other electives may be chosen from the Chemistry Electives list on page 189.
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 185) including Chem 121-121L, 122-122L, Math 113, and Phys 121-122, 121L-122L, Biol 131 or 132, 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 (0.5)
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 (0.25)
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 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)
Stat 204 Statistics for the Sciences (0.5)

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 (1.0)
Env St 400 Environmental Law (1.0)

Four one-term (Recommended courses include:
Chem courses Chem 311, 320-320L, 332-332L, 419, 420, 455)

Environmental studies 402 Environmental Law is a required one-term course to be taken in third or fourth year.

The following courses are suitable for completing the requirements for the Environmental Studies Option. Seven one-term courses are required to complete the degree. Students are strongly recommended to select courses from at least three of the divisions. All courses are one semester courses (0.5 credit) except M. Env 410 (1.0 credit).

Env St 195B Introduction to Environmental Problems
Env St 200 Field Ecology (2nd, 3rd, or 4th year)
Env St 358 Environmental Pollution and its Control
M Env 320 Environmental Economics
M Env 356 Canadian Non-Renewable Resources
M Env 357 Conservation and Resource Management (Prereq. Env St 200)
M Env 410 Honours Seminar: Environmental Management (Y)
Plan 156 Introduction to Urban and Regional Planning Concepts
Geog 303 Physical Basis and the Geography of Water
Geog 356 Resources Management
Geog 411 Resource Studies (Prereq. Geog 356)
Geog 414 Resources Management Workshop (Prereq. Geog 356)
Earth 221 Geochemistry 1 (without lab)
Earth 421 Geochemistry 2 (without lab) (Prereq. Earth 221)
Earth 641 Isotope Geochemistry
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 185). 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 Introductory Analytical Chemistry (0.5)
Chem 220L Analytical Chemistry Laboratory 1 (0.5)
Chem 254 Physical Chemistry 1 (0.5)
Math 216 Differential Equations (0.5)
or CS 370 Introduction to Scientific Computation (0.5)
Math 220, 221a, 231a, 213.

Winter Term
Chem 10 Chemistry Seminar
Chem 221 Analytical Chemistry of Multi-Component Systems (0.5)
Chem 221L Analytical Chemistry Laboratory 2 (0.25)
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)
Math 220, 221b, 231b, 213.

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)
Math 322a, 331, AM 365 plus:
One elective

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 355 Organic Chemistry 3 (0.5)
One of:
Math 322b, 331, AM 371 plus:
One elective

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 185) but the first year Phys course selected should be 121-121L, 122-122L or 162-162L, 163-163L. A full-year course in Algebra 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 Introductory Analytical Chemistry (0.5)
Chem 220L Analytical Chemistry Laboratory 1 (0.5)
Chem 254 Physical Chemistry 1 (0.5)
Math 210 Calculus 2 (0.5)
Phys 222 or 252 Electricity and Magnetism 1 (0.5)
Phys 222L or 252L 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 (0.25)
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 253 Electricity and Magnetism 2 (0.5)
Phys 223L or 253L 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†

Winter Term
Chem 10 Chemistry Seminar
Chem 313 Main Group Chemistry (0.5)
Chem 315L Inorganic Chemistry Laboratory 2 (0.25)
Chem 355 Physical Chemistry 4 (0.5)
Chem 355L Physical Chemistry Laboratory 2 (0.5)
Chem 365 Organic Chemistry 3 (0.5)
Phys 395 Atomic and Nuclear Physics 2 (0.5)
One Elective†

Year 4
Chem 10 Chemistry Seminar
Chem 492 Advanced Laboratory (1.0)
Two one-term Chemistry courses which must be at the 400-level.
Four one-term Physics courses at the 300- or 400 level.
Two one-term electives.

Honours Earth Sciences
Completion of this programme requires a total of 23.5 course-credits (including Year one). Of these, at least 19 must be from courses in the Faculties of Science and Mathematics, including all required courses, and 2 must be from courses in the Faculty of Arts. In addition, attendance on two field trips is required (Earth 390-490).

A list of recommended Science and Mathematics electives is given on page 194.

Year 1
(For a complete discussion of Year 1, see page 185)

Year 2
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 course-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, 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 3
Earth 331 Igneous Petrology (0.5)
Earth 332 Metamorphic Petrology (0.5)
Earth 333 Sedimentology 1 (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 course-credits, normally one from courses in Sciences or Mathematics and one from Arts.

† Year 3 electives may be chosen from Phys 352-353 plus 352L-353L, 362-363, 364-365, Math 221a-221b, 222b, CS 370.
### 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.

#### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth 490</td>
<td>Field trip</td>
</tr>
<tr>
<td>Earth 436</td>
<td>Thesis (1.0)</td>
</tr>
<tr>
<td>Earth 427</td>
<td>Crustal Evolution (0.5)</td>
</tr>
<tr>
<td>Earth 421</td>
<td>Geochmistry 2 (0.5)</td>
</tr>
<tr>
<td>Earth 432</td>
<td>Precambrian Geology (0.5)</td>
</tr>
<tr>
<td>Earth 434</td>
<td>Biostratigraphy (0.5)</td>
</tr>
<tr>
<td>Earth 435</td>
<td>Advanced Structural Geology (0.5)</td>
</tr>
<tr>
<td>Earth 438</td>
<td>Engineering Geology (0.5)</td>
</tr>
<tr>
<td>Earth 439</td>
<td>Groundwater Geology (0.5)</td>
</tr>
<tr>
<td>Earth 440</td>
<td>Quaternary Geology (0.5)</td>
</tr>
<tr>
<td>Earth 456</td>
<td>Mathematical Geology 2 (0.5)</td>
</tr>
<tr>
<td>Earth 461</td>
<td>Applied Geophysics 2 (0.5)</td>
</tr>
<tr>
<td>Earth 470</td>
<td>Metallic Mineral Deposits (0.5)</td>
</tr>
</tbody>
</table>

**Electives**

- One course-credit, not from Earth Sciences

---

### Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth 121</td>
<td>Introductory Geology 1 (0.5)</td>
</tr>
<tr>
<td>Earth 122</td>
<td>Introductory Geology 2 (0.5)</td>
</tr>
<tr>
<td>Geog 102</td>
<td>Introduction to Physical Geography (0.5)</td>
</tr>
<tr>
<td>Chem 121</td>
<td>Chemical Structure (0.5)</td>
</tr>
<tr>
<td>Chem 121L</td>
<td>Chemical Structure Laboratory (0.5)</td>
</tr>
<tr>
<td>Chem 122</td>
<td>Chemical Reaction (0.5)</td>
</tr>
<tr>
<td>Chem 122L</td>
<td>Chemical Reaction Laboratory (0.5)</td>
</tr>
</tbody>
</table>

**Electives**

- Seven half-courses from:
  - Field trip
  - Thesis (1.0)
  - Crustal Evolution (0.5)
  - Precambrian Geology (0.5)
  - Biostratigraphy (0.5)
  - Advanced Structural Geology (0.5)
  - Engineering Geology (0.5)
  - Groundwater Geology (0.5)
  - Quaternary Geology (0.5)
  - Mathematical Geology 2 (0.5)
  - Applied Geophysics 2 (0.5)
  - One of:
    - Geog 101: Introduction to Human Geography (0.5)
    - Geog 125R: Introduction to the Developing World (0.5)

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#### 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.

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### 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.

#### Year 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth 221</td>
<td>Geochemistry 1 (0.5)</td>
</tr>
<tr>
<td>Earth 231</td>
<td>Mineralogy (0.5)</td>
</tr>
<tr>
<td>Earth 232</td>
<td>Petrography (0.5)</td>
</tr>
<tr>
<td>Earth 235</td>
<td>Stratigraphy (0.5)</td>
</tr>
<tr>
<td>Earth 236</td>
<td>Principles of Paleontology (0.5)</td>
</tr>
<tr>
<td>Earth 260</td>
<td>Introductory Structural Geology (0.5)</td>
</tr>
<tr>
<td>Env St 200</td>
<td>Field Ecology (0.5)</td>
</tr>
<tr>
<td>Geog 201</td>
<td>Some Basic Topics of Physical Geography (0.5)</td>
</tr>
<tr>
<td>Geog 202</td>
<td>Some Basic Topics of Economic and Urban Geography (0.5)</td>
</tr>
</tbody>
</table>

**Electives**

- Three half course-credits including one of:
  - Geog 203: Some Basic Topics of Cultural and Regional Geography (0.5)
  - Geog 220: World Regional Geography (1.0)

---

### Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth 331</td>
<td>Igneous Petrology (0.5)</td>
</tr>
<tr>
<td>Earth 332</td>
<td>Metamorphic Petrology (0.5)</td>
</tr>
<tr>
<td>Earth 333</td>
<td>Sedimentology 1 (0.5)</td>
</tr>
<tr>
<td>Earth 336</td>
<td>Paleontology (0.5)</td>
</tr>
<tr>
<td>Earth 342</td>
<td>Geomorphology (0.5)</td>
</tr>
<tr>
<td>Earth 345</td>
<td>Historical Geology (0.5)</td>
</tr>
<tr>
<td>Earth 370</td>
<td>Geology of non-renewable Primary Resources (0.5)</td>
</tr>
<tr>
<td>Geog 381</td>
<td>Special Topics</td>
</tr>
<tr>
<td>Earth 390</td>
<td>Field Camp</td>
</tr>
<tr>
<td>Geog electives</td>
<td>One course-credit</td>
</tr>
<tr>
<td>Elective</td>
<td>One course-credit</td>
</tr>
</tbody>
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### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth 436</td>
<td>Honours Thesis (1.0)</td>
</tr>
<tr>
<td>Earth 490</td>
<td>Field Camp</td>
</tr>
<tr>
<td>Earth Electives</td>
<td>Three course-credits</td>
</tr>
<tr>
<td>Geog electives</td>
<td>One course credit</td>
</tr>
<tr>
<td>Elective</td>
<td>One course credit</td>
</tr>
</tbody>
</table>

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Co-operative Applied Earth Sciences

The co-operative programme in Earth Sciences is an Honours programme designed to satisfy the requirement 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 185. The co-operative Earth Sciences programme 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.

<table>
<thead>
<tr>
<th>F</th>
<th>W</th>
<th>S</th>
<th>Wk Tm</th>
<th>Year 4A 4B</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A</td>
<td>Wk Tm 1</td>
<td>2B</td>
<td>Wk Tm 2</td>
<td>3A</td>
</tr>
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The normal progress of a student entering co-operative Earth Sciences in his second academic year in the Fall of 1978 is shown in the table above. Completion of this course requires a total of 23.5 course-credits (including year one). Of these at least 19 must be from courses in the Faculties of Science and Mathematics, including all required courses, and 2 must be from courses in the Faculty of Arts. 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 194.

Year 2A
- Earth 231: Mineralogy (0.5)
- Earth 235: Principles of Paleontology (0.5)
- Earth 236: Stratigraphy (0.5)
- Electives: Three half course-credits, normally two from courses in Science and/or Mathematics and one from Arts.

Year 2B
- Earth 221: Geochemistry 1 (0.5)
- Earth 232: Petrography (0.5)
- Earth 260: Introductory Structural Geology (0.5)
- Electives: Three half course-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, General Physics (or an equivalent physics course), Math 113, Calculus, and a course involving computer programming (for example, CS 118 or Gen E 121).

Year 3A
- Earth 332: Metamorphic Petrology (0.5)
- Earth 333: Sedimentology 1 (0.5)
- Earth 345: Historical Geology (0.5)
- Earth 370: Economic Geology (0.5)
- Electives: Two half course-credits, normally one from Science or Mathematics and one from Arts.

Year 3B
- Earth 331: Igneous Petrology (0.5)
- Earth 336: Paleontology (0.5)
- Earth 342: Geomorphology (0.5)
- Earth 360: Applied Geophysics 1 (0.5)
- Earth 390: Field Camp
- Electives: Two half course-credits, normally one from Science or Mathematics and one from Arts.

Year 4A 4B
- Identical to regular programme in Honours Earth Sciences.

Co-operative Applied Earth Sciences
(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 programmes and the needs of 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 185.

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)
- Earth 236: Principles of Paleontology (0.5)
- Civ E 203: Statics (0.5)
- Math 216: Differential Equations (0.5)
- or: Civ E 222
- Math 114: Algebra and vector geometry (0.5)

Year 2B
- Earth 221: Geochemistry (0.5)
- Earth 232: Petrography (0.5)
- Earth 260: Intro. Structural Geology (0.5)
- Civ E 280: Fluid Mechanics (0.5)
- ME 19: Mechanics of Deformable Solids (0.5)
- Arts-Elective (0.5)
Year 3A
Earth 332  Metamorphic Petrology (0.5)
Earth 333  Sedimentology 1 (0.5)
Earth 370  Economic Geology (0.5)
CivE 265  Structure and Properties of Materials (0.5)
CivE 292  Engineering Economics (0.5)
CivE 353  Geology and Soil Mechanics (0.5)

Year 3B
Earth 331  Igneous Petrology (0.5)
Earth 342  Geomorphology (0.5)
Earth 360  Applied Geophysics 1 (0.5)
Earth 355  Mathematical Geology 1 (0.5)
CivE 200  Civil Engineering Project 1 (0.5)
CivE 354  Soil Mechanics and Foundations (0.5)
Earth 390  Field Camp

Year 4
Earth 490  Field Camp
Earth 436  Honours Thesis (1.0)
Earth 427  Crustal Evolution (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)
Electives three half course-credits from Earth Sciences or Civil Engineering (with at least one from Civil Engineering) and one full 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 course credits (including Year one). It is recommended that students intending to take an Honours Physics programme should take six lecture course-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 185).
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 course credits. All suggested programmes are subject to timetable restrictions.

Ex 1 Honours Physics
(with extra emphasis on experimental physics)
Core plus: Year 2
Phys259, 259L, 270-271, CS210 and CS240.
Core plus: Year 3
Core plus: Year 4
Phys432, 433, 435, 464, 465
Two of: Phys442, 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
Phys433 or 437A, 435, Chem 356-357, Sci 400, Arts Electives totalling 0.5 or 1.0 credit

Ex 3 Honours Physics
(with Biophysics)
Core plus: Year 2
Stat220
Three of: Chem254, 255, 266, 267, Biol245, 246
Core plus: Year 3
Three of: Phys352, 352L, 353, 353L, 380, 381
One of: Biol341, 343, 239, Chem 356, 357, 332, 333, 353
Core Plus: Year 4
Phys433, 434B, 435, 480, 481
2.0 credits from: Biol434, 448, 449, Chem 432, 433, 434, 453, 454, 457

Ex 4 Honours Physics
(with Computing)
Core plus: Year 2
Phys259, 259L, CS210, CS240, Arts Elective
Core plus: Year 3
Phys352, 352L, 353, 353L
Two of: Stat220, CS340, 350, CS370, 371
Core plus: Year 4
Phys435, 452, 453, EIE324, Phys433 or 437A, electives totalling 1.0 or 1.5 credits.

Ex 5 Honours Physics
(with Chemistry)
Core plus: Year 2
Chem218-219, 254-255, CS210 or CS240
Core plus: Year 3
Phys352, 352L, 371A, Chem266-267, Elective
Core plus: Year 4
2.0 credits from Phys434B, 435, Chem350, 355, 358, 312, 311, Elective

Ex 6 Honours Physics
(with Astrophysics)
Core plus: Year 2
Phys250, 251, 270, CS210, CS240
Core plus: Year 3
Two of: Phys350, 351, 352-352L, 353-353L, 449, 459, 451, Arts Electives totalling 1.0 credit
Core plus: Year 4
Phys434B,

Ex 7 Honours Physics
– Business Administration Option
See comments regarding the Business Administration Option under General Science & Business on page 207.
Core plus: Year 1 Special Requirements
Econ101-102, CS116, or CS140
Core plus: Year 2
Econ201-202, 191-192
Core plus: Year 3
Bus (WLU) 212-222, 255-275, MSc406
Core plus: Year 4
Econ383-394, Bus (WLU) 385-395, MSci407
(Phys360A and 360B are not normally taken with this option)

Ex 8 Honours Physics
(with Geophysics)
Core plus: Year 2
Phys259, 259L, Earth231, 232, 235
Core plus: Year 3
Phys369, 369, Earth260, 1.0 credit from Earth Sciences
Core plus: Year 4
Four credits from: Phys352-352L, 353-353L, 433, 438, CS210-240, selected Earth Science courses

Ex 9 Honours Physics
(with Electrical Engineering)
Core plus: Year 1
SyDe163 or GenE115 (Fall term), and CS140
(Winter term)
Core plus: Year 2
Phys259, 259L, ElE221, 241
Core plus: Year 3
Phys352, 353, 352L, 353L, ElE316 and one or two of ElE324, 380, 261

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
Phys259, 259L, Math231a-231b, elective
Core plus: Year 3
Phys355, Mathematics Elective, elective
Core Plus: Year 4

Science
Academic Programmes

Note
Students interested in this programme are advised to take Math111a-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: CS370, 371, C & O351a-351b, C & O352a-352b, AM362, AM382, CS369, CS360, AM461, C & O437a-437b, C & O459a, AM468, AM476, CS484, P Math470.

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 year, 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.

The programme must include a total of twenty-four course credits (including Year 1). It is recommended that students intending to take an honours physics programme should take six lecture course-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.

The following table shows the normal progress of students in the Applied Physics programme. This arrangement has been found advantageous since it provides more relevant work experience in senior years.

<table>
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<th>1978</th>
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<tr>
<td>Fall</td>
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<td>4</td>
<td>3A</td>
<td>5</td>
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Further information about the co-operative work terms and the Co-ordination Department can be found starting in Chapter 5.

Year 1
(For a complete discussion of Year 1, see page 185).

Year 2A Core
Phys 10  Physics Seminar
Phys 256  Wave Motion and Optics (0.5)
Phys 256L  Physical Optics Lab (0.25)
Phys 254  Thermal Physics and Properties of Matter (0.5)
Math 213A  Advanced Calculus (0.5)
Math 216a  Differential Equations (0.5)

Year 2B Core
Phys 10  Physics Seminar
Phys 253  Electricity and Magnetism (0.5)
Phys 253L  Electricity and Magnetism Lab (0.25)
Phys 255  Quantum Physics (0.5)
Math 213B  Advanced Calculus (0.5)

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
Phys 10  Physics Seminar
Phys 354  Atomic and Molecular Physics (0.5)
Phys 358  Thermodynamics (0.5)
Phys 360A  Intermediate Laboratory (0.25)
Phys 362  Classical Mechanics 1 (0.5)
Phys 364  Mathematical Physics 1 (0.25)
One of: Phys 371A, 352L (Laboratory) (0.25)

Year 3B Core
Phys 10  Physics Seminar
Phys 360B  Intermediate Laboratory (0.25)
Phys 359  Statistical Mechanics (0.5)
Phys 363  Classical Mechanics 2 (0.5)
Phys 365  Mathematical Physics 2 (0.5)
One of: Phys 371A, 371B, 353L (Laboratory) (0.25)

Note
Students desiring Phys 444 must elect Phys 355.

Year 4A-4B Core
Phys 10  Physics Seminar
Phys 434A  Introductory Quantum Mechanics (0.5)
Phys 441  Electromagnetic Theory (1.0)
Phys 355  Nuclear and Particle Physics (if not taken in Year 3) (0.5)

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 course credits.

Ex 1 Co-op Applied Physics
(Solid State)
Core plus: Year 2A
Phys 270, CS 210
Core plus: Year 2B
Phys 259, 259L, 271, Chem 311 or CS 240
Core plus: Year 3A
Phys 352, 352L, 371A
Core plus: Year 3B
Phys 353, 353L, 355, 371B
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 363, 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 342, 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 207.

Core plus: Year 1 Special Requirements  
Econ 101-102, CS 115 or CS 116

Core plus: Year 2  
Econ 201-202, 191-192

Core plus: Year 3  
Bus (WLU) 212-222, 255, 275, M Sci 406

Core plus: Year 4  
Econ 393-394, Bus (WLU) 385-395, 388-398, M Sci 407  
(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  
EIE 221

Core plus: Year 2B  
Phys 259, 259L, EIE 316

Core plus: Year 3A  
Phys 352, 352L

Core plus: Year 3B  
Phys 353, 353L, EIE 241 and one or two of EIE 324, 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  

Honours Psychology
Year 1  
is a normal Year 1 programme of the Faculty of Science  
(see page 185) with Mathematics 113, Physics 111-112, or  
121-122 and 121L-122L, Biology 131 or 132, Chemistry  
121-122 and 121L-122L, Psychology 101-102

Year 2  
Psych 283  
Statistical Methods in Psychology (0.5)
Psych 284  
Experimental Design (0.5)
One of Psych  
Research (0.5)  
293, 295, or 297
Psych Electives* (1.5)
Science Electives** (2.0)
Unspecified Elective (1.0)

Year 3  
Psych 285  
Tests and Measurements (0.5)
One of Psych  
Research (0.5)
393, 395, or 397
Psych Electives* (2.0)
Science Electives** (2.0)
Unspecified Elective (1.0)
Optometry Programme

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 185. Additional admission requirements and regulations for Examinations and Standings will be found on pages 180-182.

Selection Factors
All applicants should note that enrolment in the first professional year is limited to sixty and that in 1977 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 professional 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 January 1, 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.

As with other health care professions, graduates in optometry must hold the certificate of the licensing body of the province in which they choose to 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
Biol201 Anatomy, Histology and Embryology
Chem268 Introductory Organic Chemistry (0.5)
Chem268L Introductory Organic Chemistry Laboratory (0.25)
Optom200 History and Orientation (0.5).
Optom206 Geometrical Optics (0.5)
Optom224 Anatomy of the Eye and Associated Structure (0.5)
Psych283 Statistical Methods in Psychology (0.5)

Winter Term
Biol201 Anatomy, Histology and Embryology
Optom211 Physiological Optics (0.5)
Optom234 Anatomy of the Eye and Associated Structures (0.5)
Psych246 Physical Optics (0.5)
Phys246L Optics Laboratory (0.25)
Chem237 Introductory Biochemistry (0.5)
Chem237L Introductory Biochemistry Laboratory (0.25)

Year 3
Fall Term
Biol301 Vertebrate Physiology (first term) (0.5)
Optom301 Physiological Optics (0.5)
Optom302 Clinical Optometry (0.5)
Optom305 General Pathology (0.5)
Optom306 Optometrical Optics (0.5)

Winter Term
Biol301 Vertebrate Physiology (second term) (0.5)
Optom301 Physiological Optics (0.5)
Optom302 Clinical Optometry (0.5)
Optom305 General Pathology (0.5)
Optom306 Optometrical Optics (0.5)

Year 4
Fall Term
Optom401 Physiological Optics (0.5)
Optom402 Clinical Optometry (0.5)
Optom404 Physiology of Visual Systems (0.5)
Optom405 Ocular Pathology (0.5)
Optom406 Optometrical Optics (0.5)
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. No more than 4 course-credits offered under the "Science" label may be applied towards an Honours Science degree.

A 60% cumulative overall average in all Faculty of Science courses is required in programme (1); 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.

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-course credits, exclusive of laboratory credits. At least two of these must be Science courses chosen from: Year 1 Biology courses; Chem 111-112 + labs or Chem 121-122 + labs; Earth 121-122; Phys 111-112 or Phys 121-122 + labs or Phys 162-163 + labs.

All programmes require the successful completion of 22 or more course-credits, the number depending on the respective programme, including at least 14 Faculty of Science course-credits.

Years 2, 3 & 4
4 Science course-credits per year plus 2 other course-credits per year in Years 2 and 3; 1 other course-credit in Year 4. Of the total required 14 Faculty of Science course-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 165)

Year 2
3 course-credits from Biology 231, 232, 234, 235, 237 or 247, 236, 239.
Chemistry 266-267 and 267L
2 other course-credits (Stat 202 is recommended).
Science
Honours Science Programme

Programme (3)
Honours Science (with specialization in Chemistry)
(for Year 1, see page 185 under "Chemistry").

Year 2 (see notes below)
3 Chemistry lecture course-credits, at least 2 of which
must be chosen from Chemistry 212, 220, 221, 264,
254, 255.
1 lecture-course-credit to be chosen from Physics,
Biology or Earth Sciences. (Not Science-labelled
courses)
Elective course-credits to give a total of at least 6 course
credits in the Year.

Year 3 (see notes below)
3 Chemistry course-credits at the 300-level or higher. 1
lecture-course-credit to be chosen from Physics, Biology
or Earth Sciences (Not Science-labelled courses)
2 Elective course-credits

Year 4 (see notes below)
2 Chemistry course-credits at the 300-level or higher. At
least 1.0 must be at the 400-level.
2 lecture-course credits chosen from Physics, Biology,
Chemistry or Earth Sciences (Not Science-labelled
courses)
1 Elective course-credit

Note 1
Before graduation a student must obtain at least 20.0
lecture course-credits.

Note 2
Before graduation a student must obtain at least one
lecture course-credit in each of the following areas of

Note 3
Before graduation a student must obtain at least 0.5
laboratory course-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.
General Science Programme

The General Science Programme is available as a three- or four-year option. Students may specialize in a particular subject area in the three-year programme or may elect to pursue a broad range of Science subjects (especially a “non-major” programme). The three-year programme is titled “General Science” with no area of specialization designated. The four-year programme is the official majoring General Science programme. It is only available with a selected major field (Biology, Chemistry, Earth Sciences, Physics, or as a General Science and Business programme in which a broad range of specified Science courses is required, rather than a majoring area). It is officially titled “General Science, Biology Major”, “General Science, Chemistry Major”, etc.

Graduates of the three-year programme who have taken the required courses are qualified to apply for admission to medical school in Ontario. Students who have passed the first year of the programme with appropriate choice of courses are qualified to apply for admission to a dental school. Graduates also may be eligible for admission to the Type B course at a College of Education in Ontario or for various industrial positions such as senior laboratory technicians, technical sales representatives, and so forth.

Graduates of the four-year programme who have taken appropriate courses will be eligible for certain categories of industrial and government employment for which the three-year programme will not fit them; likewise they can meet the subject requirements for application to Type A courses at a College of Education in Ontario with specialization in a single subject.

Depending on the option chosen, a student may graduate with the General B.Sc. after either three or four years; the graduation diploma will indicate whether the three- or four-year programme has been completed. A student who has graduated from the three-year programme may apply to register for the four-year programme; upon successful completion of the latter, a new graduation diploma will be issued in exchange for 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 B.Sc. requires the successful completion of 15 course-credits at least 14 of which must be lecture course-credits. Normal progress is 5 lecture course-credits per year. At least half of the 15 course-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 course-credits or 7 Mathematics course-credits or 7 English courses, etc.). Also, at least 6 of the 15 courses 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-course credits, exclusive of laboratory credits. At least two of these must be Science courses chosen from:
Year 1 Biology courses; Chem 111-112 + labs or Chem 121-122 + labs; Earth 121-122; Phys 111-112 or Phys 121-122 + labs or Phys 162-163 + labs.

Year 2
5 course-credits of which 2 or 3 should normally be in Science.

Year 3
5 course-credits of which 2 or 3 should normally be in Science

Some possible electives (other than Year 1 courses described on page 186).

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, 220-227; 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 course-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, 226; CS 118, 250, 180, 210, 250; 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 Majoring Programmes

The four-year programmes require the successful completion (with at least a passing mark in each) of at least 20.0 or more course-credits for the BSc., the number depending on the respective programme. Of this total at least 18.0 must be lecture course-credits. An official major field (from Biology, Chemistry, Earth Sciences and Physics) must be selected; at least 8 course-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 course-credits available in each programme). Departments may have published recommendations regarding electives which should be strongly considered although they are not compulsory. Upon graduation, at least half of the 20.0 course-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 course-credits may be selected under the “Science” label.

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 Biol132 and Chem 121-122 and 121L-122L (see page 185)

Year 2

Two course-credits from: Biol 231, 232, 234, 235, 238, 239
Chem 266-267 and 267L

Two other course-credits

Year 3

Two or three course-credits† from Biol 331, 332, 333, 334, 335, 336, 338, 340, 341, 342, 343, 345, 346.

Three of two non-Biology electives (Chem 332-333 and 332L-333L recommended).

Year 4

Five courses 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 courses in Biology in Year 3 or take a third Biology course as an extra course. In Year 4, three Biology courses 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 course-credits†

Year 3††
Chem 316-316L, 356-357, 356L-357L, 366-366L
2 Elective course-credits†

Year 4††
Five elective course-credits to complete the requirements for the degree†

† Electives can be freely chosen provided that before graduation at least two Chemistry course-credits are obtained at the 300- or 400-level, in addition to the required courses listed above. At least 19.0 lecture course-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 Science Major

Year 1
Including Earth 121-122 and Chem 121-122 and 121L-122L, and at least one course-credit from courses discussed in Note 5 (see page 186)

Year 2
Earth 221, 231, 232, 236, 235, 260
Two elective course-credits

Note
Students should note that Phys 111-112 is a prerequisite for the Applied Geophysics course Earth 360 given in the third year. Math 113 and an introductory course in computer programming are prerequisites for Earth 355, 456 and 461 given in the third and fourth years.

Year 3
Two or three course-credits from:
Earth 331, 332, 333, 336, 342, 345, 355, 360, 370,
Two or one course-credits from Science or Mathematics Arts elective; One course-credit. Attendance on field trips (Earth 390, Earth 490) is required

Year 4
Two or three course-credits from:
Earth 421, 427, 432, 433, 434, 435, 436, 438, 439, 440, 456, 461, 470
Three or two course-credits from non-Earth Sciences courses

Physics Major

Year 1
Including Phys 121-122 or 162-163 and Math 113 (see page 185)

Year 2
Phys 222-223 and 222L-223L, 226-227 and 226L-227L
One of: Math 226, 220a, b or a course in computing
One of: Chem 218-219, 266-267, Sci 251-252, Earth 121-122 or 231-232
Elective(s)

Year 3
Phys 324-325
One or two of: Phys 250-251, 352 and 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(s)

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 courses
Arts or Mathematics Electives

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 earnings 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 or 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 course-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 course credits:
At least 2.0 lecture course credits must be from Biol 131 (or 132), Chem 121-122 + labs, Earth 121-122 and Phys 111-112 or 122-122 + labs.
plus
Math 113
Econ 101-102
CS 118 and CS 115 or 250

Year 2
Students must take during years 2 through 4, at least 5 lecture course-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 lecture course-credits in Science must be taken and can be chosen from any science offering.
plus
Econ 191-192
Econ 193-194

Year 3
Science courses as required above
plus
Stats 202 or Econ 221
Bus 275 (WLU)
Bus 352-362 (WLU)

Year 4
Science courses as required above
plus
Econ 291-292
Bus 385-395 (WLU)
One course credit taken from:
Econ 294, 391, 392, 393, 394, Bus 388 (WLU), 398.
14

Undergraduate Course Descriptions

Dance students performing
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>
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<tr>
<td>Fr 131</td>
<td>F,S,A</td>
<td>4C, 1L</td>
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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

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<tr>
<th>Terms Offered</th>
<th>Type of Instruction</th>
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<tr>
<td>F</td>
<td>C Lecture</td>
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<td>S</td>
<td>L Laboratory</td>
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<tr>
<td>W</td>
<td>T Tutorial</td>
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<tr>
<td>J</td>
<td>S Seminar</td>
</tr>
<tr>
<td>A</td>
<td>D discussion</td>
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<tr>
<td>M</td>
<td>R reading course</td>
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<tr>
<td>Y</td>
<td>wkshp workshop</td>
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<tr>
<td></td>
<td>std studio</td>
</tr>
<tr>
<td></td>
<td>fldlab fieldlab</td>
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<tr>
<td></td>
<td>prereq prerequisite</td>
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<tr>
<td></td>
<td>coreq corequisite</td>
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### Subject Codes

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<th>ISS</th>
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<td>PACS</td>
<td>Peace and Conflict Studies</td>
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</table>
Course Descriptions
Anthropology

Anth 101B F 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 F 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 F 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 S,F,W 3C 0.5
Introduction to Social and Cultural Anthropology
The dynamic nature of socio-cultural systems is examined. Topics include language, technology, social organization, economics, politics, and religion. Data are drawn from a broad ethnographic base, including both "primitive" cultures and modern developed societies. Also offered at St. Jerome's College

Anth 102B F 3C 0.5
Anthropology Through Science Fiction
Basic anthropological concepts, such as biological and cultural evolution, culture, human adaptability, and culture contact will be explored through examples from science fiction and related anthropological studies. Formerly 105F

Anth 102C W 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 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.
Formerly Anth 105C

Anth 204 F 3C 0.5
**Socio-linguistics**
The social basis of verbal communication. A consideration of social factors affecting speech, including dialect variations associated with social groups, styles for different occasions, and attitudes affecting language usage.
Prereq: Anth 103 or 104 or permission of the instructor

Anth 205
**Anthropology of Race and Racism in Canada**
Not offered 1978-79

Anth 210
**Anthropology of Religion**
Not offered 1978-79

Anth 214 W 3C 0.5
**Conflict, Feud, and Warfare**
The manner in which varying degrees of violence are used in the settlement of dispute is explored. Discussed are the rules which control violent behaviour, the effects of violence on the societies and populations involved, and the adaptive (or maladaptive) aspects of such phenomena as feud and warfare. Data are drawn from a broad spectrum of societies.

Anth 220 F 3C 0.5
**Old World Prehistory. The Food Procuring Phases**
A survey of the development of culture, from the beginnings of tool making to the transition to agriculture. Primary attention to sequences from Africa, Western Asia, and Europe. Comparative attention to the non-agricultural peoples of recent times. Not acceptable for Honours Anthropology credit

Anth 221 Old World Prehistory. The Food Producing Phases
Not offered 1978-79

Anth 222 W 3C 0.5
**Prehistoric Man in the Great Lakes Area – A Survey**
A general survey of the archaeological evidence of prehistoric man in the Great Lakes area from his arrival ca. 11,000 years ago to the coming of Europeans. Cultural ecology and cultural evolution will be stressed.
Honours Anthropology students should take Anth 322

Anth 227 W 3C 0.5
**Peoples of Africa**
A survey of the cultures and societies of the sub-Saharan Africa. An emphasis will be placed upon the ethnographic present.
Prereq: Anth 102 or Anth 105

Anth 228 W 3C 0.5
**Peoples of the Pacific**
A comparative ethnological survey of selected indigenous societies in the Pacific region.

Anth 229 W 3C 0.5
**Cultures of West Africa**
An examination of precolonial cultural developments in Western Africa from agricultural beginnings to the development of states, focusing on the Sahel, Savannah, and Forest Zones.

Anth 231 North American Indians 1
Not offered 1978-79

Anth 232 S 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 W 3C 0.5
Eskimo Cultures
Eskimo cultures of Alaska, Canada, and Greenland from the time of European and Asian contact to the present. Administrative systems imposed on the Eskimo will be analyzed and compared, as will the contemporary problems these communities face today.
Prereq: Second year standing (Anth 102 or 105 is desirable)

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 237 Circumpolar Peoples
Not offered 1978-79

Anth 238J F 3C 0.5
Caribbean Society
A survey of Caribbean society in which particular attention will be devoted to an analysis of the historical, cultural, and socio-economic background of selected representative Caribbean societies, within the general framework of the continuing process of acculturation in this area.
Prereq: Anth 102 or permission of the instructor
Offered at St. Jerome's College

Anth 241 The Contemporary Canadian Indian Scene
Not offered 1978-79

Anth 247 F 3C 0.5
Urban Anthropology
Various approaches to the study of urban centers 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 F 3C 0.5
Peasant Societies
The economic and social aspects of peasantry as well as the position of peasants within a society as a whole will be examined. Examples from Europe, Latin America, Asia, and Africa will be used.

Anth 258 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, and Science.
Prereq: Anth 101 or 102 or permission of the instructor

Anth 260 W 3C, 1L 0.5
Human Evolution
Data, methods, and theory in the study of the origin and evolution of humans are surveyed. Topics will include osteology, growth and development, the fossil record, and genetics.
Prereq: Anth 101 or Anth 105 or permission of the instructor

Anth 261 F 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 262 An Introduction to the Study of the Non-human Primates
Not offered 1978-79

Anth 263 Evolution of Human Behaviour
Not offered 1978-79

Anth 265 F 3C 0.5
Anthropology of Aging
The bioecological and socio-cultural aspects of the aging process will be discussed. Specific topics include neurology, physiology, disease, diagnostic procedures, and prognosis in cultural contexts.

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 Phonology for Non-Linguists
Not offered 1978-79
Anth285 W 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.

Anth286 Descriptive Grammar 2 – Syntax
Not offered 1978-79

Anth290 F 3C 0.5
Language and Culture
An examination of language as it reflects the culture of
the speakers. Focus will be on exploring aspects of
vocabulary and special usages for their cultural
relevance, with illustrations from a variety of languages.
Prereq: One half-course from each of linguistics and
socio-cultural anthropology.

Anth310 Indians of the Canadian Subarctic
Not offered 1978-79

Anth320 F 3C 0.5
Pleistocene Prehistory in the Old World
Detailed considerations of prehistoric cultural
developments from earliest toolmaking to the transition
to agriculture. An examination of the human mode of
adaptation and the increasing complexity of cultural
systems among prehistoric hunters and gatherers.
Prereq: Anth 275 or permission of the instructor.

Anth321 Recent Prehistory in the Old World
Not offered 1978-79

Anth322 W 3C 0.5
Prehistoric Man in the Great Lakes Area
An in-depth study of the archaeological evidence of
prehistoric man in the Great Lakes area from his arrival
c. 11,000 years ago to the coming of Europeans. Cultural
ecology and cultural evolution will be stressed.

Anth330 Cultural Ecology
Not offered 1978-79

Anth333 Canadian Communities and Planned Change
Not offered 1978-79

Anth334 F 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.

Anth335 Anthropology and Education
Not offered 1978-79

Anth342J Introduction to the Study of Acculturation
Not offered 1978-79

Anth345, 346, 347, 349 0.5
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.

Anth350 W 3C 0.5
Sex Roles in Anthropology
A comparison will be made of the roles of men and
women in human evolution and in social life. The special
problems encountered by men and women field workers
will also be considered.

Anth355J Ethnic and Cultural Pluralism in World
Perspective
Not offered 1978-79

Anth359 Political Anthropology
Not offered 1978-79

Anth365 W 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

Anth370 Ethnographic Field Methods
Not offered 1978-79

Anth372 S 3C 0.5
Archaeological Techniques
Various archaeological techniques will be discussed and
demonstrated. Major emphasis will be on working with
artifacts in the lab. The relationship of other disciplines
such as Pleistocene Geology, Palynology, Paleontology,
and Soils Analysis to archaeology will also be dealt with.
Primarily for Honours Anthropology students
Prereq: Permission of the instructor

Anth373 Archaeological Reporting
Not offered 1978-79

Anth375 Genetics and Variability in Human Populations
Not offered 1978-79

Anth376 Human Population Genetics
Not offered 1978-79
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 381 Semology
Not offered 1978-79

Anth 388 W 3C 0.5
Applied Anthropology
The technical and ethical aspects of directed culture change will be examined using examples from Canada and elsewhere.
Prereq: One-half-credit in socio-cultural anthropology

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 401/402 Seminar in the Literature of Social and Cultural Anthropology
Not offered 1978-79

Anth 420 Social and Cultural Change
Not offered 1978-79

Anth 430 W 3S 0.5
Anthropological Perspectives on Stratification and Class
This is a study of social anthropological approaches to the phenomenon of socio-economic differentiation. Through the use of cultural and social data the practical application of these approaches with respect to various societies will be examined.

Anth 449 Honours Seminar
Not offered 1978-79

Anth 450 W 3S 0.5
Honours Seminar
Seminar on selected contemporary issues in anthropology. Open only to Honours anthropology students.

Course Descriptions
Anthropology

Anth 451 F 3S 0.5
The Formative Years of Cultural Theory
A survey of the history of cultural theory from 1850 to 1904.
Prereq: One credit in socio-cultural anthropology

Anth 452 Contemporary Cultural Theory
Not offered 1978-79

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 signal grammar, one approach to be emphasized during each offering.
Prereq: Anth 286 or Engl 375 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
Course Descriptions
Architecture

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, AA Dip (London), RIBA, MRAIC

Professors
L. A. Cummings', AB (Washington), AM (Missouri), PhD (Washington)
C. K. Knapper², BA Hon (Sheffield), PhD (Saskatchewan)
P. H. Nash⁴, BA, MA (UCLA) CE (Grenoble), MCP, MPA, PhD (Harvard), MCIP
F. H. Watts, AA Dip (London), MLA (Harvard), RIBA, MRAIC

Associate Professors
A. Banerji, BArch (Calcutta), MArch (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, 1978-79)
J. C. Somfay, BArch (N.S.W. Sydney), MArch (Toronto), MRAIC (on sabbatical leave 1978)
F. Thompson, BArch, MArch (Toronto), MRAIC (on sabbatical leave 1978/79)
J. Zvilna

Assistant Professors
A. Brown, BArch (Toronto)
O. Dutt, BA (Punjab), BSc(Hon) (London), MS (Wisconsin), PhD (Waterloo), PEng
R. Wiljer, BA (Waterloo), MA (Ottawa)

Lecturers
E. R. Haldenby, BES, BArch (Waterloo)

Adjunct Assistant Professors
E. Gustavs, BArch, MArch (Toronto), MRAIC

Visiting Critics
D. J. Clark, BArch (Toronto), MRAIC
M. Fisher, RIBA
R. J. March, RIBA, MRAIC
H. Plumb, BArch, MArch (Toronto), MRAIC
M. Plumb, BArch (Toronto), MArch (Harvard)
H. Schetter, BArch (Cornell), MRAIC

Special Lecturers
W. G. Dailey, BArch (Liverpool)
D. K. Lansdowne
J. Tughan, BTh (Ontario Bible College), HonBA (Waterloo)

Faculty members holding cross and/or joint appointments as shown
Architectural and Environmental Studies and Psychology
Architecture and Civil Engineering
Environmental Studies

Course Descriptions

Courses for Bachelor of Environmental Studies (Pre-Professional Architecture)

For Recommended Programme, see page 134.
For Elective Course Requirements, see page 223.

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 W 3C 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 118 Introduction to Scientific Problem Solving by Computer
See Computer Science course descriptions, page 345.
Arch 163  W  1C,2L  0.5  Statics
Basic concepts, forces, moments, system 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
Exploration of new structural forms. Basic physical principles and laws governing these forms. Study of membrane surfaces. Arrangements of forms for structural efficiency. Minimum surfaces and modular developments (close packing and hierarchies). Use of modular symmetry to create optimum structural systems. Prereq: Architecture students should have completed first year; other students require consent of instructor

Env St 271 Introduction to Quantitative Research Methods
See Environmental Studies, course descriptions, page 286.

Env St 272 Computer Programming in Environmental Studies
See Environmental Studies course descriptions, page 286.

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 or 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 Environmental Studies course descriptions, page 286.

Env St 195A Introduction to Environmental Studies
See Environmental Studies course descriptions, page 286.

Env St 195B Introduction to Environmental Problems
See Environmental Studies course descriptions, page 286.
**Course Descriptions**

**Architecture**

**Env St 200 Field Ecology**
See Environmental Studies course descriptions, page 286.

**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,W,S 1C,2std 0.5**

**An Introduction to Landscape Design**
An introduction to the design of landscape with emphasis upon the architectural attributes of plant and land forms.
Prereq: Arch 192 and 193

**Env St 252 Media Tools for Environmental Studies**
See Environmental Studies course descriptions, page 286.

**Env St 253 Media Tools for Environmental Studies - Advanced Level**
See Environmental Studies course descriptions, page 286.

**Env St 358 Environmental Pollution and its Control**
See Environmental Studies course descriptions, page 286.

**Env St 380/381 Environmental Studies Workshop**
See Environmental Studies course descriptions, page 286.

**Env St 401 Environmental Law**
See Environmental Studies course descriptions, page 286.

**Env St 402 Planning Law**
See Environmental Studies course descriptions, page 286.

**Env St 411 Alternative Future Environments 1**
See Environmental Studies course descriptions, page 286.

**Env St 412 Alternative Future Environments 2**
See Environmental Studies course descriptions, page 286.

**Env St 417 Land Use History and Landscape Change 1**
See Environmental Studies course descriptions, page 286.

**Env St 418 Land Use History and Landscape Change 2**
See Environmental Studies course descriptions, page 286.

**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 091 0.5**

**An Introduction to Studies in Architecture**
Created for those who wish to study architectural first principles. Objectives include participant exposure and visual communicative techniques including free-hand drawing etc. related to explorations in general design.
Prereq: None

**Arch 095 0.5**

**An Introduction to Visual Design**
Intensive studio participation involving seminars and lectures develops problem solving abilities through the introduction of man-made and natural structural models. Knowledge integration, the genesis of form is applied in the search for new ideas and methods.
Prereq: None

**Arch 192 F 2C,6std 1.0**

**Design Fundamentals and Workshop**
Design Fundamentals and Workshop
Perceptual techniques and methods; principles of graphic communication, what “media” are and what are their best applications, the qualities of materials in construction and the qualitative, behavioural characteristics of structural forms and shapes; perspectives, and instrument and free-hand drawing.
Prereq: Architecture students only
Course Descriptions
Architecture

Arch 193  W  7C,7wkshop  1.5
Design Fundamentals and Studio
Space notation, serial vision; the sensory input and stimuli of the environment to man, pattern recognition; design exercises for the students to observe and communicate about action and reaction of materials in the environment, the individual responses physiologically and psychologically to objects in the environment, and the methods of communicating specific messages from man to man using graphic media.
Prereq: Arch 192

Arch 194  W  2C  0.5
Visual Interdisciplinary Language
Theory and practice of visual form based on formative processes and hierarchial 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 284, 285  F,W  3C  0.5
Architectural Research
This offers a student an opportunity for independent research study 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) U.G.A.C.

Arch 292  F  3C,11std  1.5
Design Concepts and Studio
To develop in each student the ability to design on a small, personal scale and explore design as a thinking process. Small space design exercises where the student is required to define and analyze a problem and generate an architectural solution. Solutions are refined through a series of evaluations. The finalized solution is presented and construction documents produced.
Prereq: Arch 193

Arch 293  S  3C,11std  1.5
Design Concepts and Studio
Design involving problems of human perception and dimension in complex or large spaces, and to develop in each student the ability to generate solutions to architectural problems on a scale which involves "privacy and community". Emphasis is placed on programming, analysis and solution evaluation. Problems of construction, servicing, and siting will be further explored.
Prereq: Arch 292

Arch 294, 295  F,W  R  0.5
Architectural Research
This offers a student an opportunity for independent research study 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) U.G.A.C.

Arch 292  W  4C,17std  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 293  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 292
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 prerequisite are required for these courses except for Architecture students.

Arch 022 0.5
Architecture & Its Social Context
A critical view of the social forces that shape buildings. Examples, both historical and contemporary, from differing cultures, will be used; Medieval architecture, Masai villages, Scandinavian buildings, Shaker architecture, the organization of architects offices, clients aspirations. If deemed useful, there will be a small design project. 
Prereq: Consent of Instructor

Arch 045 0.5
British and North-American Architecture
The development of modern architecture in Britain from 1930 until the present. Introduction to the major forces and forms of North American architecture.
Prereq: None

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 F 2C,3D 0.5
History of Gardens of Europe and Western Asia
To study the garden as a work of art reconciling man with his world. Gardens of Europe and Western Asia are studied as responses to the stress and aspirations of an age 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.

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 models, the spread of this "renaissance" mode, leading to consideration of the Mannerist, the Baroque, the Rococo, the Neoclassical; investigation of the course of men's attitudes from humanism, nationalism, and Reformation through the Enlightenment until the French Revolution and Hume's dethronement of Reason.
Prereq: Arch 246

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
Arch 347  4C  0.5
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 135). 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: B.E.S. 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: B.E.S. standing

Arch 462  F  2C,2L  0.5
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: B.E.S. 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, geometrics and materials; and vertical transportation systems.
Prereq: Arch 372

Arch 498, 499  F,W  3R  0.5
Architectural Research
This offers a student an opportunity for independent research study 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) U.G.A.C.

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 closely related to existing contexts and parallel current practicing conditions. Both individual and group work are included.
Prereq: B.E.S. or its equivalent
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 563 W 3C 0.5

Architectural Practice
The Profession
Discussion of the legal and ethical aspects of architectural practice in Canada and in Ontario in particular, contracts, bonds and insurance, mechanics liens, by-laws and regulations, architectural partnership. The legal background, client-architect relations, partial services, professional problems.
Prereq: B.E.S. standing

Electives
Students are permitted to study courses given by the University at large which are in the area of the student’s individual interest. This will hopefully provide better orientation and more inter-disciplinary communications relevant to the student’s academic pursuits.

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), DPhl (Oxford) 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)

Associate Professors
F. H. Epp, BA (Bethel), MA, PhD (Minnesota) G
P. H. Smith, Jr., BA (Harvard), PhD (Pennsylvania)

Lecturers
E. Regehr, BA (Waterloo)
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 conducted 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 1978-79

Arts 122G/123G F, W 2C, 1D 0.5
Quest for Meaning in the 20th Century
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 prerequisite for Arts 191

Arts 192/193 0.5/0.5
Introductory Chinese
Similar course to Arts 190/191 but for speakers of any Chinese dialect except Mandarin. The course emphasizes standard pronunciation practice and analysis of Chinese literary forms.
Prereq: Permission of instructor; in addition, Arts 192 is a prerequisite for Arts 193.

Note
Students may not receive credit for both Arts 190/191 and Arts 192/193

Arts 200G F 2C, 1D 0.5
Issues in Mass Communication 1
An introductory and interdisciplinary approach to those factors in mass media behavior that contribute to good communication or to distortion, including the historical, psychological, legal, sociological, semantic, etc. Emphasis will be on the domestic scene.

Arts 201G W 2C, 1D 0.5
Issues in Mass Communication 2
The emphasis of this course will be on the mass media role in National and International affairs and a study of those factors in mass media performance, which contribute to better international understanding and conflict resolution. Topics will include propaganda, economic and political factors, government information systems, press freedom, language and stereotypes.

Arts 211/212 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/I. 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.
Course Descriptions
Arts

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 218G Love in the Western World
Not offered in 1978-79

Arts 219G 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, 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
A continuation of Arts 219G.
Prereq: Arts 241R.

Arts 242R W 3C 0.5
Art and Society 2
A continuation of Arts 241R.
Prereq: Arts 241R.

Arts 271G/272G F,W 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 292/293 0.5/0.5
Intermediate Chinese
Description same as Arts 290/291
A continuation of Arts 192/193
Prereq: Arts 192/193; Arts 292 is a Prereq. for Arts 293

Note
Students may not receive credit for both Arts 290/291 and Arts 292/293

Arts 301G F S 0.5
Seminar in 20th Century Values
The purpose of this course is to help members of the University struggle with current value questions that have arisen because of the development of technology. The precise topics will vary from year to year.

Arts 302G Seminar in 20th Century Values
Not offered in 1978-79

Arts 320R/321R Special Topics in Chinese Thought and Culture
Not offered in 1978-79
Course Descriptions
Arts/Biology

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 393/394 3C 0.5/0.5
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.
Prereq: Arts 192/193 or Arts 391/392 or permission of the instructor

Arts 395/396 F,W 3C 0.5/0.5
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 Mean.

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, 393/394, 395/396 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, BSc (Toronto) PhD (Alberta)

Professor, Graduate Officer
A. D. Harrison, MSc, PhD (Capetown)

Associate Professor, Graduate Officer
S. M. Smith, MSc (McMaster), PhD (Manitoba)

Associate Professor, Undergraduate Officer
H. R. N. Eydt, MSc, PhD (McMaster)

Assistant Professor, Undergraduate Officer
J. C. Carlson, MSc, PhD (Massachusetts)

Assistant Professor, Undergraduate Officer
W. R. Hawthorn, MSc (McMaster), PhD (Western)

Professors
C. R. Barnes, BSc (Birmingham), PhD (Ottawa)
C. H. Fernando, BSc (Ceylon), DPhil (Oxford)
H. B. N. Hynes, PhD, DSc (London), ARCS, FRSC
W. B. Kendrick, BSc, PhD (Liverpool)
J. Kruve, MSc (Toronto), PhD (Western)
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 (Western)
E. B. Dumbroff, MForestry, PhD (Georgia)
H. C. Duthie, BSc, PhD (Wales)
W. E. Inniss, MSA (Toronto), PhD (Michigan State)
A. G. Kempton, MSA (Toronto), PhD (Michigan State)
P. E. Morrison, MSc (Western), PhD (McMaster)
G. G. Mulamoottil, BSc (Mysore), MSc (Bombay), PhD (Delhi)
J. J. Pasternak, MA (Toronto), PhD (Indiana)
J. Sivak, LScO (Montreal), MS (Indiana), PhD (Cornell)
J. B. Theberge, BScA (Guelph), MSc (Toronto), PhD (UBC)
K. Zachariah, BSc (Madras), BA Hons (Oxford), MA, PhD (Princeton)

Assistant Professors
R. J. Hebda, BSc (McMaster), PhD (UBC)
C. I. Mayfield, BSc, PhD (Liverpool)
C. A. Peterson, MSc (Alberta), PhD (California, Davis)
J. C. Semple, BSc (Tufts), MA, PhD (Washington U, St. Louis)

Associate Professors
N. Bols, BSc (Simon Fraser), MSc (UBC), PhD (Toronto)
M Globus, MSc (McGill), PhD (Toronto)
R. J. Hebda, BSc (McMaster), PhD (UBC)
C. I. Mayfield, BSc, PhD (Liverpool)
G. A. Peterson, MSc (Alberta), PhD (California, Davis)
J. C. Semple, BSc (Tufts), MA, PhD (Washington U, St. Louis)
Adjunct Faculty
I. R. Ball, BSc (Liverpool), PhD (Waterloo).
Royal Ontario Museum.
R. W. McCauley, MA (Toronto), PhD (Western)
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

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 course credit towards a BSc if taken by students of the University of Waterloo.

Biol 110 W 2C,3L 0.5
Introductory Zoology
An introduction to the principles of zoology. The course will include the structure and function of animals, survey of the animal kingdom, cell structure, embryology, human biology and general ecological concepts. Available to students other than those intending to major in Biol or to enter the School of Optometry. Credit will not be given in more than one of Biol 110, 130, 131 or 132.

Biol 130 Y 2C 1.0
Introduction to Biology
This course is the same as Biol 131 without the laboratory component. (For non-Biology majors only)

Biol 131 Y 2C,3L 1.0
Introduction to Biology
The principles of biology are developed by reference to all biology (including genetics), growth and development, and to selected organisms. Man is discussed as a biological organism. Labs on alternate weeks. (For all students other than those intending to major in Biol or to enter the School of Optometry)

Biol 132 Y 2C,3L 1.0
Principles of Biology
An introductory course designed to give a grounding in the main branches of biology. Emphasis is laid on an understanding of biological processes and on relating these to the structure and diversity of living organisms. (For Science students intending to major in Biol or to enter the School of Optometry)

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 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.)

Biol 201 Y 2C,3L 1.0
Anatomy, Histology and Embryology
A survey of functional mammalian anatomy and histology, with particular emphasis placed on the human, and an introduction to basic embryology. Prereq: Biol 132 or equivalent (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)
**Biol231** F 3C/fieldlab 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*

**Biol232** 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 131 or 132*

**Biol234** 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 131 or 132*

**Biol235** 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 131 or 132*
*(Only for students in Biol Honours Programmes and 4-year Biol majors)*

**Biol237** 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 131 or 132*

**Biol238** 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 131 or 132*

**Biol239** 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 131 or 132*

**Biol245** 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)*

**Biol246** 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)*

**Biol247** 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)*

**Biol301** 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.
*Prereq: Biol 131 or 132*
*(For Optometry students only)*

**Biol331** 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*

**Biol332** 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*

**Biol333** 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*
Biol334  F  2C,3L  0.5

The Flowering Plants
A study of floral morphology in relation to classification and evolution. An introduction to taxonomy and nomenclature. History of taxonomy. Systems of classification. Mechanisms of pollination and dispersal. (Students entering this course are required to make a flowering plant collection. Instructions should be obtained from the Herbarium prior to the summer break.)

Biol335  Y  2C,3L  1.0

Microbial Form and Function
Prereq: Biol 235 or permission of instructor

Biol336  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

Biol338  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

Biol340  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.

Biol341  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 131 or 132
Coreq: Chem 332-333

Biol342  Y  2C,3L  1.0

Vertebrate Physiology
A study of the physiology of vertebrate organ systems and their integration, with emphasis placed upon the effects of current developments on basic physiological concepts.
Not open to students who have taken Biol 203, 204
Prereq: Biol 238
Coreq: Chem 332-333

Biol343  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 131 or 132

Biol345  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

Biol346  F  2C,1T  0.5

Population Ecology
The ecology of populations. Topics include: demographic parameters and their estimation; population growth and regulation; competitive and predator-prey interactions; population genetics and evolution; applied population biology.
Prereq: Biol 231 and Stat 202

Biol431  Y  2C,3flab/T  1.0

Quantitative and Experimental Ecology
A consideration of various procedures employed to study populations, population interactions, and community relationships such as diversity and stability. Topics include: the analysis of model properties, evolutionary aspects of ecology, structural descriptions of vegetation, systems ecology.
Prereq: Biol 346

Biol432  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 F 2C,3L 0.5
**Entomology**
Introduction to morphology, systematics and biology of insects.
*(Brief field trips will be made to collect insects from different local habitats.)*

Biol 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 F 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 441 Y 2C,3L 1.0
**Plant Physiology**
A detailed study of the physical and chemical processes that govern plant growth and function.
*Prereq: Biol 345*

Biol 442 Y 2C,3L 1.0
**Comparative Animal Physiology**
A comparative study of physiological processes in the animal kingdom with emphasis on endocrine physiology.
*Prereq: Biol 342*

Biol 443 Y 2C,3L 1.0
**Applied Microbiology**
Properties of pathogenic microorganisms and special groups related to food and fermentation microbiology.
*Prereq: Biol 335*

**Course Descriptions**

**Biology**

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 232, 336*

Biol 446 F 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.
*Prereq: Registration Year 4 Biology*
*(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.

Biol 449 Y 2C,3L 1.0
**Immunology and Virology**
The course will consist of an introduction to the nature of antigens and antibodies and their reactions, hypersensitivity and blood groups, as well as a study of the nature and interactions of animal, insect bacteria and plant viruses and their hosts.
*Prereq: Biol 235*

Biol 450 F 2C,3S/lab 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*

Bio 498 F or W lab 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

Associate Professor, Acting Chairman of the Canadian Studies Group
R. R. Kerton, BComm (Toronto), MA (Carleton), PhD (Duke)

Assistant Professor, Director of the Programme
S. E. McMullin, BA, MA (Carleton), PhD (Dalhousie)

Members of the Canadian Studies Group

Professors
H. S. Coblenz, BA Hons (Durham), MRP (North Carolina), FRIP, AIP, FSS, PGP
H. MacKinnon, BA (Montreal), PhL, STL (Gregorian), MA (Toronto), DPhil (Oxford)
W. U. Ober, BA (Washington and Lee), PhD (Indiana)
J. M. Wilson, BA, MA (Toronto)

Associate Professors
J. R. Dugan, BA, MA (Toronto), PhD (Yale)
G. R. McBoyle, BSc, PhD (Aberdeen)
S. M. Weaver, BA, MA, PhD (Toronto)
K. Westhues, BA (Conception), MA, PhD (Vanderbilt)

Participating Faculty (1977-78)

Professors
R. R. Krueger, BA, MA (Western), 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. D. Burt, BA, MA (Waterloo)

Guest Lecturers
Wallace Clement, Sociology, McMaster University
Terry Copp, History, WLU

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

CdSt201 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.

CdSt202 W 2C,1S 0.5
Cultural Regionalism
Also an interdisciplinary approach to the study of the cultural environment in Canada. Canadian culture is examined within a regional context.

CdSt300 Y 3S 1.0
Regionalism
A seminar course, staffed by at least two faculty members from different departments, in which particular themes and problems relating to Canada will be investigated. The content of the programme each year will vary according to the interest and inclination of faculty and students.
Prereq: CdSt 201/202 or permission of the instructor.

CdSt400 Y T 1.0
Research Essay
An extensive senior research essay, supervised by a committee composed of faculty members from two or more of the participating departments, which deals with a specific aspect of Canada utilizing material and methods from several different disciplines.
Prereq: CdSt 300

Principa l Canadian Content Courses Offered by the Participating Departments

Anthropology
Anth 102C The Cultural Anthropology of Canada
Anth 203 Prehistoric Man in North America
Anth 222 Prehistoric Man in the Great Lakes Area - A Survey (Honours Anthropology students should take Anth 322)
Anth 231 North American Indians 1
Anth 232 North American Indians 2
Anth 233 Eskimo Cultures
Anth 241 The Contemporary Canadian Indian Scene
Anth 310 Indians of the Canadian Subarctic
Anth 322 Prehistoric Man in the Great Lakes Area
Anth 333 Canadian Communities and Planned Change
Anth 334 Ethnicity and Ethnic Diversity in Canada
Anth 377 Early Man in the New World
Anth 499 Honours Essay

Economics
Econ 100A/B Introduction to Modern Economics
Econ 101 Introduction to Microeconomics
Econ 102 Introduction to Macroeconomics
Econ 241 Cost-Benefit Analysis and Project Evaluation
Econ 263 Economic History of Canada
Econ 333 Interregional Economics
Econ 341 Public Finance
Econ 343 Urban Economics
Econ 347 Industrial Organization
Econ 351 Labour Economics
Econ 353 Population Economics
Econ 355 Economics of Energy and National Resources
Econ 363 Contemporary Canadian Problems
Econ 364 Contemporary Canadian Problems

English
Eng 205R The Canadian Short Story
Eng 209F Themes in Canadian Literature
Eng 313 Canadian Literature to 1920
Eng 314 Canadian Poetry Since 1920
Eng 315 Canadian Prose Since 1920
Eng 316 Canadian Drama
Eng 415 Major Canadian Writers
Eng 495 Senior Honours Essay (Canadian Literature option)

French
Fr 151 Basic French (For students who have not passed the equivalent of Year 5 French)
Fr 152 Basic French (For students who have not passed the equivalent of Year 5 French)
Fr 191 French Language and Literature
Fr 192 French Language
Fr 205 Spoken French
Fr 206 Spoken French
Fr 207 Spoken French
Fr 208 Spoken French
Fr 250 Intensive Language Training
Fr 273 Aspects of Quebec
Fr 274 Survey of French-Canadian Literature
Fr 300 Advanced Instruction in Written French
Fr 375 Contemporary French-Canadian Novel
Fr 401 Advanced Language Study
Fr 402 Advanced Language Study
Fr 471 French-Canadian Poetry
Fr 472 Contemporary Quebecc Theatre
Fr 501 Problems of French Language
Fr 502 Problems of French Language

Geography
Geog 195 Environmental Studies:
Geog 200 Introduction to Environmental Problems
Geog 300 Geomorphology and the Southern Ontario Environment
Geog 322 Geographical Study of Canada
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<th>Course Code</th>
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<td>Historical Geography of Canada 1</td>
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<td>Geog 352</td>
<td>The Rural-Urban Fringe of Canadian Cities</td>
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<td>Geog 411</td>
<td>Resource Studies</td>
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<td>Hist 225</td>
<td>Canadian Culture and Society</td>
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<td>Hist 266</td>
<td>The History of Selected Racial and Regional Minorities</td>
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<td>Hist 267</td>
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<td>Hist 268</td>
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<td>Hist 275</td>
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<td>Hist 361A-381B</td>
<td>Studies in the History of Canadian Regionalism</td>
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<td>Hist 390</td>
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<td>Hist 420</td>
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<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>
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<tr>
<td>P Sci 352</td>
<td>Comparative Legislative Systems</td>
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<tr>
<td>P Sci 373</td>
<td>Political Parties</td>
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<td>P Sci 374</td>
<td>Interest Group Politics</td>
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<tr>
<td>P Sci 431</td>
<td>Canadian Public Policy 1</td>
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<td>P Sci 432</td>
<td>Canadian Public Policy 2</td>
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<tr>
<td>P Sci 434</td>
<td>Canadian Foreign Policy</td>
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<td>P Sci 435</td>
<td>The Politics of Canadian Resource Development</td>
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<td>P Sci 442</td>
<td>Politics in Ontario</td>
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<td>P Sci 443</td>
<td>Politics in Western Canada</td>
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<tr>
<td>P Sci 445</td>
<td>Politics in the Atlantic Provinces</td>
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<tr>
<td>P Sci 451</td>
<td>Comparative Parliamentary Systems</td>
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<tr>
<td>P Sci 461</td>
<td>Problems in Canadian Politics 1</td>
</tr>
<tr>
<td>P Sci 462</td>
<td>Problems in Canadian Politics 2</td>
</tr>
<tr>
<td>P Sci 473</td>
<td>Voting Behaviour</td>
</tr>
<tr>
<td>P Sci 475</td>
<td>Political Socialization</td>
</tr>
<tr>
<td>P Sci 476</td>
<td>Research Seminar in Political Behaviour</td>
</tr>
<tr>
<td>P Sci 478</td>
<td>Research Seminar in Political Socialization</td>
</tr>
<tr>
<td>Soc 101</td>
<td>Introduction to Sociology</td>
</tr>
<tr>
<td>Soc 120R</td>
<td>Fundamentals of Sociology</td>
</tr>
<tr>
<td>Soc 201</td>
<td>Canadian Society: Structure and Development</td>
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<tr>
<td>Soc 205</td>
<td>Sociological Analysis of Social Problems</td>
</tr>
<tr>
<td>Soc 215</td>
<td>Sociology of Sex Roles</td>
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<tr>
<td>Soc 216</td>
<td>An Introduction to the Sociology of Marriage and the Family</td>
</tr>
<tr>
<td>Soc 231</td>
<td>Industrial Sociology</td>
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<tr>
<td>Soc 250</td>
<td>Crime and Society</td>
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<tr>
<td>Soc 251</td>
<td>Ethnic and Racial Relations</td>
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<tr>
<td>Soc 253</td>
<td>The Administration of Criminal Justice</td>
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<td>Soc 260</td>
<td>French-English Relations in Canada</td>
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<td>Soc 262</td>
<td>Population in Canadian Society</td>
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<td>Soc 300</td>
<td>Canadian Social Institutions</td>
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<tr>
<td>Soc 301</td>
<td>Urban Sociology</td>
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<tr>
<td>Soc 303</td>
<td>Crisis in Social Structure and Character</td>
</tr>
<tr>
<td>Soc 304</td>
<td>Crisis Management</td>
</tr>
<tr>
<td>Soc 315</td>
<td>Social Stratification</td>
</tr>
<tr>
<td>Soc 323</td>
<td>Project in Sociological Research</td>
</tr>
<tr>
<td>Soc 324</td>
<td>Social Indicators and Their Use</td>
</tr>
<tr>
<td>Soc 327R</td>
<td>Canadian Ethnic and Cultural Minorities</td>
</tr>
<tr>
<td>Soc 328R</td>
<td>Canadian Ethnic and Cultural Minorities</td>
</tr>
<tr>
<td>Soc 330</td>
<td>Comparative Social Structure</td>
</tr>
<tr>
<td>Soc 351</td>
<td>Research Seminar in Canadian Society</td>
</tr>
<tr>
<td>Soc 352</td>
<td>Seminar in Nationalism and Ideology in Canada and Quebec</td>
</tr>
<tr>
<td>Soc 372</td>
<td>Medical Sociology</td>
</tr>
<tr>
<td>Soc 398</td>
<td>Seminar in Nationalism and Ideology in Canada and Quebec</td>
</tr>
<tr>
<td>Env St 401</td>
<td>Environmental Law</td>
</tr>
</tbody>
</table>

**Course Descriptions**

**Canadian Studies**

**Politics**

**Sociology**

**Urban and Regional Planning**
### Course Descriptions

#### Canadian Studies/Chemistry

### Department of Chemistry

**Professor, Chairman of Department**
D. E. Irish, BSc (Western), MSc (McMaster), PhD (Chicago), FCIC

**Professor, Associate Chairman of Department**
R. G. Woolford, MSc (Western), PhD (Illinois), FCIC

**Associate Professor, Associate Dean of the Faculty of Science**
D. A. Brisbin, BSc (Alberta), PhD (Toronto)

**Professor, Director of the Guelph-Waterloo Centre for Graduate Work in Chemistry**
A. J. Carty, BSc, PhD (Nottingham)

#### Faculty of Arts

**Fine Arts**
- Fine316 Canadian Art
- Fine317 Canadian Art

**Inter-Disciplinary Social Science**
- ISS221R Community Issues

**Religious Studies**
- RS220 Evangelical Christianity
- RS241 Religions of Waterloo County
- RS265P Religion in Canada 1
- RS265P Religion in Canada 2

**Social Work**
- Socwk120R Introduction to Social Work
- Socwk121H Social Problems

### Principal Canadian Content Courses Offered by Other Arts Departments

#### Fine Arts
- Fine316 Canadian Art
- Fine317 Canadian Art

#### Inter-Disciplinary Social Science
- ISS221R Community Issues

#### Philosophy
- Phil225 Problems in Social and Political Philosophy in Canada

#### Psychology
- Psych242 Educational Psychology: Learning Disabilities
- Psych454 Senior Seminar in Educational Psychology

#### Social Work
- Socwk120R Introduction to Social Work
- Socwk121H Social Problems
Course Descriptions
Chemistry

Assistant Professors
L. J. Brubacher, BA (Goshen College, Indiana), PhD (Northwestern)
P. C. Chieh, BSc (Nat. Taiwan), MSc (Nat. Taing Hua), PhD (UBC)
R. J. Friesen, BSc, MSc (Manitoba)
M. Tchir, BSc (Alberta), PhD (Western)

Senior Demonstrators
C. Folzer (Mrs.), BSc (Purdue), MSc, PhD (Rutgers)
M. C. Michael (Miss), BSc (Waterloo)
T. Rudensky, BSc (Waterloo)
M. Vatcher, HNC (Bolton Technical College), BSc (Waterloo)

Faculty Members holding cross appointments as shown
1 Chemistry and Physics
2 Chemistry and Applied Mathematics
3 Chemistry 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 F,W,S 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. Offered by correspondence only, one term. 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.

However, if they have not completed Ontario Year 5 Chemistry (or its equivalent), students may prefer Chem. 111 l-12 (and 111L-l 12L). Eligibility for these courses is determined by the Instructor or Advisor. Credit will not be allowed for both 111-112 and 121-122.

Chem 111 F 3C 0.5
General Chemistry 1
Structure and properties of matter, formulae, nomenclature, stoichiometry, atomic and molecular structure.
Prereq: Grade 12 Chem
Science students must take Chem 111L with this course

Chem 111L F 3L 0.25
General Chemistry 1 Laboratory
Selected experiments for students taking Chemistry 111.

Chem 112 W 3C 0.5
General Chemistry 2
Chemistry 111 continued to include chemical equilibria and rates of reaction and oxidation reduction reactions.
Prereq: Chem 111
Science students must take Chem 112L with this course
Chem 112L W 3L 0.25
General Chemistry 2 Laboratory†
$selected experiments for students taking Chemistry 112.

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 Coop) 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 Studies (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 yr) students unless permission to do otherwise has been approved by their Departmental 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.

Course Descriptions
Chemistry

Note
Must 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, 6L 0.5
Analytical Chemistry Laboratory 1
Selected experiments for students taking Chemistry 220.

Chem 221†† F,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-components systems.
Prereq: Chem 220
††Students registering in Chem 221 must also register in Chem 221L

Chem 221L F,W,S 3L 0.25
Analytical Chemistry Laboratory 2
Selected experiments for students taking Chemistry 221.

Chem 254 F,W 2C,1T 0.5
Physical Chemistry 1
Kinetic theory of gases and elementary transport properties. Thermodynamics of ideal systems. Rate of chemical reactions and applications to the elucidation of reaction mechanisms.
Prereq: Chem 121-122, Calculus (eg. Math 113)

Chem 255 F,W,S 2C,1T 0.5
Physical Chemistry 2
Introductory quantum mechanics. Phase equilibria, phase rule, and the properties of liquids and solutions.
Prereq: Chem 254, Math 215
Chemistry

**Chem 264 W,S 2C,1T 0.5**
**Organic Chemistry 1**
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 312 F,S 2C 0.5**
**Transition Element Chemistry**
The transition elements and their compounds. Stereochemistry of complex ions; ligand field and molecular orbital theories of metal-ligand bonding; electronic spectra and magnetochemistry of complexes; reaction mechanisms.
*Prereq: Chem 212*

**Chem 313 W 2C 0.5**
**The Chemistry of the Main Group Elements**
A systematic approach to the synthesis, 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,S, 2C 0.5**
**Physical Chemistry 3**
Elementary statistical mechanics. Introduction to the physical chemistry of surfaces and simple macromolecules.
*Prereq: Chem 254-255, Math 215*

**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**
Some theories of rates of chemical reactions. Basic electrochemistry and transport properties of ionic solutions. Application of quantum mechanics to atomic spectroscopy.
*Prereq: Chem 254-255, Math 215*

**Chem 358L W 6L 0.5**
**Physical Chemistry Laboratory 2**
Selected experiments for students taking Chemistry 358.

**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**
Stereochemistry 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 1.0**
**Advanced Laboratory**
9 hours laboratory. See Chem 492 co-ordinator for details.

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.*

**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 227*

**Chem 320L W 3L 0.25**
**Chemical Instrumentation Laboratory**
Selected experiments for students taking Chemistry 320.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Credit</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem332</td>
<td>F,W</td>
<td>2C</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Biochemistry 1</strong></td>
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<tr>
<td><strong>Prereq:</strong> Chem 264 or 267</td>
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<tr>
<td>Chem332L</td>
<td>F,W</td>
<td>3L</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Biochemistry 1 Laboratory</strong></td>
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<tr>
<td>Qualitative and quantitative measurements of biochemically important materials for students taking Chemistry 332.</td>
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<tr>
<td>Chem333</td>
<td>F,W</td>
<td>2C</td>
<td>0.5</td>
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<tr>
<td><strong>Biochemistry 2</strong></td>
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<tr>
<td>Introduction to the chemistry and metabolism of carbohydrates and lipids.</td>
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<tr>
<td><strong>Prereq:</strong> Chem 332</td>
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<tr>
<td>Chem333L</td>
<td>F,W</td>
<td>3L</td>
<td>0.25</td>
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<tr>
<td><strong>Biochemistry 2 Laboratory</strong></td>
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<tr>
<td>A continuation of Chemistry 332L for students taking Chemistry 333.</td>
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<tr>
<td>Chem342</td>
<td>F (even years only)</td>
<td>2C</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Quantum Chemistry</strong></td>
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<tr>
<td>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.</td>
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<tr>
<td><strong>Prereq:</strong> Chem 255</td>
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<tr>
<td>Chem350</td>
<td>F</td>
<td>2C</td>
<td>0.5</td>
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<tr>
<td><strong>Spectroscopy and Molecular Structure</strong></td>
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<tr>
<td>Introduction to concepts and applications of microwave, Raman, IR, electronic and resonance spectroscopy with respect to molecular parameters.</td>
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<tr>
<td><strong>Prereq:</strong> Chem 255</td>
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<tr>
<td>Chem351</td>
<td>W (even years only)</td>
<td>2C</td>
<td>0.5</td>
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<tr>
<td><strong>Statistical Thermodynamics</strong></td>
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<tr>
<td>Chem353</td>
<td>F,S</td>
<td>3C</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Introduction to Polymer Science</strong></td>
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<tr>
<td>Basic definitions and polymer nomenclature, molecular weight averages and distributions, polymer constitution, configuration and conformation, step-growth and free-radical chain-growth polymerization and copolymerization.</td>
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<tr>
<td><strong>Prereq:</strong> Chem 254</td>
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<tr>
<td>Chem354</td>
<td>W</td>
<td>2C</td>
<td>0.5</td>
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<tr>
<td><strong>Applied Kinetics</strong></td>
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<tr>
<td>Introduction to kinetics and mechanism of elementary chemical processes in homogeneous systems, reversible, consecutive and simultaneous reactions, interpretation of kinetic data. Application to industrial processes, both batch and continuous.</td>
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<tr>
<td><strong>Prereq:</strong> Chem 255</td>
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<tr>
<td>Chem359</td>
<td>W (even years only)</td>
<td>2C</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Application of Chemical Thermodynamics</strong></td>
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<tr>
<td>Chem362</td>
<td>W (even years only)</td>
<td>2C</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Theoretical Organic Chemistry</strong></td>
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<tr>
<td>Chem363</td>
<td>W</td>
<td>2C</td>
<td>0.5</td>
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<tr>
<td><strong>Applied Organic Chemistry</strong></td>
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<tr>
<td>The organic chemistry involved in selected industrial processes will be discussed. Petroleum chemistry, synthesis of dyestuffs, pharmaceuticals, pesticides, organic polymers, etc.</td>
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<tr>
<td><strong>Prereq:</strong> Chem 364 or 257</td>
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<tr>
<td>Chem367</td>
<td>W</td>
<td>2C</td>
<td>0.5</td>
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<tr>
<td><strong>Selected Topics in Organic Chemistry</strong></td>
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<tr>
<td>Some of the following topics will be discussed: natural products, photochemistry, organometallic compounds, carbohydrates.</td>
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<tr>
<td><strong>Prereq:</strong> Chem 365 or 366</td>
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<tr>
<td>Chem395</td>
<td>W (even years only)</td>
<td>3C</td>
<td>0.5</td>
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<tr>
<td><strong>History of Chemistry</strong></td>
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<tr>
<td>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.</td>
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<tr>
<td>Chem409</td>
<td>W (odd years only)</td>
<td>2C</td>
<td>0.5</td>
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<tr>
<td><strong>Solid State Chemistry</strong></td>
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<tr>
<td>Packing in solids: metals, alloys and molecular crystals: ionic and covalent solids; chemical factors affecting crystal structures; properties of metals, semiconductors and molecular crystals.</td>
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<tr>
<td><strong>Prereq:</strong> Chem 212, 312 or 313</td>
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<tr>
<td>Chem411</td>
<td>F</td>
<td>2C</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Organometallic Chemistry</strong></td>
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<tr>
<td><strong>Prereq:</strong> Chem 312</td>
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</tr>
</tbody>
</table>
Chem 416 W 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 227*

Chem 421 W 2C 0.5
**Spectrometric Analysis**
The techniques and fundamental principles of infrared, mass spectrometry and NMR as applied to the qualitative identification of chemical compounds.
*Prereq: Chem 221 or 227*

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.

The Courses Listed Below are Electives Primarily Intended For Students in Chemistry Major Programmes (Honours and General)

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 440 F (odd years only) 2C 0.5
**Group Theory**
*Prereq: Math 215*

Chem 453 F 2C 0.5
**Polymer Properties and Polymerization**
Polymerization reactions; control of polymer structure and properties.
*Prereq: Chem 353 or equiv.*

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 254 and 255*

Chem 457 W 1C,3L 0.5
**Experimental Aspects of Polymer Science**
Selected experiments to describe properties of polymers and polymerization processes.
*Prereq: Chem 353 or equiv.*

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 358*
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 registering in Chem 226 must also register in Chem 226L

Chem 226L F 3L 0.25
Chemical Analysis 1 Laboratory
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 registering in Chem 227 must also register in Chem 227L

Chem 227L W 6L 0.5
Chemical Analysis 2 Laboratory
The application of analytical methods to contemporary problems in Chemistry and other Sciences.

Chem 266 F 2C,1T 0.5
Organic Chemistry 1
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 212

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)
Chemistry 241

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 357 W 2C 0.5
General Physical Chemistry 2
Selected experiments for students taking Chemistry 357

Chem 357 L W 3L 0.25
General Physical Chemistry Laboratory 2

Chem 366 F 2C 0.5
Structural and Synthetic Organic Chemistry
Stereocchemistry 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 366 L 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 360 F,W,S, T 0.5
Organic Chemistry 3
Stereocchemistry of organic compounds; conformational isomers, geometrical (cis-trans) isomers, optical isomers and diastereomers. Introductory carbohydrate chemistry.
Prereq: Chem 267

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. (equivalent to 311-312)

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 hetero-cyclic 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 237 L 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 stereocchemistry and reaction mechanisms.
Prereq: Ont. Year 5 Chem.; (Yr. 1 Chem desirable), (For Optometry students only.)

Chem 268 L F 3L 0.25
Introductory Organic Chemistry Laboratory
Selected experiments for students taking Chemistry 268.
Course Descriptions

Chemical Engineering

Faculty members having cross-appointments as shown

1 Chemical Engineering and Philosophy
2 Chemical Engineering and Chemistry
3 Chemical Engineering, Management Science, and Statistics
4 Chemistry and Chemical Engineering

Course Descriptions

ChE100  F  3C,1T,6L for first six weeks  0.75
Introduction 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.

ChE101  W,S  3C,1T,3L  0.75
Introduction Engineering Concepts 2
An extension of the topics covered in ChE100: energy
balances; Laboratory experiments illustrate the physical
principles discussed.

ChE102  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.

ChE211  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
conducts; flow past immersed bodies. Description,
collection and separation of particulate systems.

ChE220  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.

ChE230  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.
Chemical Engineering

ChE231  S,F  3C,1T  0.5
Physical Chemistry 2
Prereq: Ch E 230

ChE232  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.

ChE233  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.

ChE312  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

ChE313  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

ChE315  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

ChE320  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

ChE330  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

ChE331  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 F 231

ChE332  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

ChE334  W,S  3L  0.5
Instrumental Methods of Chemical Analysis
An introduction to modern analysis including optical, electrochemical, radiochemical, chromatographic and spectroscopic methods.

ChE340  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

ChE422  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 products, study of criteria for the appraisal of capital expenditures, critical path method, linear programming.

ChE482  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.
### Course Descriptions

#### Chemical Engineering

**ChE501 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.

**ChE510 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.

**ChE515 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.

**ChE517 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.

**ChE520 W,F 3C 0.5**
Chemical Engineering Analysis
Application of advanced mathematical techniques to the analysis of chemical engineering processes.  
*Prereq: Permission of instructor*

**ChE521 W 3C 0.5**
Process Dynamics and Control 2
Analog computation, time domain analysis, control of complex chemical systems.  
*Prereq: ChE 420*

**ChE523 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: ChE 420*

**ChE540 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.

**ChE541 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: ChE 540*

**ChE543 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: ChE 541*

**ChE550 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.

**ChE551 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 reaction, introductory hydrometallurgy, corrosion and homogenous catalysis.

**ChE553 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.

**ChE560 S,F 3C 0.5**
Introduction to Biochemical Engineering
Aspects of microbiology and biochemical 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.

**ChE561 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. Courses includes some lab work.  
*Prereq: ChE 560 or permission of instructor*
Course Descriptions

Chemical Engineering/Civil Engineering

ChE563 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: ChE 560 or permission of instructor

ChE570 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.

ChE571 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.

ChE580 S,F, 6L 0.5
Research-Design Project 1
Individually supervised research and/or design project on any Chem Eng subject chosen by the student-professor group. Written report required.

ChE581 W 12L 1.0
Research-Design Project 2
Continuation of ChE 580. Equivalent to two one-term courses. A written report, meeting minimum technical report standards, and a public oral presentation will be required.

ChE583 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.

ChE585 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 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, Chairman of the Department
T.H. Topper, BASc (Toronto), PhD (Cambridge), PEng

Professor, Dean of Engineering
W.A. McLaughlin, PEng (Saskatchewan) MS, PhD (Purdue), PEng

Professor, Associate Dean of Engineering
H.H. 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

Professor, Associate Chairman, Undergraduate Studies
J. Shortreed, BEngSc (Western), MSc (Queen's), PhD (Northwestern), PEng

Professors
S.T. Ariaratnam, BSc (Eng.) (Ceylon), MSc (London), PhD (Cambridge)
D.C. Clough*, BASc, MBA (Toronto), PEng
M.Z. Cohn, CSC (Bucharest), PEng
G.M. L. Gladwell, BSc PhD, DSC (London)
R.Green, BSc (Eng) (London), MSc (Queen's), MSc (Waterloo), PhD (Texas), PEng
V.K. Handa, BSc (Calcutta), BSc (Eng) (London), MSc (Queen's), MSc (Waterloo), PhD (Texas), PEng
R.C. G. Haas, BSc, MSc (Alberta), PhD (Waterloo), PEng
B.G. Hutchinson, BE (Sydney), MSc (Queen's), PhD (Waterloo), PEng
W.C. Lonnox, BASc, MSc (Waterloo), PhD (Lough), PEng
N.C. Lind, MSc (Tech. Univ. of Denmark), PhD (Illinois), PEng
J.T. Pindera, Dr. of Tech. Sciences (Warsaw), Docent Habil (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 (Manchester), MS (Lehigh), MA, PhD (Cambridge), PEng
S.I. Solomon, CivHyd Eng (Bucharest), PhD (City Univ., London), PEng
T.E. Unny, BE (Madras), MTech (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
D. E. Grierson, BASc, MASc, PhD (Waterloo), PEng
B. LeLievre, BEng (West Australia), MASc PhD (Waterloo), PEng
E. L. Matyas, BSc (Toronto), D/C, PhD (London), PEng
E. A. Bedell, BASc (UBC), SM, PhD (MIT), 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), P.Eng

Assistant Professors
N. Kouwen, BASc, PhD (Waterloo), PEng
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, BS (IIT), MS (Columbia), Eng (Stanford), PhD (Waterloo), PEng
J. J. Munk, BSc (Sir George Williams), BEng (McGill), LLB (Osgoode Hall), PEng
D. T. McClurkin, Chartered Accountant
N. W. McLeod, BSc (Alberta), MSc (Saskatchewan), ScD (Michigan), PEng
O. Stradal, CE, DSc (Prague)
O. L. White, BSc (Melbourne), MASc (Toronto), PhD (Illinois), PEng

Adjunct Lecturer
J. B. Kerr, MASc (Waterloo)

Faculty members holding cross-appointments as shown
1 Architecture and Civil Engineering
2 Management Sciences and Civil Engineering

Course Descriptions

Civil Engineering

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; 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
Differential Equations

Probability and Statistics

Structure and Properties of Materials

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.

Survey Camp
A one-week course in surveying. Introduction to surveying, length measurements, levelling, transit surveys. Approximate cost to each student $60.

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.

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.
CivE342  W,S  3C,2T  0.5  
**Transport Engineering 1**

CivE343  W,S  3C,2T  0.5  
**Transport Engineering 2**
Modes of Transport in Canada. Trends in use. Role of Civil Engineering profession. Highway transport; Railway transport; Air transport; Water pipeline characteristics; Arctic transport; Multi-modal planning studies.

CivE344  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.

CivE353  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.

CivE354  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.

CivE375  F,W  3C,2L/T  0.5  
**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.

CivE381  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.

CivE383  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.

CivE398  W,S  1S  0.0  
CivE399  F,W  1S  0.0  
**Seminar**
The engineer in society. Principles, methods and practice of Civil Engineering. Informal lectures.

CivE400  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.

CivE403  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.

CivE404  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.

CivE405  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.

CivE413  F,S  3C,2T  0.5  
**Structural Steel Design**

CivE414  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.
Civ E 415  W  3C,2T  0.5  
**Structural Systems**

Civ 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, thermostatic moire.

Civ E 440  F,S  3C,2T  0.5  
**Urban Traffic Management**

Civ 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.

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.
Department of Classics and Romance Languages

Associate Professor and Chairman of the Department
J. R. Dugan

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)

Course Descriptions
Classical Civilization (Courses in Translation)

CCiv 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.

CCiv 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.

CCiv 201 F 3C 0.5
Ancient Greek Society
A survey of the civilization of Classical Greece. Topics studied, based on primary (in English translation) and secondary sources, will include the individual, the city, institutions and leisure activities.

CCiv 202 W 3C 0.5
Ancient Roman Society
A survey of the civilization of the Roman Republic and Empire. Topics studied, based on primary (in English translation) and secondary sources, include the individual, cities and towns, institutions and leisure activities.

Note
With regard to the following 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 Classical Civilization 251—Classical Civilization 252.

CCiv 251 F 3C 0.5
Greek History
A survey of ancient Greece, emphasizing its political, military, social and economic aspects. This course is acceptable for credit by the History department.

CCiv 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 department.

CCiv 255 Mediaeval Civilization
Not offered 1978-79

CCiv 256 Mediaeval Civilization
Not offered 1978-79

CCiv 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.

CCiv 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.
Mythology and Religion
A general survey of Graeco-Roman mythology. Attention will also be devoted to such topics as the state cults, Oriental mystery religions in the Mediterranean area, and the Ruler Cult and worship of the Roman Emperor.

Forms of Classical and Neo-Classical Satire
Not offered 1978-79

Pastoral and Mythological Aspects of Classical and Neo-Classical Poetry
Not offered 1978-79

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 FineArts310)

Roman Art and Architecture
A survey of the art and architecture of the Roman world from Etruscan to Imperial times.

Problems in Greek History 1
Not offered 1978-79

Problems in Greek History 2
Not offered 1978-79

Christianity and the Roman Empire 1
Not offered 1978-79

Christianity and the Roman Empire 2
Not offered 1978-79

From Diocletian to Constantine
A study of the political and economic collapse of the Roman Empire, oriental ideas of the ruler, paganism, and the persecution of the Christian Church.

Constantine the Great
A study of Constantine's rise to power as sole ruler of the Roman Empire, his measures to secure the empire and its economy, his relationship with the Christian Church, and the establishment of 'new Rome'.

Classical Prose in Translation
Not offered 1978-79

Atlantis: The Making of Myth
Not offered 1978-79

Roman Civilization and History
Senior seminar. An in-depth study of various problems and aspects of Roman Civilization and History. (Same as History 400)

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)

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 200. 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.

Epic and Philosophy
An introduction to Greek epic and philosophy, with readings from Plato (selections are usually chosen from the Apology, Crito, Republic, or Symposium) and from Homer (selections from either the Iliad or Odyssey). Prereq: Year 5 Grk, Grk 100 or instructor's permission.

The Birth of History
An introduction to Greek history and historiography. Selections from Herodotus.

The Drama of Euripides
Euripides: Medea

The Greeks at War
Not offered 1978-79

Lyric and Elegiac Poetry
Not offered 1978-79

Aeschylus and Early Greek Tragedy
Not offered 1978-79

Classical Drama
Not offered 1978-79

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.
### Latin

(Department of Classics and Romance Languages)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lat100</td>
<td>Y</td>
<td>3C 1.0</td>
<td>Introductory Latin&lt;br&gt;A course designed for students beginning the study of Latin who have not yet reached the level expected in Lat150. 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.</td>
</tr>
<tr>
<td>Lat150</td>
<td>Y</td>
<td>3C 1.0</td>
<td>A survey of Latin Literature&lt;br&gt;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. &lt;br&gt;Prereq: Year 5 Latin, Lat100, or instructor's permission.</td>
</tr>
<tr>
<td>Lat251</td>
<td>F</td>
<td>3C 0.5</td>
<td>Latin Composition and Grammar&lt;br&gt;Composition, translation, basic grammar with intensive analysis of selected works. &lt;br&gt;Offered 1978-79 at Wilfrid Laurier University</td>
</tr>
<tr>
<td>Lat261</td>
<td>F</td>
<td>3C 0.5</td>
<td>Latin Prose 1&lt;br&gt;Not offered 1978-79</td>
</tr>
<tr>
<td>Lat262</td>
<td>F</td>
<td>3C 0.5</td>
<td>Latin Prose 2&lt;br&gt;Selections from Livy and Suetonius</td>
</tr>
<tr>
<td>Lat272</td>
<td>W</td>
<td>3C 0.5</td>
<td>An Introduction to Vergil&lt;br&gt;Offered 1978-79 at Wilfrid Laurier University</td>
</tr>
<tr>
<td>Lat281</td>
<td>W</td>
<td>3C 0.5</td>
<td>Latin Poetry 1&lt;br&gt;Selections from the lyric poems of Catullus and Horace</td>
</tr>
<tr>
<td>Lat282</td>
<td>W</td>
<td>3C 0.5</td>
<td>Latin Poetry 2&lt;br&gt;Not offered 1978-79</td>
</tr>
<tr>
<td>Lat352</td>
<td>W</td>
<td>3C 0.5</td>
<td>The History of the Latin Language&lt;br&gt;Not offered 1978-79</td>
</tr>
<tr>
<td>Lat361</td>
<td>W</td>
<td>3C 0.5</td>
<td>Cicero&lt;br&gt;The life and works of Cicero; his historical importance and his contribution to Latin literature. Selections from various works. &lt;br&gt;Offered 1978-79 at Wilfrid Laurier University</td>
</tr>
<tr>
<td>Lat362</td>
<td>W</td>
<td>3C 0.5</td>
<td>Lucretius&lt;br&gt;Not offered 1978-79</td>
</tr>
<tr>
<td>Lat363</td>
<td>W</td>
<td>3C 0.5</td>
<td>Roman Comedy&lt;br&gt;Not offered 1978-79</td>
</tr>
<tr>
<td>Lat371</td>
<td></td>
<td></td>
<td>An Introduction to the Roman Historians&lt;br&gt;Not offered 1978-79</td>
</tr>
<tr>
<td>Lat372</td>
<td>F</td>
<td>3C 0.5</td>
<td>Tacitus&lt;br&gt;Selections from the works of Tacitus</td>
</tr>
<tr>
<td>Lat381</td>
<td></td>
<td></td>
<td>Mediaeval Latin&lt;br&gt;Not offered 1978-79</td>
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<tr>
<td>Lat382</td>
<td></td>
<td></td>
<td>Mediaeval Latin&lt;br&gt;Not offered 1978-79</td>
</tr>
<tr>
<td>Lat461</td>
<td>F</td>
<td>2S 0.5</td>
<td>Vergil 1&lt;br&gt;Aeneid I-VI (selections)</td>
</tr>
<tr>
<td>Lat462</td>
<td>W</td>
<td>2S 0.5</td>
<td>Vergil 2&lt;br&gt;Aeneid VII-XII (selections); readings from the Eclogues and Georgics. &lt;br&gt;Prereq: Latin 461 or instructor's permission.</td>
</tr>
<tr>
<td>Lat471</td>
<td></td>
<td></td>
<td>Roman Elegy&lt;br&gt;Not offered 1978-79</td>
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<tr>
<td>Lat481</td>
<td></td>
<td></td>
<td>Roman Satire 1&lt;br&gt;Not offered 1978-79</td>
</tr>
<tr>
<td>Lat482</td>
<td>F</td>
<td>2S 0.5</td>
<td>Roman Satire 2&lt;br&gt;Selections from Petronius, Martial and Juvenal &lt;br&gt;Offered 1978-79 at Wilfrid Laurier University</td>
</tr>
<tr>
<td>Lat491-494</td>
<td></td>
<td></td>
<td>Senior Seminars&lt;br&gt;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.</td>
</tr>
</tbody>
</table>

### French

(Department of Classics and Romance Languages)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Prerequisites</th>
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</thead>
<tbody>
<tr>
<td>French Faculty</td>
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<tr>
<td>Associate Professor and Chairman of the Department</td>
<td>J. R. Dugan</td>
<td></td>
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<tr>
<td>Professors</td>
<td></td>
<td></td>
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<tr>
<td>A. Ages, BA (Carleton), MA, PhD (Ohio State)</td>
<td></td>
<td></td>
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<tr>
<td>J. R. Finn, CR, BA (Western), MA (Toronto), PhD (Illinois) J</td>
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<tr>
<td>R. L. Myers, BA (Western), MA, PhD (Johns Hopkins)</td>
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<tr>
<td>Associate Professors</td>
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<td></td>
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<tr>
<td>J. J. Binamé, L en Phil Rom, Agrégé (Brussels)</td>
<td></td>
<td></td>
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<tr>
<td>J. La France, BPaed, MA, PhD (Laval)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. D. Wilson, MA, PhD (Trinity College, Dublin)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assistant Professors
P. H. Dubé, BA, MA (Toronto), PhD (Ohio State)
R. J. Fournier, BA, MA, PhD (Western)
P. Socken; BA (Toronto), MA (Iowa), PhD (Toronto)

Sessional Appointments
C. C. Abbott, BA, MA, PhD (Ohio State)
P. Aplevich, BA, MA (Waterloo)
H. S. Fournier, BA (Toronto), MA, PhD (Western)
M. Hennig, BA (Western), MA (Waterloo)

Co-ordinators
M. Levert-Phillips, BA en Péd. (Quebec), Graduée du conservatoire d’art dramatique de l’Université de Montréal, BA-UQAM (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.

Fr101 F 3C,1L 0.5  
**Reading French**
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.

**Note**
This course is intended for students who have never had French before.
Prereq: Consent of Department.

Fr102 W 3C,1L 0.5  
**Reading French**
A continuation and completion of the work begun in Fr101.
Prereq: Fr101 or consent of Department.

Note 1
There is no follow-up to Fr102. Students wishing a basic French course leading to further courses should see Fr151 below.

Note 2
Successful completion of Fr102 will satisfy the “reading knowledge of French” requirement of University of Waterloo Graduate programmes.

Level 1: Courses for Students Who have not Completed High School Year 5 French
Fr151 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 Fr151 qualifies a student to take Fr152.

**Note**
Students will be placed into sections appropriate to their ability and background in French.
Also offered at St. Jerome’s College.

Fr152 W 3C,1L 0.5  
**Basic French**
A continuation of the work done in Fr151. Successful completion of Fr152 qualifies a student to take Fr191 or Fr192.
Prereq: Fr151 or consent of Department
Also offered at St. Jerome's College

**Note**
Students completing Fr152 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 Fr191 or 192.

**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.
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 novels and short stories. 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

French Language
A very intensive French language course, taught in French. Emphasis will be placed exclusively on strengthening oral expression, comprehension of spoken French, reading and writing skills.
Prereq: Year 5 French, Fr 152 or consent of Department.

Note
These half-courses are available only to students in the co-operative System or with the permission of the Department.

Second-Year French Courses

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, 192B, 196, or consent of Department.
Fr 255  F  3C  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.

Fr 256  W  3C  0.5  
**French Grammar**
A course designed to improve the student's knowledge of French grammar. Emphasis is placed on the study of sentence structure and sentence formation.
*Prereq: Fr 191 or Fr 192.*

Fr 257  F  3C  0.5  
**French Composition**
A course designed to improve the student's ability to write in a clear, concise, and effective manner. Emphasis is placed on the study of grammar, sentence structure, and style.
*Prereq: Fr 191 or Fr 192.*

Fr 258  F  3C  0.5  
**French Reading**
A course designed to improve the student's ability to read French literature. Emphasis is placed on the study of grammar, sentence structure, and style.
*Prereq: Fr 191 or Fr 192.*

Fr 259  W  3C  0.5  
**French Writing**
A course designed to improve the student's ability to write in a clear, concise, and effective manner. Emphasis is placed on the study of grammar, sentence structure, and style.
*Prereq: Fr 191 or Fr 192.*

Fr 260  F  3C  0.5  
**French Literature**
A course designed to introduce students to the study of French literature. Emphasis is placed on the study of major works and authors.
*Prereq: Fr 191 or Fr 192.*

Fr 261  W  3C  0.5  
**French Civilization**
A course designed to introduce students to the study of French civilization. Emphasis is placed on the study of major periods and events.
*Prereq:Fr 191 or Fr 192.*

Fr 270  F  3C  0.5  
**Survey of French-Canadian Literature**
A course designed to introduce students to the study of French-Canadian literature. Emphasis is placed on the study of major works and authors.
*Prereq: Fr 191 or Fr 192.*

Fr 271  W  3C  0.5  
**Survey of French Civilization**
A course designed to introduce students to the study of French civilization. Emphasis is placed on the study of major periods and events.
*Prereq: Fr 191 or Fr 192.*

Fr 272  F  3C  0.5  
**French and French-Canadian Civilization**
A course designed to introduce students to the study of French and French-Canadian civilization. Emphasis is placed on the study of major periods and events.
*Prereq: Fr 191 or Fr 192.*

Fr 273  W  3C  0.5  
**Advanced French Language Study**
A course designed to provide advanced study in the French language. Emphasis is placed on the study of grammar, sentence structure, and style.
*Prereq: Fr 191 or Fr 192.*

Fr 274  F  3C  0.5  
**Survey of French-Canadian Literature**
A course designed to introduce students to the study of French-Canadian literature. Emphasis is placed on the study of major works and authors.
*Prereq: Fr 191 or Fr 192.*

Fr 275  W  3C  0.5  
**Survey of French Civilization**
A course designed to introduce students to the study of French civilization. Emphasis is placed on the study of major periods and events.
*Prereq: Fr 191 or Fr 192.*

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 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 popular music, art, politics, industry, etc.
*Prereq: Fr 291 is recommended.*

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*
Fr402 W 0.5
Advanced Language Study
Consult the Department for further details of this course.
Prereq: Fr401 or consent of Department

Fr501 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.

Fr502 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
Fr409-419 Medieval Language or Literature
Fr420-429 Renaissance Literature
Fr230-239, 330-339, 430-439 17th Century French Literature
Fr340-349, 440-449 18th Century French Literature
Fr253-259, 350-359, 450-459 19th Century French Literature
Fr360-369, 460-469 20th Century French Literature
Fr270-279, 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 Fr300 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 Fr401/Fr402 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 Fr401/Fr402 or their equivalent.

Course Descriptions
Classics and Romance Languages
French

Fr342 F 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.
N.B. This course is not open to students having taken Fr341.

Fr363 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.
N.B. This course is not open to students having taken Fr361/362.

Fr375 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 Langewin; Hubert Aquin; Gérard Bessette. Taught in French.

Fr409 F 3C 0.5
Medieval French Language
An introduction to the early development of French. Offered at St. Jerome's College.

Fr421 F 3C 0.5
French Prose of the Renaissance
Readings in sixteenth century literature: Rabelais, Montaigne, etc.

Fr422 W 3C 0.5
French Poetry of the Renaissance
Readings in sixteenth century poetry: Marot, the Pléiade, the baroque poets etc. Taught in French.
Fr431  F  3C  0.5
Classical French Tragedy
The rise and decline of classical French tragedy from Corneille to Voltaire.
Taught in French.

Fr441  F  3C  0.5
"The Philosophes": French Prose Writers of the Eighteenth Century. Selected texts from Voltaire, Rousseau, Diderot, etc.
Taught in French.

Fr443  W  3C  0.5
Comedy and “drame bourgeois” of the Eighteenth Century
A study of examples of the comedy and “drame bourgeois” of the 18th century: Marivaux, La Chaussée, Voltaire, Diderot, Palissot, Sedaine, Beaumarchais.
Taught in French.

Fr451  F  3C  0.5
Movements and Themes in Nineteenth Century Poetry
A survey of lyric poetry in the nineteenth century.
Taught in French.

Fr461  W  3C  0.5
French Literature between the Wars
A study of some of the most significant literary works of the period in their historical, social and intellectual setting.
Taught in French.

Fr471  W  3C  0.5
French-Canadian Poetry
A study of its evolution from Octave Crémazie to Anne Hébert.
Taught in French.

Fr472  F  3C  0.5
Contemporary Quebec Theatre
A study of the themes, structures and evolution of Contemporary Québec theatre, based on the principal plays of authors such as: Gratien Gélinas; Marcel Dubé; Yves Thériault; François Loranger; Anne Hébert; Jacques Ferron; Jacques Langirand; Michel Tremblay.
Taught in French.

Fr490-498  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.

Course Descriptions
Classics and Romance Languages
French/Italian

Italian
(Department of Classics & Romance Languages)

Italian Faculty

Assistant Professor
V. F. Golini, BA (McMaster),
MA (Colorado) PhD (Berkely) J

Sessional Lecturer
A. Gualtieri, BA (Toronto), MA (Colorado) J

The following courses are administered by St. Jerome’s College

Ital100J  Y  3C,1L  1.0
Introduction to Italian (Formerly Ital110J)
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.
Offered at St. Jerome’s College

Ital101J  F  3C,1L  0.5
Introduction to Italian
Fall term of Ital100J: see note below.

Ital102J  W  3C,1L  0.5
Introduction to Italian
Winter term of Ital100J; see note below.

Ital190J  Y  3C,1L  1.0
Intermediate Italian (formerly Ital210J)
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: Ital110J or consent of instructor.
Offered at St. Jerome’s College.

Ital191J  F  3C,1L  0.5
Intermediate Italian
Fall term of Ital190J; see note below

Ital192J  W  3C,1L  0.5
Intermediate Italian
Winter term of Ital190J; see note below

Note
Ital101J, 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.
Italian Culture (formerly Ital230J)
This course, given in English, aims at giving the students a well-balanced view of Italy and her culture, through the study of her Geography, History, Religion, Literature, Art, Music and her contribution to the world and to North America in particular.
Prereq: Second Year standing.
Offered at St. Jerome's College

From Dante to Machiavelli
An intensive survey of major works from Dante to Machiavelli. Some attention also given to influence of Medieval and Renaissance writers on European literature.
Prereq: Ital190J, or 191J/192J, or consent of instructor.
Offered at St. Jerome's College

Italian Literature from 1600-1800
Not offered 1978-79

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: Ital190J, 191J/192J, or consent of instructor.
Offered at St. Jerome's College

Modern Italian Poetry
A survey of the major Italian poets from the Futurists through to Montale and their influence on European poetry.
Prereq: Ital190J, 191J/192J, or consent of instructor.
Offered at St. Jerome's College

Spanish (Department of Classics and Romance Languages)

Associate Professor and Chairman of the Department
J. R. Dugan

Spanish Faculty

Professor
J. C. McKeegney, BA (Western), 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)
S. Harrison, BA (Oxford), MA (Toronto), MA (Oxford)

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.
Prereq: Span 101 or consent of Division.

Introduction to Spanish
A continuation of Spanish 101
Prereq: Span 101 or consent of Division.

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.
Prereq: Grade 13 Spanish, or consent of Division.

Reading Spanish
Elementary course, taught in English, designed for rapid and adequate reading knowledge of Spanish. Basic elements of sentence structure. Reading passages from academic and other fields are studied according to personal interest. Not for spoken Spanish.
Prereq: Span 115

Advanced Intermediate Spanish
For students with some knowledge of Spanish. Includes oral and written work, review of grammar and an introduction to Hispanic civilization and culture.
Prereq: Grade 13 Spanish, or consent of Division.

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 194 W 3C,1L 0.5
**Advanced Intermediate Spanish**
A continuation of Spanish 193.
**Prereq:** Span 193 or consent of Division.

Span 210 Y 3C,D 1.0
**Spanish Civilization**
Spanish and Spanish American Civilization. A study in English of the highlights of the culture and history of Spain and her former overseas possessions, from the Altamira cave painters to the post-Franco era. Includes a survey of Aztec, Maya and Inca cultures. No knowledge of Spanish required.

Span 213 Commercial Spanish
Not offered 1978-79

Span 251 F 2C,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, 193/194, or permission of Division

Span 252 W 2C,D 0.5
**Composition and Conversation**
A continuation of Spanish 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:** Span 191/192 or 193/194
†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:** Span 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 Verse and Drama of the Golden Age
Not offered in 1978-79

Span 331 F 2R 0.5
**The Spanish Novel in Translation**
A study of the Peninsular novel including the picaresque, Don Quixote, 19th-century realistic novel, Generation of 1898, and the post-Spanish Civil War. Taught in English
† No Spanish Credit for majors and honours students. It is not acceptable as fulfilling the A(ii) requirements, but satisfies A(iii) requirements.

Span 332 W 2R 0.5
**Contemporary Spanish American Fiction In Translation**
A study of some of the novels and short stories of the outstanding writers of South America: Borges, Garcia Marquez, Fuentes, Rulfo, Cortazar, Vargas Llosa, Asturias. Taught in English.
† No Spanish Credit for majors and honours students. It is not acceptable as fulfilling the A(ii) requirements, but satisfies A(iii) requirements.

Span 341 F 3C 0.5
**Romantic Drama and Poetry In Spain**
A study of the most important dramatists and poets of the romantic literature of the 19th century, including Rivas, Zorrilla, Espronceda, and Becquer.

Span 342 W 3C 0.5
**The Spanish Novel of the 19th Century**
Costumbriamo, romanticism, realism and naturalism in the Peninsular novel of the past century, including Alarcon, Valera, Pereda, and Pardo Bazan.

Span 343 Galdos
Not offered in 1978-79
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 in 1978-79

Span 386 Modern Spanish American Poetry
Not offered in 1978-79

Span 395 F 2C,D 0.5
Spanish American Prose
A critical study of Spanish American prose from the Cortés letters to the works of Sarmiento.

Span 396 W 2C,D 0.5
Recent Spanish American Prose
A critical study of masterpieces in prose from Sarmiento to the present.

Span 417 Prose and Poetry of the Generation of '98 and Followers
Not offered in 1978-79

Span 441 F 2C,D 0.5
Old Spanish
Introduction to the origins and development of the Spanish language, with emphasis on phonology and morphology.

Span 442 W 2C,D 0.5
Medieval Spanish Literature
Analysis of texts from the 11th to the end of the 15th century, including the Poema de Mio Cid, El libro de buen amor and La Celestina.

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 F 2C,D 0.5
The Novel in Mexico
Principal stress will be placed on novels dealing with the Mexican Revolution.

Spain 496 W 2C,D 0.5
The Novel in the Andean Countries
The works of selected novelists from Colombia, Ecuador, Peru, and Bolivia, principally from the 20th century.

Spain 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. Required of all honours students.

By arrangement, Medieval Spanish will be taught in alternate years at Wilfrid Laurier University. Please check Cross-Registration procedures.
Dance Group

Assistant Professor, Chairman of Dance Group;
Associate Dean, Faculty of Human Kinetics
and Leisure Studies
W. N. Widmeyer, BA (Western Ontario), BPE (McMaster),
MA (California), PhD (Illinois)

Dean, Faculty of Human Kinetics and Leisure Studies
G. S. Kenyon, BPE (UBC), MS (Indiana), PhD (NYU)

Professor
N. J. Ashton, BSc (McGill), MS (Michigan)

Assistant Professor
R. Priddle, BPHE (Toronto), MSc (Springfield),
MA (Waterloo)
J. Officer, ARAD (Adv and ATC) (London)

Lecturers
R. Ryman, BA (York), MA (York)
D. Taplin, BA (Bennington)
Z. Wolofsky, BSc (McGill), MSc (Simon Fraser)

Instructor
D. King

Course Descriptions

Dance 162 F 2C,2std 0.5
Introduction to the Dance
An overview of dance as manifest through its earliest
forms as an expression of folk culture to its artistic
presentation in contemporary society.

Dance 163 W 2C,2std 0.5
A Study of the Medium of Movement
A course leading to an understanding of the broad
conceptual framework of movement emphasizing the
qualitative nature of movement and its relationship to
creative expression.
Prereq: Dance 162 or consent of instructor

Dance 262 F 2C,3std 0.5
Dance Theory: Process
This course focuses upon selected compositional
theories of major dance artists as examples of the
changes in choreographic approach from the 30's to 70's.
Prereq: Dance 163 or consent of instructor

Dance 264 F 2C,2std 0.5
History of the Classic Dance to 1909
Historical survey of the development of the classics from
elements appearing in the Greek Theatre to the end of the
Russian classic period in the early 20th century.
Prereq: Dance 162 or consent of instructor

Dance 265 W 3C 0.5
20th Century Ballet: Part 1 (History)
An in depth 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 264

Dance 272 Y 1C,3std 0.5
Technique and Notation Analysis of Ballet
A theoretical and practical study of ballet technique. The
course will explore the principles and technique of basic
ballet emphasizing movement analysis through Benesh
Notation.
Prereq: Dance 191/192 or consent of instructor ††
†† To obtain consent of instructor students must
audition during registration week.

Dance 273 Y 1C,3std 0.5
Technique and Notation Analysis of Modern Dance
A theoretical and practical study of modern dance
technique. The course will examine the fundamental
principles and technique of modern dance emphasizing
movement analysis through Labanotation.
Prereq: Dance 193/194 or consent of instructor.††
†† To obtain consent of instructor students must
audition during registration week.

Dance 362 W 3C 0.5
Socio-cultural Study of the Dance
Dance as an avenue for socio-cultural expression is
examined from the perspective of the social sciences.
Prereq: Soc 101 and Dance 264 or permission of
instructor
Offered alternate years

Dance 363 W 2C,2std 0.5
Dance Ethnology
A comparative study of ethnic dance forms with a
particular emphasis on dance style as a significant
cultural pattern. The course attempts to develop an
understanding of the effect of particular ideologies and
political systems on the development of a cultural
dance form.
Prereq: Dance 264 or consent of instructor
Offered alternate years

Dance 364 F 2C,2T 0.5
Development Aspects of Movement
A study integrating the cognitive and perceptual
developments in children as they relate to motor
development. Primary emphasis is placed on
investigating movement experiences suitable for children.
Dance

Dance 262 W 3C 0.5
Dance Criticism
This course covers questions about the role of the critic, his audience, his credentials, etc. The course also focuses upon particular dance events, in the studio and on the stage, for the purpose of developing critical faculties in a living context.
Prereq: Dance 262, 265
Offered alternate years

Dance 267 F 2C,2std 0.5
20th Century Ballet: Part 2 (Choreography)
Analysis and study of the themes and styles of 20th century ballets and the changing attitudes to the theatre. Consideration is given to the adaptations of the classical idiom to the artistic trends of this century.
Prereq: Dance 265
Offered alternate years

Dance 268 W 2C,4std 0.5
Dance Theory: Product (Modern Dance)
This course focuses upon theories of dance as they engender a particular view of art and a particular view of the human body and thus delimit the nature of the created work itself. The nature of a theory is discussed, as is the nature of scientific and aesthetic theories.
Prereq: Dance 262
Offered alternate years

Dance 365 W 3C 0.5
Labanotation
This course examines the basic theoretical concepts of Laban's system for the graphic notation of human movement. Emphasis is given both to the reading and the writing of notated dance scores.
Prereq: Dance 273 or consent of instructor
Offered alternate years

Dance 367 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:
- a) Dance with Children and Adolescents
- b) Advanced Ballet (Performance)
- c) Advanced Choreography
- d) Dance Production

The workshop series is open only to 3rd and 4th year Honours dance students. Two workshops may be taken in the 420 series toward the Honours degree.

Dance 461/462
Research Project
An independent research project on an approved topic, supervised by a faculty member. Required of all students enrolled in Honours Dance, Dance 461 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 462 includes the completion of the project begun in Dance 461
Prereq: Dance 461

Dance 367 Y 1C,3std 0.5
Principles and Technique of Ballet
A theoretical and practical study of selected aspects of ballet. The student is asked to draw upon his knowledge of anatomy and basic mechanics in order to better understand and perform ballet movements.
Prereq: Dance 272 plus Kin 200 or consent of instructor

Dance 372 Y 1C,3std 0.5
Principles and Technique of Modern Dance
A theoretical and practical study of selected aspects of modern dance. The student is asked to draw upon his knowledge of anatomy and basic mechanics in order to better understand and perform modern dance movements.
Prereq: Dance 273 plus Kin 200 or consent of instructor

Dance 382 W 2C,2std 0.5
Benesh Notation
The course examines the basic theoretical concepts of the Benesh Notation system for the graphic notation of human movement. Emphasis is given to the reading and writing of notated dance scores, especially ballet scores.
Prereq: Dance 272 or consent of instructor
Offered alternate years

Dance 383 W 2C,2std 0.5
Principles and Technique of Modern Dance
The concern of this course is the relationships of man to the art products which he fashions. Questions such as are all people creative? are discussed as is the validity of a distinction between art and life. A phenomenological analysis of dance is presented, discussed, critiqued and evaluated.
Prereq: Phil 100 and two full courses in Dance
Dance 474  F.W
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

Studio Courses
The following studio courses are elective and non-credit. 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  Beginning Ballet, F
Dance 192  Beginning Ballet, W
Dance 193  Beginning Modern Dance, F
Dance 194  Beginning Modern Dance, W
Dance 197  Folk Dance, F
Dance 198  Beginning Jazz, W
Dance 298  Advanced Jazz
Dance 491  Advanced Ballet, F
Dance 492  Advanced Ballet, W
Dance 493  Advanced Modern Dance, F
Dance 494  Advanced Modern Dance, W

Drama and Theatre Arts Group
Associate Professor, Chairman of the Department
W. R. Chadwick, BA, MA (Toronto), PhD (London)

Lecturers
T. Bentley-Fisher, Drama Centre, London
M. vanDijk, BA, MA (Wellington), PhD (Toronto)
S. Dobson, Drama Centre, London
J. M. Kelman, BA (Waterloo)

Part-Time Lecturers
P. Bentley-Fisher, Drama Centre, London
G. Butler, BA, MBA (York)

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 will be required to 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 CIV266)
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 Jacobean (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.

Course Descriptions
Drama and Theatre Arts Group

Drama 255  3C  0.5
Survey of Dramatic Literature and Theory 5.
The twentieth century from Brecht to the present.

Drama 261  F  4C.L  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  4C,L  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 22.

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 F 3C 0.5
Arts Administration 1
An introduction to management in and of the performing and fine arts. Topics will include theatre and company management, marketing, elementary accounting, touring and contracts.

Drama 349 W 3C 0.5
Arts Administration 2
Additional topics in performing and fine arts management, including copyright, cultural policy, taxation, funding, research and audience development.

Canadian Drama
A study of plays by such dramatists as Merrill Denison, Robertson Davies, Gratien Gelas (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 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 381 Costuming 1
Not offered 78/79

Drama 382 Costuming 2
Not offered 78/79

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 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 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.
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 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 W,S 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. Introduction to isotope geology and radiometric dating.

Earth 231 F 2C,3L 0.5
Mineralogy and Crystallography

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.

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.

Earth 260  W,S  2C,3L  0.5  
Introductory Structural Geology  

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 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  
Mathematical Geology 1  
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 369  W  2C,2L  0.5  
Geophysics 2  
The geology of the ocean basins. Topics in physical oceanography. Physical properties of ocean water, heat budget of the world oceans, Oceanic circulation, Coriolis effects. Some idealized current regimes (Identical to Phys 369).  
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 industry. The laboratory will involve sampling methods, ore calculation and property evaluation.  
Prereq: Earth 231, 232
Course Descriptions
Earth Sciences

Earth 390 S fdlab
Field Camp
Ten day field camp at Whitefish Falls, held at beginning of spring term.

Earth 421 F 2C,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.
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
Biostratigraphy
Methods of using paleontological data to solve stratigraphic problems. Faunal provinces in space and time. Effects of continental drift and climatic change on biogeography through the Phanerozoic.
Prereq: Earth 236

Earth 435 F 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 438 W 2C,3wkshp 0.5
Engineering Geology
Review of basic concepts in soil and rock mechanics. Field and laboratory methods used to define and characterize the properties of geological materials and 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 439 F 3C,1T 0.5
Groundwater Geology
The location, exploitation, and conservation of groundwater-surface water interactions, effect of man's activities on ground water quality, hydrogeologic facts in subsurface waste disposal.

Earth 440 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 456 W 3C 0.5
Mathematical Geology 2
Boundary value problems in geophysics and hydrogeology. Mathematical modelling of geological systems; simulation.
Prereq: Math 113, Earth 355

Earth 461 W 3C,1T 0.5
Applied Geophysics 2
Physical and mathematical foundations of applied geophysics, advanced methods of treatment of geophysical data, with emphasis on problems from geophysical exploration.
Prereq: Earth 360

Earth 470 F 3C,2L 0.5
Metallic Mineral Deposits
The petrology and genesis of metalliferous ore deposits. The description of classic deposits; the stability of ore minerals; ore minerals in aqueous systems. The laboratory will include instruction and practice in ore microscopy.
Prereq: Earth 370
Earth 480  S  fldlab  0.5
Field Study
Depending on the demand and the availability of an instructor, a six week field course may be offered in an area of unusual geological interest during the spring or summer. This course will consist of two weeks of classroom lectures and one month in the field location. Expenses are to be paid by the student. Prereq: consent of the instructor.

Earth 490  F  fldlab  0.5
Field trip
Week-long field trip to Appalachian localities, held at beginning of fall term.

Department of Economics

Associate Professor, Chairman of the Department
R. R. Kerston, BComm (Toronto), MA (Carleton), PhD (Duke)

Associate Professor, Associate Chairman
A. Olsen, BComm (Sir George Williams), MBA (Western Ontario)

Associate Professor, Graduate Officer
W. R. Needham, BComm (Carleton), MA, PhD (Queen’s)

Associate Professor, Undergraduate Officer
S. K. Ghosh, BSc, MSc (Calcutta) MS, PhD (Wisconsin)

Professors
J. H. Hoston, BA (Colorado College), MA, PhD (Penn)
A. Koutsoyiannis, BA (Athens), PhD (Manchester)
L. Needleman, BA, MA (Oxford), PhD (Glasgow)

Associate Professors
K. M. H. Bennett, BA, MA (Queen’s), PhD (McGill)
F. P. Dougherty, BComm (Sir George Williams), CA (McGill), MSc (Clarkson), PhD (Penn State)
L. P. Fletcher, BComm (Mount Allison), AM, PhD (Brown)
H. M. Herauf, BComm (Sask.), CA (Institute of CA of Sask), MBA (Mich)
N. E. Lavigne, CR, BA (Western), MComm (Ottawa), MBA (Detroit)
R. A. Long, BComm, (UBC), CA (ICABC), MBA (Washington)
W. R. Thirsk, BA, MA (UBC), PhD (Yale)

Assistant Professors
A. Andrikopoulos, BA (Athens), MA (Wayne State), PhD (Southern California)
S. W. Kardasz, BA (Loyola), PhD (Queen’s)
G. Russell, BComm, MBA (McMaster), RIA
S. Shinohara, BA (Tokyo), MA (Chicago), PhD (Waterloo)

Lecturers
E. Carvalho, BA, MA (Waterloo)
S. J. Glover, BMath (Waterloo), CA (ICAO)
K. Stollery, BA (Southern California), MA (Queen’s)
R. M. Blair, BEng, MBA (Queen’s), CA (part-time)
R. Kilimnik, BA (Waterloo), MBA (McMaster) (part-time)

Adjunct Professors
A. Headlam, FCA
L. Seguin, BComm (McGill) CA

Visiting Professor
G. C. Routh, BComm (Witwatersrand), PhD (London)
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 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 193 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

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

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, analytical geometry, derivation, exponential and logarithmic functions and differentiation—all developed within the context of economic theory. Prereq: Econ 101, 102

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

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
## 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>
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</thead>
<tbody>
<tr>
<td>100 Intro. Modern Economics</td>
<td>201 Microeconomic Theory</td>
<td>301 Intermediate Microeconomics</td>
<td>401 Advanced Economic Theory</td>
<td>Economic Theory</td>
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<tr>
<td>101 Intro. Microeconomics</td>
<td>202 Macroeconomic Theory</td>
<td>302 Monetary Theory and Banking</td>
<td>402 Economic Cycles and Stabilization Policy</td>
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<td>102 Intro. Macroeconomics</td>
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<td>303 Economic Thought</td>
<td>403 Econ. Analysis, Forecasting, and Public Policy</td>
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<td>211 Mathematics for Economists</td>
<td>311 Intro. Math Economics</td>
<td>411 Mathematical Economics</td>
<td>Quantitative Economics</td>
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<td>221 Statistics for Economists</td>
<td>321 Intro. Econometrics</td>
<td>413 Economic Growth Theory</td>
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<td>231 Intro. International Economics</td>
<td>331 International Trade Theory</td>
<td>332 International Monetary Theory</td>
<td>421 Econometrics 1</td>
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<td>333 Interregional Economics</td>
<td>422 Econometrics 2</td>
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<td>335 Economic Development</td>
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<td>431 Advanced International Economics</td>
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<td>432 International Economic Policy</td>
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<td>341 Public Finance</td>
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<td>Public Economics</td>
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<td>343 Urban Economics</td>
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<td>345 Industrial Organisation</td>
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<td>347 Economics of Transportation and Communication</td>
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<td>353 Population Economics</td>
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<td>355 Energy &amp; Natural Resources</td>
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<td>357 Environmental Economics</td>
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<td>263 Canadian Economic History</td>
<td>361 North American Economic History</td>
<td>461 Comparative Economic Systems</td>
<td>Economic History and Contemporary Problems</td>
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<td>363 Contemporary Canadian Prob.s.1</td>
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<td>364 Contemporary Canadian Prob.s.2</td>
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<td>381-389 Special Topics</td>
<td>481-489 Special Studies</td>
<td>Special Topics and Studies</td>
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<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>
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<td>193 Economics and the Administrator 1</td>
<td>293 Auditing</td>
<td>393 Corporate Finance 1</td>
<td>493 Taxation</td>
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<td>194 Economics and the Administrator 2</td>
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<td>394 Corporate Finance 2</td>
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<td>Econ 241</td>
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<td>Cost-benefit Analysis and Project Evaluation</td>
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<td>Econ 263</td>
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<td>Economic History of Canada</td>
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<td>Econ 291</td>
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<td>Intermediate Financial Accounting 1</td>
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<td>Business Law</td>
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<td>Econ 301</td>
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<td>Intermediate Microeconomics</td>
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<td>Monetary Theory and Banking</td>
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<td>Econ 303</td>
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<td>Economic Thought</td>
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<td>Econ 304</td>
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<td>Introduction to Mathematical Economics</td>
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<td>Econ 321</td>
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<td>Introduction to Econometrics</td>
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<td>Econ 331</td>
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<td>International Trade Theory</td>
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<td>Econ 332</td>
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<td>International Monetary Theory</td>
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<td>Econ 333</td>
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<td>Inter-regional Economics</td>
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</table>
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 (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 1978-79

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 1978-79

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 0.5/0.5
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, 211
Econ 393 is a prereq. for Econ 394

Econ 401 F 3C 0.5
Advanced Economic Theory
Pure theory of exchange, production and consumption theory, the core of an economy, capital theory, general equilibrium analysis of multiple markets, and related theoretical issues.
Prereq: Econ 301, 302, 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 1978-79*

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 1978-79*

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*
Course Descriptions
Electrical Engineering

Department of Electrical Engineering

Professor, Chairman
K. D. Srivastava, BSc, BE (Hons) (Roorkee), PhD (Glasgow)

Professor, Associate Chairman for
Graduate Matters
I. F. Blake, BSc, MSc. (Queen's). MA, PhD (Princeton)

Associate Professor, Associate Chairman for
Undergraduate Matters
J. D. Aplevich, BE (Saskatchewan),
PhD (Imperial College, London)

Professor, Dean of Graduate Studies
L. A. K. Watt, BSc (Manitoba), MS (Chicago),
PhD (Minnesota)

Professor, Director Computer Communications
Network Group
E. G. Manning, MSc (Waterloo), PhD (Illinois)

Professors
H. 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. Heasell, BSc, PhD (Imperial College, London)
R. H. MacPhie, BASc (Toronto), MS, PhD (Illinois)
S. N. Kalra, BSc (Punjab), MS, PhD (Illinois)
R. S. Ramshaw, BSc, PhD (Nottingham)
H. C. Ratzi, BASc (Toronto), MS (MIT), PhD
(Saskatchewan)
J. Reeve, BSc, MSc, PhD, DSc (Manchester)
D. J. Roulston, BSc (Belfast), PhD (Imperial College,
London)
J. Vlach, Dipl Ing CSc (Technical University of Prague)
L. Y. Wei, BS (National Northwestern College, China),
MSc, PhD (Illinois)

Associate Professors
Y. L. Chow, BEng (McGill), MASC, PhD (Toronto)
G. J. Dufault, BA (Ottawa), BSc (Carleton)
J. A. Field, BA (Saskatchewan), 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 (BC)
J. C. Majithia, BSc (Hons) (London), MEng, PhD
(McMaster)
J. W. Mark, BASc (Toronto), 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, MASC(Saskatchewan), PhD (Cambridge)

Visiting Professors
I. C. Goknar, PhD (Michigan State)
I. N. Hajj, BA (American Univ of Beirut), MS (Mexico),
PhD (California)
R. V. Patel, PhD (Cambridge)
S. Skelboe, PhD (Tech Univ Denmark)

Adjunct Professor
J. Carr, PhD (Waterloo)

Faculty member holding cross-appointments as shown

Department of Computer Science

Course Descriptions

EIE14 W,F 3C,3L,12T 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.

EIE32 W,S 3C,3L,2T 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.

EIE116 W,S 2C,3L,1T 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

EIE201 F,W 1C 0.0
Seminar
General Seminar
EIE202  F,S  1C  0.0  
Seminar  
General Seminar

EIE205 (Math211)  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.

EIE206 (Math212)  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.

EIE221  W,F  2C,2L',1T  0.5  
Principles of Digital Circuits & Systems  
An introduction to digital systems, switching algebra, combinational logic analysis and synthesis. Minimization using map methods. Elementary treatment of sequential circuits, including design of clocked circuits with specified transition tables. Number representation and arithmetic process codes and parity.  
'Alternate weeks.

EIE233  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.

EIE241  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.

EIE261  F,S  3C,1T  0.5  
Energy Processing and Conversion  

EIE271  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.

EIE293  W,F  1C,4L',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.

EIE294  S,F  1C,3L',1T  0.5  
Measurement Instrumentation 2  
Experiments related to material covered in courses EIE261 and EIE271 will be performed. This course also includes further topics on instrumentation and measurement techniques. 'Open Lab.

EIE301  W,S  1C  0.0  
Seminar  
General Seminar

EIE302  F,W  1C  0.0  
Seminar  
General Seminar

EIE316  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.

EIE317  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.

EIE324  W,F  2C,1T,2L'  0.5  
Introduction to Digital Computers  
Prereq: EIE221 or equivalent
EIE342 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: EIE241 or Equivalent

EIE351 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: EIE233 or equivalent

EIE352 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; noise in electronic circuits.
"Alternate weeks.

EIE362 W,S 2C,1T,3L',0.5

Energy Conversion
Electric motors and generators.

EIE372 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.

EIE380 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.

EIE401 F,S 1C,0.0

Seminar
General Seminar

EIE402 W 1C,0.0

Seminar
General Seminar

EIE407 W 2C,2T,0.5

Numerical Methods

EIE418 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

EIE419 W 2C,1T,1L',0.5

Digital Communications
"Open

EIE425 S,F 2C,2L',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

EIE426 W 3C,3L,0.5

Software Engineering
Prereq: EIE324 or equivalent

EIE427 S,F 2C,2L,0.5

Digital Hardware Engineering
Prereq: EE221, EE324 or equivalent
EIE 434  W  2C,2T  0.5
**Quantum Electronics and Magnetics**
Laser principles: solid state, semiconductor and gas lasers. Laser applications, holography. Ferromagnetism, ferrimagnetism, diamagnetism and paramagnetism, electron-spin resonance, core and bubble memories.

EIE 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.

EIE 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.

EIE 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: EIE 342 or equivalent.

EIE 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.

EIE 453  W  2C,1T,3L'  0.5
**Linear Electronic Circuits**

EIE 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'IL and PL.

EIE 469  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.

EIE 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.

EIE 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.

EIE 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.

EIE 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.
Course Descriptions
Electrical Engineering/English

EIE 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: EIE 372 or equivalent

EIE 481  S,F  2C,1T,1L*  0.5  
Control Systems 1  
Alternate weeks

EIE 482  W  2C,1L*,2T  0.5  
Control Systems 2  
Prereq: EIE 446, EIE 481

EIE 499A  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.

EIE 499B  W  9L  0.5  
Project  
Either a continuation of EIE 449A or a separate one-term project.

Department of English

Professor, Chairman of the Department  
W. U. Ober, BA (Washington and Lee), PhD (Indiana)

Professor, Associate Chairman and  
Undergraduate Officer  
W. R. Martin, BA, MA, D Litt et Phil (South Africa)

Associate Professor and Graduate Officer  
G. E. Slethaug, BA (Pacific Lutheran),  
MA, PhD (Nebraska)

Professor and Associate Dean, Undergraduate Affairs  
J. C. Gray, BA (Washington State), MA (Connecticut),  
PhD (Syracuse)

Professor and Associate Dean, Special Programmes  
K. L. Ledbetter, AB (Central College, Mo.),  
MA, PhD (Illinois)

Professors  
J. Gold, BA (Birmingham), PhD (Wisconsin)
G. R. Hibbard, BA, MA (London)
W. K. Thomas, MA, PhD (Toronto)

Associate Professors  
R. R. Dubinski, BA, MA (Western), PhD (Toronto)
A. I. Dust, MA, PhD (Illinois)
H. B. Ellis, BA (Rollins), MA, PhD (Illinois)
R. N. Gosselink, BA (Kansas), MA, PhD (Colorado)
B. N. Honeyford, BA, PhD (Toronto)
N. C. Hultin, BA (Concordia), MA (Chicago),  
PhD (Johns Hopkins)
P. M. Hinchcliffe, BA (UBC), MA, PhD (Toronto)
D. R. Letson, BA (Waterloo), MA (McMaster),  
PhD (Toronto)
R. R. Dubinski, BA, MA, PhD (Toronto)
W. R. Macnaughton, BA (Toronto), MA, PhD (Wisconsin)
J. S. North, BA, MA (UBC), PhD (Alberta)
E. F. Shields, BA (Chestnut Hill), MA (Villanova),  
PhD (Illinois)
J. S. Stone, BA, MA (UBC)
H. Tuyun, MA (Utrecht and Oxon), Docteur de  
l'Université de Paris R

Assistant Professors  
P. D. Beam, BA (Waterloo), MA (McMaster),  
PhD (Toronto)
S. Fogel, BA (Carleton), MA (UBC), PhD (Purdue) J
D. S. Keppel-Jones, BA (Natal), MA, PhD (Queen's) J
Sister M. Leon, SSND, BA (Toronto), MA (Detroit) J
E. P. McCormack, BA (Glasgow), PhD (Manitoba) J
S. E. McMillen, BA, MA (Carleton), PhD (Dalhousie)
M. G. Thysell, MA (Montana), PhD (Iowa)
Lecturer

L. Dorney, BA, MA (Louisville) J (part-time)

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

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.

Engl109  Introduction to Essay Writing 1
Engl110  Introduction to Essay Writing 2
Engl209  Advanced Essay Writing
Engl210  Report Writing
Engl309  Seminar in Essay Writing
Engl335  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.

Engl150  English as an Instrument of Thought and Communication 1
Engl151  English as an Instrument of Thought and Communication 2
(Formerly English 140/141.)
Engl140R  Use of English 1
Engl141R  Use of English 2
Engl245R  Form and Function

Note

R Courses are administered by Renison College.

1A)

Engl109  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

Engl110  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: Engl109
Also offered at St. Jerome’s College

Engl209  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

Engl210  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

Engl309  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: Engl209 or consent of instructor

Engl335  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 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.
Prereq: Engl 150
Also offered at Renison College

Engl 140R F 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 Y 1.0
Form and Function
The uses of literacy and the functions of language as acquired in Engl 140R/141R. These will be applied to the more advanced form of the literary and critical assignment essay, involving comparison, evaluation and exposition.

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.

Course Descriptions
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 0.5
The Hero
A study of human excellence in thought and action, embodied in representative men and women, as seen through works of literature.

Engl 108R 0.5
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.

Engl 108C 0.5
Literature and Morality
Works in English literature from its beginnings are selected for their bearings on questions of morality.

Engl 108D The Quest Theme in Literature
Not offered in 1978-79

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.
Also offered at St. Jerome’s College
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

Eng 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 and tragedics. Shakespeare's variety and flexibility in developing 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 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.

Engl 206 The Art of the Essay  
Not offered in 1978-79

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.

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, Heilner, 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, Lawrence, 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 208F 0.5  
Themes in Canadian Literature  
The course will explore a theme which is significant in the understanding of the Canadian literary mind. Examples include: the impact of the landscape, rural-urban conflict, isolation, social conservatism, regional reality. Novels, poetry, drama, essays and biography may be considered.  
Also offered at St. Jerome's College
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl208H</td>
<td>Arthurian Legend</td>
<td>0.5</td>
<td>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.</td>
</tr>
<tr>
<td>Engl208K</td>
<td>Detective Fiction</td>
<td>0.5</td>
<td>The history and characteristics of the &quot;detective novel,&quot; the &quot;novel of crime,&quot; and the &quot;thriller.&quot; 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.</td>
</tr>
<tr>
<td>Engl211/212</td>
<td>The Novel</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Engl211J</td>
<td>The Novel 1</td>
<td>0.5</td>
<td>A study of the novel in English from its beginnings to the late 19th century.</td>
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<td><em>Also offered at St. Jerome's College</em></td>
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<tr>
<td>Engl212</td>
<td>The Novel 2</td>
<td>0.5</td>
<td>A study of the novel in English from the late 19th century to the present.</td>
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<td><em>Also offered at St. Jerome's College</em></td>
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<tr>
<td>Engl230</td>
<td>Narrative Poetry</td>
<td>0.5</td>
<td>A study of the major narrative forms in English poetry including the ballad, epic, mock epic, and dramatic monologue.</td>
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<td><em>Also offered at St. Jerome's College</em></td>
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<tr>
<td>Engl231</td>
<td>Lyric and Other Poetry</td>
<td>0.5</td>
<td>A study of the development of various lyric forms (e.g., erotic, religious), the ode, elegy, meditative-descriptive verse, and perhaps other forms. Engi230 is not a prereq.</td>
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<td><em>Also offered at St. Jerome's College</em></td>
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<tr>
<td>Engl232</td>
<td>The Development of Drama to 1660</td>
<td>0.5</td>
<td>A study of the origins and development of English drama, with special concentration on 16th-century non-Shakespearean drama. <em>(Cross-listed with Drama 252)</em></td>
</tr>
<tr>
<td>Engl233</td>
<td>Drama from 1660</td>
<td>0.5</td>
<td>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. <em>(Cross-listed with Drama 253)</em></td>
</tr>
<tr>
<td>Engl236</td>
<td>Literature of Ideas 1</td>
<td>0.5</td>
<td>This course considers such problems as idealism versus realism, the individual versus society, and rebellion versus revolution. Texts include classics such as Machiavelli's <em>The Prince</em>, More's <em>Utopia</em>, Marx's <em>Communist Manifesto</em>, and Mill's <em>On Liberty</em>, and 20th-century counterparts of these works.</td>
</tr>
<tr>
<td>Engl237</td>
<td>Literature of Ideas 2</td>
<td>0.5</td>
<td>Similar to English236, but dealing with moral implications of philosophical and scientific ideas and discoveries that have profoundly affected 20th-century society.</td>
</tr>
<tr>
<td>Engl251</td>
<td>Y</td>
<td>1.0</td>
<td>The Practice and Theory of Criticism</td>
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<td></td>
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<td></td>
<td>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. <em>Also offered at St. Jerome's College</em></td>
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<tr>
<td>Engl290</td>
<td>F</td>
<td>0.5</td>
<td>American Literature</td>
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<td>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. <em>Also offered at St. Jerome's College</em></td>
</tr>
<tr>
<td>Engl291</td>
<td>W</td>
<td>0.5</td>
<td>Modern American Literature</td>
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<td></td>
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<td></td>
<td>Approaches to reality amid the confusion and uncertainty of 20th-century America. Emphasis on such major writers as Faulkner, Miller, and Cummings. Prereq: Engl290 <em>Also offered at St. Jerome's College</em></td>
</tr>
</tbody>
</table>
Course Descriptions

English

Engl305  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

Engl310  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

Engl312  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

Engl313  0.5
Canadian Literature to 1920
A study of Canadian prose and verse to 1920, with particular attention given 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

Engl314  0.5
Canadian Poetry Since 1920
Poetry in Canada from E. J. Pratt and A. J. M. Smith to Leonard Cohen. Also offered at St. Jerome's College

Engl315  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

Engl316  0.5
Canadian Drama
A study of plays by such dramatists as Merrill Denison, Robertson Davies, Gratien Gélinas (in translation), James Reaney, John Coulter, George Ryga and Michel Tremblay (in translation). Background for 20th-century drama will be provided in lectures. (Cross-listed with Drama 351)

Engl330  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 preceding 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

Engl339  0.5
Contemporary British Literature
A study of the major trends in British literature from World War 2 to the present. The course will examine the rise of the angry generation and social protest, the renaissance in drama, the return to tradition and the reaction against experimentation, and other topics related to the literary emergence of a new England.

Engl345/346/347
Studies in American Literature
(Usually only one or two courses from this series are offered each year.)

Engl345B  W  0.5
American Fiction
The Southern Myth: its origins in early literature, its flowering and ruin, as seen by white and black writers, including Twain, Faulkner, Welty, Styron, Grau, O'Connor, Wright, and Ellison. Prereq: English 290 or consent of instructor.

Engl347A  W  0.5
Contemporary American Literature
A study of American Literature from World War 2 to the present. Prereq: Engl290 or consent of instructor. Also offered at St. Jerome's College

Engl350  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

Engl355  0.5
Forms of Classical and Neo-Classical Satire
Not offered in 1978-79

Engl356  1.0
Pastoral and Mythological Aspects of Classical and Neo-Classical Poetry
Not offered in 1978-79

Engl362  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

Engl363  W  0.5
Shakespeare 2
A study of the plays written after 1599-1600, including Julius Caesar. Also offered at St. Jerome's College
Course Descriptions

English

Engl365/366  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

Engl373  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.

Engl375  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.

Engl376R  F  0.5
Our Changing Language: Syntax and Semantics 1
In its evaluation of modern systems of syntax, the course will provide a thorough and practical grounding in structure of language and will stress the need for semantic interpretation. (An extensive knowledge of syntax is not assumed.)
Prereq: Engl 141R and 245R

Engl377R  W  0.5
Our Changing Language: Syntax and Semantics 2
Continuation of Engl376R. The semantic approach expanded: meaning conditions form and practical significance in language teaching. Of interest to intending teachers of English as the native or as a second language.
Prereq: Engl376R

Engl385R  Y  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.

Engl400  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

Engl410  Y  1.0
The Augustan Age
A study of English literature from 1660 to 1706: 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

Engl415  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

Engl430  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

Engl451  Y  1.0
Literature of the Victorian Age
An historical and critical study with emphasis on the major poets (Browning, 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

Engl460  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

Note
The following course is administered by St. Jerome's College

Engl480J Senior Seminar
Not offered in 1978-79

Engl495 Supervision of Senior Honours Essay
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. Knapper¹, BA Hons (Sheffield), PhD (Saskatchewan)
P. H. Nash, BA, MA (UCLA), CE (Grenoble), MCP, MPA, PhD (Harvard), MCIP

Associate Professor
D. EstritY, BA LLB (Alberta) (part-time)
R. T. Newkirk², BA, MSc, PhD (Western)
D. H. Wood², BComm. LLB (Toronto) (part-time)

Adjunct Professor
M. M. R. Freeman, BSc (Reading), PhD (McGill)

Adjunct Lecturers
B. Steele
D. G. E. Wicken, Diploma AA

Faculty members cross and/or joint appointments as shown
¹ Environmental Studies and Psychology
² Environmental Studies and Planning
³ Environmental Studies and Man-Environment Studies

Course Description

Env St 111 F 3C 0.5
Introduction to the Study of the Future
Non-technical survey of current approaches to thinking about and refining views of the "Future". The role of images and scenarios, contributions of the arts and concepts of space and time. Impacts of regional science, ecketics, bioethics, synergetics, and prophetic. Paths to "inventing" the future and the comprehensive design of "optimum" environments. No prereq

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 0.5
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 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: television, 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. Emphasis is placed on group participation. The student will be required to purchase materials. Prereq: Env St 252 or consent of Instructors
EnvSt271 F,W 3C,1L 0.5
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.

EnvSt272 W 3C 0.5
Computer Programming in Environmental Studies
The course emphasizes programming skills and applications in the context of environmental problems. Prereq: EnvSt271

EnvSt358 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

EnvSt380/381 F,W C 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; enrollment 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.

EnvSt401 F 3C,1.5S 0.5
Environmental Law
A detailed survey of the institutions and laws which regulate Canadian environmental quality, highlighting governmental responsibilities, the role of the public and legal remedies available to individuals concerned about environmental issues. Students may participate in model court hearings. Prereq: 3rd and 4th year students

EnvSt402 W 3C,1.5S 0.5
Planning Law
An analysis of the legal basis for planning in Ontario and the practice of planning law as it affects planners, municipalities, local councils, property owners and residents. The roles of planning 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: 3rd or 4th year students only

EnvSt411 F 2C 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

EnvSt412 W 2C 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: EnvSt411

EnvSt417 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

EnvSt418 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: EnvSt417 and consent of instructor
Fine Arts

Professor, Chairman
A. M. Urquhart, BFA (Buffalo)

Professor
V. Burnett, BS (Columbia), MA (California)

Associate Professors
N. L. Patterson, BA (Washington)
D. I. MacKay, BFA (Mt. Allison) MA (Cornell)
(Sabbatical 1978-79)

Assistant Professors
A. Green, BFA (Art Instit. of Chicago)
B. Irland, BFA (Illinois), MFA (Massachusetts)
E. Kliman, MA, PhD (Toronto)
J. Uhde, MA (Purkyne's University Brno, Czechoslovakia), PhD (Waterloo)

Lecturers
C. Crockford, BEd (Alberta), MA (UBC)
A. Roberts

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 (WLU), MMus

Part-time Lecturers
K. Hull, BA (Waterloo), BMus (Western Ontario)
M. Jarrett
A. Martin, BMus (Toronto), MMus (Eastman)

Course Descriptions - Fine Arts

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 211  W  3C  0.5
Modern Art 2
A continuation of Fine 210, commencing with impressionism and proceeding through the major trends of the early 20th century up to the contemporary period.

Fine 212  F  3C  0.5
Italian Renaissance Art 1
A survey of painting, sculpture, and architecture, especially in Florence and Siena, starting with Giotto and his contemporaries and covering innovations in perspective, anatomy, and iconography through the end of the 15th century.

Fine 213  W  3C  0.5
Italian Renaissance Art 2
A continuation of Fine 212 starting with the masters of the High Renaissance, Leonardo, Raphael and Michelangelo, and proceeding through Mannerism, Baroque and Rococo in Florence, Venice and Rome.

Fine 214  W  3C  0.5
British Art
An examination of British Art from the sixteenth Century up to the modern period.

Fine 215  Art of the United States
Not offered 1978-79

Fine 218 Western Religious Art
Not offered 1978-79

Fine 220  F  6std  0.5
Fundamentals of Painting 1
Exploration of painting problems in various media as vehicles for serious creative expression. The fundamentals of composition and painting techniques (paint, materials, and preparation of painting surfaces) will be presented through studio projects. Lab fee.
Prereq: Fine 120/121
Fine 221 6 std 0.5
Fundamentals of Painting 2
The creation of both non-objective and representational forms on a two-dimensional surface using various mediums. The course will build upon concepts learned in Fine 200 but with more emphasis on individual expression. Lab fee
Prereq: Fine 220

Fine 222 F 3 std 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 3 std 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 6 std 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 4 std 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 4 std 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 std 0.5
Introduction etching with emphasis on intaglio printing. Lab fee.
Prereq: Fine 120/121

Fine 226B W std 0.5
Introductory relief printing with emphasis on woodcut. Lab fee.
Prereq: Fine 120/121

Fine 226C W std 0.5
Introductory silkscreen. Lab fee.
Prereq: Fine 120/121

Fine 227 Scientific Drawing
Not offered 1978-79.

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 1978-79

Fine 228B The Visual Arts and the Theatre
Not offered 1978-79

Fine 228C W,C std 0.5
Images and Effigies
A study of contemporary and historical images and effigies in art, ritual, and drama, and a series of studio projects in which three-dimensional images are constructed.

Fine 229 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 230 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 224 or consent of Instructor

Fine 231 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.
**Course Descriptions**

**Fine Arts**

**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  0.5  
**Religion and Film 1**  (Religious Studies 226R)  
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  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 Classic listing*

**Fine 312**  F  3C  0.5  
**The Art and Architecture of Northern Europe**  
An in-depth survey from the Middle Ages to the eighteenth century that included the Romanesque and Gothic cathedral in France, Flemish painting, Northern Mannerism, Rubens and Dutch Art of the seventeenth century.

**Fine 313**  W  3C  0.5  
**Topics in French, English and German Art**  
A study of eighteenth and nineteenth century art with special emphasis on the development of Romanticism.

**Fine 314**  **Medieval Art 1**  
Not offered in 1978-79

**Fine 315**  **Medieval Art 2**  
Not offered in 1978-79

**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 1978-79

**Fine 319**  F  3C  0.5  
**Contemporary Art**  
A seminar exploring contemporary artistic concepts through critical analysis, historical correlation, discussions with artists and visits to studios and galleries.  
*Prereq: consent of instructor*

**Fine 320**  0.5  
**Advanced Painting 1**  
An exploration of various painting techniques as a means of creating both non-objective and representational forms on a two-dimensional surface. *Lab fee.*  
*Prereq: 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 std  0.5  
**Advanced Painting 2**  
A continuation of Fine 320 with emphasis on independent problems.

**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**  
Organisation 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 std 0.5
Advanced Drawing
A course in which drawing is investigated as a means of expression and communication. An understanding of the human figure—is structure, its movement, and its connotation—will be a central goal of the work. Objects and the landscape will also be studied as sources of artistic possibility. The student will be encouraged to experiment with imagery, to develop personal vision, and to devise individual formal means of expressions. Lab fee.
Prereq: Fine 224 and consent of instructor

Fine 325 W std 0.5
Advanced Drawing 2
Continuation of Fine 324

Fine 326 Advanced Printmaking 1
Not offered 1978-79

Fine 327 W std 0.5
Advanced Printmaking 2
A continuation of Fine 326 with emphasis on independent problems. Lab fee.
Prereq: Fine 326

Fine 328 F C std 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. Lab fee.

Fine 329 W 3C std 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 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 1978-79

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
Not offered 1978-79

Fine 349R The Films of Fellini
Not offered 1978-79

Fine 370 F D std 0.5
Film Theory 1 (Anatomy of Film)
Discussion of the aesthetic aspects of cinematographic work (principles known as "film language").
Prereq: consent of instructor

Fine 371 W D std 0.5
Film Theory 2 (Film Aesthetics and Criticism)
An extension of Fine 370. The main accent will be placed upon major theories of cinematography, such as those of Kracauer, Metz, and Eisenstein, and upon the development of the students' own judgement in the form of critical expression. The impact of the film medium upon modern society will also be discussed as well as the relationship between film and television.
Prereq: Fine 370

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 C 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
Course Descriptions

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 1978-79

Fine 435 Senior Seminar in Film Techniques 2
Not offered 1978-79

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 endeavour will be presented in the form of an exhibition or its equivalent (i.e.: film, illustrated book, portfolio, or essay), which will be examined by faculty members of Fine Arts and also where pertinent, by members of other departments. Required of all students in Honours Fine Arts Admission by permission only

Fine 491 S, std, R 0.5
Senior Honours Presentation 2
A continuation of Fine 490
Admission by permission only

Course Descriptions - Music

Music 150 G F, J 3C 0.5
Introduction 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 151 G W, A 3C 0.5
Introduction to Music 2
Continuation of 150G.
Prereq: Music 150G or Consent of instructor

Music 160 G F 1C, 3L 0.5
Choral Literature 1
Choral literature from the Renaissance period to the present will be introduced through singing reading sessions, discussion and performance. Repertory will vary from year to year and will be suited to the existing choral ensemble. Required of all students in Honours Fine Arts Admission by permission only

Music 161 G W 1C, 3L 0.5
Choral Literature 1
Continuation of 160G
Prereq: Music 160G or consent of instructor

Music 166 G 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 250 G F 3C, 1L 0.5
Music Theory
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 251 G 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 254G  F   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

Music 255G  W   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 lieder of Schubert, Schumann and Wolf, symphonic of Brahms, Mendelssohn, Tschaikowsky, and piano music by Chopin.  
Prereq: Music 150G/151G

Music 262G  F   2C 2L  0.5  
Instrumental Literature
The study of the music written from the seventeenth century to the present for a variety of instrumental groups, such as chamber music, symphony, concertos.  
Prereq: Music 150G/151G or consent of instructor

Music 266G  F  W  std  0.5  
Music Studio
See Music 166G for course description.  
Prereq: Music 150G/151G 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 300G  Stratford Festival Seminar
Not offered 1978-79

Music 301G  Stratford Festival Seminar
Continuation of Fine Arts Music 300G  
Not offered 1978-79

Music 351G  F   3C  0.5  
Ancient, Medieval and Renaissance Music
The study of music from pre-Christian times to approximately 1600.  
Prereq: Music 150G/151G

Music 352G  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 355G/356G  S   S  0.5/0.5  
Music and Culture in Vienna
A Spring seminar to be taught in Vienna and environs. The course includes daily lectures and attendance of music performances during the Vienna Music Festival, as well as tours of places relating to the culture of Vienna.

Music 350G  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

Music 361G  W   2C 1D  0.5  
Music of the Church
Continuation of Music 360G.  
Prereq: Music 360G or consent of instructor

Music 366G  F  W  std  0.5  
Music Studio
See Music 166G for course description.  
Prereq: Music 266G and consent of Music Faculty

Music 370G  F   3C 1L  0.5  
Music Theory 3
The analytical study of music of the 19th century.  
Prereq: Music 250G/251G or consent of instructor

Music 371G  W   3C 1L  0.5  
Music Theory 4
The analytical study of music of the 20th century.  
Prereq: As in Music 370G.

Music 372G  F   2C 1L  0.5  
Choral Music, Repertoire and Techniques 1
A study of conducting techniques, rehearsal procedures, and score analysis.  
Prereq: Music 150G/151G, 250G/251G or consent of instructor

Music 373G  W   2C 1L  0.5  
Choral Music, Repertoire and Techniques 2
Continuation of Music 372G.  
Prereq: as in Music 372G.

Music 380G/381G  0.5/0.5  
Directed Study in Music
Prereq: Advanced standing in music and consent of the instructor

Music 466G  F  W  std  0.5  
Music Studio
See Music 166G for course description.  
Prereq: Music 366G and consent of Music Faculty
General Engineering

Course Descriptions

Gen E 010 F, W 1S 0.0
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 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 4L 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 1
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.

Department of Geography

Course Descriptions
General Engineering/Geography

Professor, Chairman of the Department
L. H. Russwurm², BA (Western), PhD (Illinois)

Associate Professor, Associate Chairman
C. Bryant, BA, PhD (London)

Professor, President of the University
B. C. Matthews³, BSA (Toronto), AM (Missouri), PhD (Cornell)

Professor, Dean of Environmental Studies
J. G. Nelson, BA (McMaster), MA (Colorado), PhD (Johns Hopkins)

Associate Professor, Associate Dean
(Environnemental Studies Undergraduate Affairs)
A. G. McLeish, BSc, PhD (Glasgow)

Associate Professor, Graduate Officer
D. F. Walker, BSc (London), MA, PhD (Toronto)

Associate Professor, Undergraduate Officer
R. A. Bullock, BA, MA (Belfast), PhD (London)

Professors
A. Diem, BA (Wayne State), MA (Clark), PhD (Michigan)
D. K. Erb, BSc (Western), MA (Toronto), PhD (McGill)
R. M. Irving, BA, MA (Toronto), PhD (Minnesota)
C. K. Knappner, BA Hans (Sheffield), PhD (Saskatchewan)
R. R. Krueger, BA, MA (Western), PhD (Indiana)
P. H. Nash, BA, MA (California), CE (Grenoble), MCP, MPA, PhD (Harvard), AIP
R. E. Preston, BA (Central Washington), MA (Washington), PhD (Clark)

Associate Professors
J. H. Bate, BA, MA (UBC), PhD (London)
J. C. Day, BA, MA (Western), PhD (Chicago)
J. S. Gardner, BSc (Alberta), MSc, PhD (McGill)
L. T. Guelke, BSc (Cape Town), MA (York), PhD (Toronto)
B. Hyma, BS, MS (Madras), MA (Sheffield), PhD (Pittsburgh)
A. B. Kesik, MA, PhD (UMCS-Lublin, Poland)
G. R. McBoyle, BSc, PhD (Aberdeen)
(on Sabbatical Leave 1978-79)
W. B. Mitchell, BA, MA (UBC), PhD (Liverpool)
G. Wall, BA (Leeds), MA (Toronto), PhD (Hull)

Assistant Professors
T. E. Bunting, BA (York), MA (Western), PhD (Toronto)
E. F. LeDrew, BA (Toronto), MA (McMaster), PhD (Colorado)
E. R. Officer, BA (UBC), MA (Wisconsin)
Lecturer
D. Dudycha, BA (WLU), MA (Waterloo)

Adjunct Lecturers
G. Brannon, CC
D. I. McKenzie, BES, MA (Waterloo)

Faculty members holding cross and/or joint appointments as shown
1 Geography and Earth Sciences
2 Environmental Studies
3 Geography and Planning
4 Geography and Renison College
5 Environmental Studies and Psychology

The following represents a grouping of the course offerings of the Department of Geography according to subject matter. This should act as an additional guide in selecting courses. The course descriptions themselves are found after this and are in numerical order.

Human Geography

General/Introductory
Geog 101 Introduction to Human Geography
Geog 202 Some Basic Topics of Economic and Urban Geography
Geog 203 Some Basic Topics of Cultural and Regional Geography

Cultural, Historical, Political
Geog 232 Geography of Population
Geog 330 Cultural Geography
Geog 331 Special Topics in Cultural Geography
Geog 332 Special Topics in the Geography of Population
Geog 341 Historical Geography of Canada 1
Geog 342 Historical Geography of Canada 2
Geog 345 Political Geography

Regional
Geog 125R Introduction to the Third World
Geog 126R Development in the Third World
Geog 127 Regional Problems of Europe
Geog 204 Soviet Union
Geog 205 Africa
Geog 220 World Regional Geography
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 Development of the Third World
Geog 421 Europe and the Mediterranean
Geog 423 Central and Eastern Europe
Geog 321 Geographic Perspectives on Contemporary Problems of American Society
Geog 322 Geographical Study of Canada
Geog 323 Comparative Regional Problems

Geog 422 Canada
Geog 424 Soviet Union
Geog 425 Africa

Resource Management
Geog 356 Resource Management
Geog 357 Conservation and Resource Management
Env St 380/381 Environmental Studies Workshop
Geog 410 Recreation Geography
Geog 411 Resource Studies
Geog 413 Behavioural Studies
Geog 414 Resources Management Workshop
Geog 461 Land Dereliction and Rehabilitation 1
Geog 462 Land Dereliction and Rehabilitation 2

Industrial
Geog 311 Regional Industrial Development
Geog 412 Geography of Manufacturing Firms and Industries

Rural
Geog 315 Agricultural Geography
Geog 452 Problems of Rural Land Use

Urban
Geog 251 Urban Areas in North America
Geog 349 The City as a System 1
Geog 350 Regional Urban Systems 1
Geog 352 The Rural-Urban Fringe of Canadian Cities
Geog 448 Urban Historical Geography
Geog 449 The City as a System 2
Geog 450 Regional Urban Systems 2

Miscellaneous
Geog 475 Special Readings and Seminar on Selected Topics
Geog 476 Special Readings and Seminar on Selected Topics

Physical Geography

General/Introductory
Geog 102 Introduction to Physical Geography
Geog 201 Some Basic Topics of Physical Geography

Ecology
Env St 200 Field Ecology
Geog 451 Soils Geography

Climatology
Geog 301 Climatology
Geog 408 Special Topics in Climatology and Natural Hazards
Course Descriptions

Geography

Geomorphology
Geog 300 Geomorphology and the Southern Ontario Environment
Geog 302 Geomorphological Processes
Geog 303 Physical Basis and Geography of Water
Geog 400 Climatic and Periglacial Morphology
Geog 401 Glacial Geomorphology and Some Contemporary Applications
Geog 406 Tropical Geomorphology
Geog 407 Field and Lab Techniques in Geomorphology

Techniques and Methodology

General
Env St 252 Media Tools for Environmental Studies
Env St 253 Media Tools for Environmental Studies – Advanced Level

Cartography
Geog 260 Introduction to Cartography and Map Analysis
Geog 360 Preparation of Maps and Illustrations
Geog 403 Advanced Cartography 1
Geog 404 Advanced Cartography 2

Remote Sensing
Geog 275 Introductory Air Photo Analysis and Remote Sensing
Geog 375 Air Photo Interpretation and Remote Sensing 1
Geog 470 Air Photo Interpretation and Remote Sensing 2
Geog 471 Air Photo Interpretation and Remote Sensing 3

Quantitative Analysis
Geog 307 Social Survey Techniques
Geog 316 Multivariate Statistics
Geog 317 Nonparametric Statistics
Geog 318 Spatial Analysis
Geog 319 Regional Planning Techniques

Independent Research Oriented Courses
Geog 110 Tutorial in Geography
Geog 390 Senior Honours Essay Research Proposal
Geog 391 Field Research
Geog 490 Senior Honours Research Essay

Nature and Philosophy of Geography
Geog 381 The Nature of Geography
Geog 481 Frontiers in Geography
Geog 482 Geography and Education

Note 1
Fields of interest with a small number of offerings are often augmented by offerings in other departments.

Note 2
There is obviously considerable overlap in terms of fields of interest between many of the above categories.

Course Descriptions

Geog 101 F,W 2C,2L 0.5
Introduction to Human Geography
An introduction to human geography through a survey of some of the concepts, methods, techniques and applications of geographic analysis of man’s cultural environment. The course is directed towards the man-land theme and the location analysis theme.

Geog 102 F,W 2C,2L 0.5
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 Tutorial in Geography
Not offered 1978-79

Env St 111 Introduction to the Study of the Future
See Env St course description, page 286

Geog 125R F 3C 0.5
Introduction to the Third World
This introductory course deals with a thematic approach to the study of some of the major contemporary development problems of the Developing Countries of Africa, Asia and Latin America. Selected “Development” topics such as population issues, planning and practices, education and health in the social development process, urbanization and industrialization, planning for rural and urban development will be introduced. Various concepts related to development and underdevelopment at both the international, national and regional level will be explored.

Geog 126R Development in the Third World
Not offered 1978-79

Geog 127 F 2S 0.5
Regional Problems of Europe
An introduction to the Geography of Europe which examines agricultural, industrial and urban problems. Lectures, discussions and visual presentations based on field experience of instructors.
Env St 195A Introduction to Environmental Studies
See Env St course description, page 286

Env St 195B Introduction to Environmental Problems
See Env St course descriptions, page 286

Env St 200 Field Ecology
See Env St course descriptions, page 286

Geog 201 F,W 2C,2L 0.5
Some Basic Topics of Physical Geography
Further study of energy and matter flows in the atmosphere and on the land. Specific topics include global radiation balances, energy flux at the land-air interface, weather modification, urban climates, climate classification systems, the physical processes in the pollution of land, air and water, 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 F 2C,2L 0.5
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

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 0.5
Africa
The geography of modern Africa south of the Sahara in the context of changing attitudes to the continent on the part of the "developed" countries. Attention will focus on problems of the physical, social and economic environments.

Geog 220 Y 2C,2D 1.0
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 occupancy and utilization of urban and rural lands, and the effects of man's tools, techniques and institutions on the earth's surface.

Geog 225R F 3C 0.5
Urbanization in the Third World
An analysis of the factors behind the rapid urbanization of selected areas in Asia, Africa and Latin America, with an examination of related problems of urban planning and development control policies.

Geog 226R Food and Agriculture, and Integrated Rural Development in the Third World
Not offered 1978-79

Geog 232 W 2C,1L 0.5
Geography of Population

Geog 251 W 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 286

Env St 253 Media Tools for Environmental Studies—Advanced Level
See Env St course descriptions, page 286.

Geog 260 F,W 2C,2L 0.5
Introduction to Cartography and Map Analysis
Basic concepts involved in the analysis and use of existing types of cartographic products. Background theory of the production and reproduction of topographic and thematic maps, including historical development, collection of data and symbolization.
Prereq: Geog 102

Env St 271 Introduction to Quantitative Research Methods
See Env St course descriptions, page 286.

Env St 272 Computer Programming in Environmental Studies
See Env St course descriptions, page 286.
Geog 275 F,W 2C,2L 0.5
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 $12. Prereq: Geog 102, or Sci 100, and a first year human geography course.

Geog 300 F 2C,4flab 0.5
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 S 3C 0.5
Climatology

Geog 302 W 2C,2L 0.5
Geomorphic Processes
The impact of processes in landform development and modification will be analyzed. Techniques of measurement will be discussed particularly as they show the impact of changes under different climatic conditions and processes connected with glaciation and deglaciation, and eolian, karst, coastal and fluvial landforms. Prereq: Geog 201 or Earth 130 or consent of instructor

Geog 303 W 2C,2L 0.5
Physical Basis and the Geography of Water
The geography of water, including snow and ice. Specific topics include: the earth's water balance and cycle, the oceans, lakes and swamps, snow cover, ground ice, glacier ice and streams. Attention is directed to the impact of water on the earth's surface, the role of water in the earth's system, and water as a resource and hazard. Some field work. Prereq: Geog 201 or consent of instructor

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 W 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,S 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 F 3S 0.5
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 W,S 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 F,S 3C 0.5
Spatial Analysis
Advanced quantitative analysis applied to spatial patterns and interactions. The course will focus on a selection of techniques from gravity models, linear programming, nearest neighbour analysis, Markov chain analysis, graph theory, simulations, and trend surface analysis. This course is the same as Plan 318. Prereq: Env St 271 or consent of instructor
Geog 319 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 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 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 1978-79

Geog 326R 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 W 3C 0.5
Cultural Geography
The place of culture, material and non-material, in man’s relationship with his environment. Attention will be given to both the historical and contemporary periods.
Prereq: A second year human geography course

Geog 331 Special Topics In Cultural Geography
Not offered 1978-79

Geog 332 Special Topics in the Geography of Population
Not offered 1978-79

Geog 341 F 3C 0.5
Historical Geography of Canada 1
The changing geographies of settlement and resource use from the Discoveries to the early nineteenth century.
Prereq: Geog 203 or consent of instructor

Geog 342 W 3C 0.5
Historical Geography of Canada 2
The changing geographies of settlement and resource use in the nineteenth and early twentieth centuries.
Prereq: Geog 203 or consent of instructor

Geog 345 W 3C 0.5
Political Geography
A study of differences from place to place in political phenomena. Subjects covered include the interrelationships of states and nations, centripetal and centrifugal “forces” within states, electoral geography, boundary and frontier problems, the location of capital cities, internal organization of states, external relations, and geopolitics.
Prereq: A 2nd year human geography course or consent of instructor

Geog 349 W 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 251 or consent of instructor

Geog 350 F 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
<table>
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<tr>
<th>Course Code</th>
<th>Term</th>
<th>Credits</th>
<th>Description</th>
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| Geog 356    | 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. 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. Prereq: Env St 200. |
| Env St 358  |        |         | Environmental Pollution and Its Control  
See Env St course descriptions, page 286. |
| Geog 360    | W     | 1C, 2L  | 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 260. |
| Geog 375    | W, S  | 2C, 2L  | Air Photo Interpretation and Remote Sensing 1  
The principles of air photo interpretation via indepth 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. The course is a prerequisite for Geog 470.  
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 286. |
| Geog 381    | F, W  | 2S 0.5  | The Nature of Geography  
| Geog 390    | W     | 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 $60-$75. |
| Env St 401  |        |         | Environmental Law  
See Env St course descriptions, page 286. |
| Env St 402  |        |         | Planning Law  
See Env St course descriptions, page 286. |
| Geog 400    |        |         | Climatic and Periglacial Morphology  
Not offered 1978-79. |
| Geog 401    |        |         | Glacial Geomorphology and some Contemporary Applications  
Not offered 1978-79. |
| Geog 403    | W     | 3C 0.5  | Advanced Cartography 1  
Advanced study of numerical map analysis and computer mapping techniques. Prereq: Geog 260, or 271. |
| Geog 404    | F     | 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 300, Geog 302, Earth Sci 342, or consent of instructor. |
| Geog 407    | F     | 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 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 410 W,S 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 286.

Geog 411 W 3C 0.5
Resource Studies
Study of natural resource problems, with particular attention upon the role of foreign investment and the global corporation in developing resources in Canada and other selected countries.
Prereq: Geog 356 or Geog 410

Env St 412 Alternative Future Environments 2
See Env St course descriptions, page 286.

Geog 412 W 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

Geog 413 F 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 356, 311, or 357

Geog 414 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

Course Descriptions
Geography

Env St 417 Land Use History and Landscape Change 1
See Env St course descriptions, page 286.

Env St 418 Land Use History and Landscape Change 2
See Env St course descriptions, page 286.

Geog 421 F 2C,2L 0.5
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 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 1978-79

Geog 424 W 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 1.0
Field Research in Regional Geography
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

Geog 448 F 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
Course Descriptions
Geography

Geog 449 *The City as a System 2*
Not offered 1978-79

Geog 450 F 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 0.5
**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,S 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 F 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.

This will now be a half credit course with changes to the title and course description.

Geog 462 S 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 F 3C 0.5
**Air Photo Interpretation and Remote Sensing 2**
Advanced air photo interpretation and its application in geomorphology, geology, resources inventory, engineering soils, hydrology, and pre-planning studies (terrain analysis). Projects in specific fields of interest form a significant part of the course.
Lab fee $12. Prereq: Geog 375 and Geog 300 or 302 or consent of instructor

Geog 471 Air Photo Interpretation and Remote Sensing 3
Not offered 1978-79

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

Geog 481 Frontiers in Geography
Not offered 1978-79

Geog 482 W 2S 0.5
**Geography and Education**
Prereq: In third year of Honours Geography, Man-Environment Studies, Architecture, or Urban and Regional Planning. Willingness to be a teaching assistant in Env St 195B in following fall term

Geog 490 Y 3S 1.0
**Senior Honours Research Essay**
Prereq: Geog 390
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 (German)
H. W. Panthel, BA (Waterloo), MA (Cincinnati), PhD (Waterloo)

Professor, Associate Chairman (Slavic)
I. A. Levitsky, AB (Rochester), MA (Buffalo), PhD (Duke)

Professors
E. Heier, BA, MA (UBC), PhD (Michigan)
S. Hoefert, BA, MA, PhD (Toronto)

Associate Professors
G. Brude-Firnau, Staatsexamen (Berlin), PhD (Yale)
M. Kuxdorf, BA, MA (Waterloo), PhD (Alberta)
M. Richter, Staatsexamen (Berlin and Bonn), MA, PhD (Toronto)
W. Shelest, MA (Ottawa), Dr. phil (Münchener FU)
J. Whiton, BA, MA, PhD (Minnesota)
A. Zweers, Doctorandus (Amsterdam), litt. Dr. (Groningen)

Assistant Professors
F. Jakobsh, BA, MA (Manitoba), PhD (Waterloo)
D. G. John, BA, MA, PhD (Toronto)
R. I. Karpiak, BA, MA (Manitoba)

Visiting Assistant Professor
R. Kemper, Dr. phil. (Mannheim)

Lecturers
S. Dyck (Mrs.), BA (London), MPhil (Waterloo) (part time)
H. Marsden (Mrs.), BA (Randolph-Macon), MA (Waterloo) (part time)
A. Newman (Mrs.) MA (Poznan, Poland) (part time)
T. Sommer (Miss), BA, MA (Waterloo)
I. Tschimmel (Mrs.), MA (McGill) Dr. phil (Trier)
I. Wynnyckyj (Mrs.), BSc (McGill), MA (Waterloo) (part time)

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 102 F, W, A 3C, 1L 0.5
First Year German
As Ger 101
Prereq: Ger 101

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

Reading and Translation
This course is designed to assist graduate students in acquiring a reading knowledge of German. Usage and structure of German scientific writings. Translation in the fields of specialization.
Open to graduate students of all departments.
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, with attention to themes such as society and the dropout, the search for the self, confronting the absurd, and the question of collective responsibility.  
*Prereq: At least 2 years of High School German, or consent of instructor*

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*
Conservation 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 consent of instructor*

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. Optional Language Lab.  
*Prereq: Ger 102 or consent of instructor*

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 consent of instructor*

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 consent of instructor*

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*
Ger276  W  3C  0.5
German Culture in the 20th Century
as Ger275.

Ger281  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: Ger122, 152 or consent of instructor
Students with Ger231 are ineligible

Ger282  W  3C  0.5
Post-War Literature
As Ger281
Prereq: Ger281

Ger291  F  3C  0.5
Survey of German Literature
Introduction to the major periods of German literature.
Readings and interpretation of representative texts.
Prereq: Ger122, 152, or 202

Ger292  W  3C  0.5
Survey of German Literature
As Ger291
Prereq: Ger291

Ger341  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: Second year standing

Ger342  W  3C  0.5
The Age of Goethe (Romanticism)
Reading, interpretation, and critical analysis of
representative works (Novalis, Tieck, Brentano, etc.).
Prereq: Second year standing

Ger343  F  3C  0.5
Intermediate Conversation and Composition
This course is a continuation of Ger202. It offers
conversation and composition on contemporary topics,
vocabulary building, and exercises in grammar and
stylistics on the intermediate level.
Prereq: Ger202 or consent of instructor
Not open to students with Ger 252 or 352 nor students in
Honours German.

Ger344  W  3C  0.5
Intermediate Conversation and Composition
As Ger343
Prereq: Ger343

Ger351  F  3C  0.5
Intermediate Conversation and Composition
Conversation on modern topics. Exercises in advanced
grammar, stylistics, and composition.
Prereq: Ger202 or 252

Ger352  W  3C  0.5
Intermediate Conversation and Composition
As Ger351.
Prereq: Ger351

Ger355  F  3C  0.5
The Stage as Forum: German Drama in Translation
Major German Dramas will be studied from various points
of view, including historical importance, themes, and
technique. The course includes theory and selected
dramas of such playwrights as Lessing, Goethe, Schiller,
Büchner, Brecht, and Dürenmatt. Taught in English.
Prereq: Open to students from all departments: not
normally to first year students.
This course is complemented in the Winter term by
Russ356.

Ger361  F  3C  0.5
Young Germany and Biedermeier
Reading, interpretation, and critical analysis of
prescribed prose, drama and poetry (Grillparzer, Mörike,
Stifter, Gotthelf, etc.).
Prereq: Second year standing

Ger362  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: Second year standing

Ger371  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: Second year standing

Ger372  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: Second year standing
Course Descriptions
Germanic and Slavic Languages and Literatures
German/Russian

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.

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 consent of instructor

Ger 452 W 3C 0.5
Advanced Conversation, Grammar and Composition
As Ger 451.
Prereq: Ger 451

Ger 461 F 3C 0.5
Introduction to the History of the German Language with Readings in Middle High German
Prereq: Second year standing
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 461
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: Second year standing

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: Second year standing

Ger 481 F 3C 0.5
Humanism/Reformation
Reading, interpretation, and critical analysis of prescribed texts (Erasmus, Luther, Sachs, Bidermann, etc.).
Prereq: Second year standing
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: Second year standing
Offered in alternate years

Ger 495-498 F,W,S,M R each 0.5
Reading Courses in Approved Topics
Prereq: Fourth year students only

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 six 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

Russ 101 F 3C,1L 0.5
First Year Russian
(Art 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, 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 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 permission of instructor

Russ 262 W 3C 0.5
Introduction to Russian Literary Movements
As 261.
Prereq: Russ 261

Russ 271 F 3C 0.5
Russian Thought and Culture
A survey of cultural history from 862 to 1861. 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 will be taught in English.

Russ 272 W 3C 0.5
Russian Thought and Culture
A survey of cultural history from 1861 to the present. Lectures will focus on major developments in literature, philosophy, art, and music as seen against the background of Russia's historical past. Discussion will be devoted primarily to works of Russian literature. This course is taught in English.

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 (Donskoi).
This course is taught in English.
Open to all students.
This course carries AIII 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.
Prereq: Russ 102 or permission of instructor

Russ 282 W 3C 0.5
Russian Short Story
As Russ 281.
Prereq: Russ 281

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.
Prereq: Russ 102 or permission of instructor
Course Descriptions
Germanic and Slavic Languages and Literatures
Russian

Russ342  W  3C  0.5
Russian Drama
As Russ341
Prereq: Russ341

Russ351  F  3C  0.5
Intermediate Conversation and Composition
Written reports on prescribed themes and topics. Oral
drill and translation.
Prereq: Russ252 or equivalent

Russ352  W  3C  0.5
Intermediate Conversation and Composition
As Russ351.
Prereq: Russ351

Russ356  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, Mayakovsky, and Pogodin. The course is conducted entirely in English.
Fall term: See Ger355.
Open to students from all departments.
Not normally open to first year students.

Russ381  3C  0.5
The Peoples of the Soviet Union
Especially emphasized will be the study of non-Slav
peoples of the Caucasus and Central Asia, European
Russia and Siberia. Czarist and Soviet policy towards
national minorities, assimilation and integration
problems in the light of linguistic division; development
of literary languages. Some achievements of Soviet
anthropology.

Russ382  3C  0.5
The Peoples of the Soviet Union
As 381.

Russ391  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.

Russ392  W  3C  0.5
Great Russian Novels
Reading and interpretation of 19th and 20th century
novels selected from the works of Dostoevsky, Gorky,
Pasternak, Solzhenitsyn, and Zamiatin. Lectures on
social and intellectual background. Conducted in
English. Extra work in Russian required of Russian
majors only.
Open to all students.

Russ411  3C  0.5
East Slavic Epic Tradition
A study of the origins and development of the Epic
tradition in East Slavic Literature.

Russ442  3C  0.5
Russian Epic Tradition
As Russ411.

Russ451  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: Russ352 or equivalent

Russ452  W  3C  0.5
Advanced Conversation, Grammar and Composition
As Russ451.

Russ461  F  3C
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.
Prereq: Russ102

Russ462  W  3C
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.
Prereq: Russ 461

Russ481  F  3C
Russian Poetry
A study of themes and forms of representative authors of
Classicism, Romanticism (Lomonosov, Derzhavin,
Pushkin, Lermontov, Nekrasov, Fet, Tiuchev, etc.).
Prereq: Russ102

Russ482  W  3C
Russian Poetry
A study of themes and forms of representative authors
from Symbolism to the present (Blok, Esenin,
Mayakovsky, Akhmatova, etc.).
Prereq: Russ 102

Russ485  F  3C
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.
Prereq: Russ102
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.
Prereq: Russ 102

Russ 496-496  F,W,S  0.5
Reading Courses in Approved Topics
Open to fourth year students only.

Polish

Polish 101  F  3C  0.5
First Year Polish
The fundamentals of Polish grammar are taught with emphasis on oral practice and pronunciation. An introduction to Polish culture is given as well. 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

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 permission of instructor
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.
Prereq: Ukr 102 or permission of instructor. This course is taught in English.

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).
Prereq: Ukr 301 or permission of instructor. This course is taught in English.
Health Studies Programme

The Health Studies Programme is offered within the Department of Kinesiology.

Professor, Chairman of Department of Kinesiology
N. J. Ashton, BSc (McGill), MS (Michigan)

Professor, Dean of the Faculty of Human Kinetics and Leisure Studies
G. S. Kenyon, BPE (UBC), MS (Indiana), PhD (NYU)

Assistant Professor, Associate Dean of Undergraduate Affairs of the Faculty of Human Kinetics and Leisure Studies
W. N. Widmeyer, BA (Western Ontario), 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 (Western Ontario), PhD (Wisconsin)

Assistant Professor, Associate Chairman Undergraduate Affairs Health Studies
H. W. Gruchow, BSc, MSc, PhD (Wisconsin)

Associate Professors
J. A. Best, BA (Queen's), PhD (Waterloo)
R. P. Schlegel, BA (Western Ontario), MSc (Illinois), PhD (Ohio State)

Assistant Professors
R. Love, BA, MA, PhD (Houston)
S. McColl, BSc (McGill), PhD (Purdue)
C. H. Pierce, BA (Grinnell), MA (Depauw), PhD (Kansas)

Adjunct Assistant Professor
D. Rainham, MD, BB, BCH (Wales)

Course Descriptions

Health Studies

Health 141  W  3C,1T  0.5
Introduction to Health Sciences 2
A survey course directed towards the health of man—middle age through death. Topics include family planning, cancer, cardiovascular and systemic diseases, transplants, accidents, fitness, aging and death. Health Studies students enroll in Health 141a (same as Health 141 but with designated tutorial section)

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: An introductory course in statistics

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
An Introduction to Biomathematics (Mathematics 302)
Course material has been selected with particular reference to some of the fundamentals of medical science including macromolecular processes, environmental health, genetics and genetic engineering, aging processes and theories and quantitative models which describe events in these areas. Topics include types of distributions, data processing and simple differential equations as they relate to biological phenomena. Prereq: Kin 116 or first year Chemistry or consent of instructor

Health 303  W  2C  0.5
An Introduction to Biomathematics (Mathematics 302b)
A continuation of Health 302
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. Prereq: Health 241
Helth 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

Helth 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: an introductory course in statistics.

Helth 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: Helth 140, Psych 101 or consent of instructor.

Helth 410  W,S  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

Helth 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

Helth 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 Helth 431

Helth 440  F  3C  0.5
Marriage and Family
An exploration of societal 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: Soc 101 and Psych 101 or consent of instructor

Helth 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

Helth 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

Helth 472  F,W,S  0.5
Independent Study
For the student who desires to pursue a particular topic in depth through guided independent research and/or reading. A faculty member must approve a student's project prior to registration. May be repeated in subsequent terms.
Prereq: Consult with Department
Department of History

Professor, Chairman of the Department—on leave
H. MacKinnon, BA (Montreal), PhL, STL (Gregorian), MA (Toronto), DPhil (Oxford)

Assistant Professor, Associate Chairman
J. A. Stubbs, BA (Toronto), MSc (Econ) (London), DPhil (Oxford)

Professors
R. W. Beachey, BA (Queen's), PhD (Edinburgh) FRHistS
P. G. Cornell, ED, MA, PhD (Toronto)
M. J. Craton, BA (London), MA, PhD (McMaster), FRHistS
F. C. Gerard, MA (College St. Dominique, France), BD (McGill), STM, PhD (Hartford, Conn. U.S.A.) P
P. Keresztes, MA (Toronto), PhD (Graz)
W. Klaassen, BA (McMaster), DPhil (Oxford) G
D. C. Masters, BA, MA (Toronto), DPhil (Oxford) (part time)
J. F. H. New, BA, MA (Melbourne), PhD (Toronto), FRHistS
G. M. Ostrander, BA (Columbia), MA, PhD (California—Berkeley)

Adjunct Professors (WLU and Guelph)
R. P. Fuke, BA (Toronto), MA (Maryland), PhD (Chicago) (WLU)
W. Stanford Reid, PhD (Penn.), FRHistS

Associate Professors
D. N. Baker, BA (UBC), AM, PhD (Sanford)
M. T. Cherniavsky, MA (Oxford)
D. A. Davies, BA, PhD (Washington)
Recipient of the Distinguished Teacher Award
K. R. Davis, BA (Toronto), MA (Wheaton), PhD (Michigan)
K. D. Eagles, BA (Cambridge), MA, PhD (Washington)
F. H. Epp, BA (Bethel College), MA, PhD (Minneapolis), LLD (Brandon) G
P. J. Harrigan, BA (Detroit), AM, PhD (Michigan)
L. A. Johnson, BA (Waterloo), MA, MPhil (Toronto)
R. C. MacGillivray, BA (Queen's), AM, PhD (Harvard)
E. P. Patterson, BA (Baylor), MA (Kansas), PhD (Washington)
R. Sawatsky, BChEd (CMBC), BA (Bethel College), MA (Minnesota) MA (Princeton), PhD (Princeton) G
P. S. Smith, MA (Toronto), PhD (New Mexico) J
J. A. Wahl, CR, BA (Western), MA, PhD (St. Louis) J
R. E. Wynne, DJur (Vienna), BEd, MA (Alberta), PhD (Washington)

Assistant Professors
J. R. English, BA (Waterloo), AM, PhD (Harvard)
R. W. Guisso, BA (Toronto), DPhil (Oxford)
D. J. Horton, BA (Waterloo Li.), MA (Waterloo), PhD (McGill)
S. K. Johannessen, 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
J. W. Walker, BA (Toronto), MA (Waterloo), PhD (Dalhousie)
D. E. Wright, BA (Cambridge), MA, PhD (McMaster)

Faculty member holds cross-appointment as shown

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 must also take at least 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 department advisor.

Undergraduate Courses

Note
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: Foundation courses (For General & Honours credit)
Level 3: Specialized courses (For 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. 74). 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: Staff

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 1978-79

Hist 202 Expansion of Europe in the 19th and 20th Centuries
Not offered 1978-79

Hist 204A-204L
Themes of History
History through thematic perspectives.

Hist 204A Aborigines and Empires
Not offered 1978-79

Hist 204B F 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

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: Johnson

Hist 204D W 0.5
History of European Urban Society
This course will focus on the demographic changes that fostered towns, industrialization and the new class alignments. It will emphasize the European experiences of the 18th and 19th centuries.
Instructor: Harrigan

Hist 204E F 0.5
War and Society in the Twentieth Century
A historical examination of the effects of war on Western European societies in the twentieth century. The effects of war on politics, economics, social structure and the arts will be some of the themes investigated.
Instructor: Stubbs
Course Descriptions

History

Hist204F  F  0.5
The History of Education in Ontario, Part 1
An introduction to Ontario educational history focusing on the creation of the public school system in the nineteenth century.
Instructor: Staff

Hist204G  W  0.5
The History of Education in Ontario, Part 2
A survey of Ontario education in the twentieth century from kindergarten to university.
Instructor: Staff

Hist204H The Individual and the Family in History
Not offered 1978-79

Hist204K  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

Hist204L  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

Hist211  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

Hist212  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: Staff

Hist214A  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

Hist214B  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

Hist225  Y  1.0
Canadian Culture and Society
This course will take the form of an inquiry into the nature of the Canadian experience. The social, political, and cultural evolution of Canada from New France to the present will be the major areas of discussion.
Instructor: Cornell
Offered at St. Jerome's College

Hist225A  F  0.5
Canadian Culture and Society 1
(Part 1 of 225).
Offered at St. Jerome's College

Hist225B  W  0.5
Canadian Culture and Society 2
(Part 2 of 225)
Offered at St. Jerome's College

Hist227  W  0.5
The History of Selected Racial and Regional Minorities in North America, Part 2
An examination of the historical dynamics of the Black community in North America, especially Canada. The Black experience in Canada will illustrate the place of “visible minorities” in Canadian society.
Instructor: Walker

Hist228  F  0.5
The History of Selected Racial and Regional Minorities in North America, Part 1
An examination of the emergence of minority assertiveness and the position of minorities in modern Canadian society.
Instructor: Patterson

Hist235G (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: Klaasen
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 Introductory Courses

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, Staff*

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 102R  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 103  F  0.5
**The Emergence of the Third World**
Surveys the history of the social, political and economic
changes which have led to the creation of new nations
and the resurgence of old nations and peoples in Asia,
Africa and the New World.
*Instructor: Walker*

Hist 104  W  0.5
**The Emergence of the Third World**
Surveys the history of the social, political and economic
changes which have led to the creation of new nations
and the resurgence of old nations and peoples in Asia,
Africa and the New World. A continuation of 103.
*Instructors: Walker, Craton, Guisso*

Hist 120  Y  1.0
**An Introduction to Western Intellectual History**
A foray into intellectual history, this course will explore
seemingly visions of the human predicament and its
solution advanced by Western thinkers over the past
2,500 years. Designed for students willing to be
challenged intellectually, this is a course without
lectures, but with continuous reading and discussions
in small seminars.
*Instructor: New*

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, Johnson,
McL. aghlin*
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

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
Hist125C   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

Hist125D   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

Level 2: Foundation Courses
3 hours. Lectures and tutorials. These are General and Honours courses and are open to students in other disciplines. No prerequisites.

Hist250   Y   1.0
History as an Intellectual Discipline
The course focuses on three aspects of historical study: the history of history in the Western tradition; philosophical questions raised by the study of history; and the historian's use of social scientific assumptions and methods.
Highly recommended for all Honours History students.
Instructor: New

Hist251A, B, C, D
Special Topics
Courses to be mounted for one year only.

Hist252   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

Hist252A   F   0.5
Twentieth Century America 1
(The first half of 252)
Offered at St. Jerome's College

Hist252B   W   0.5
Twentieth Century America 2
(The second half of 252)
Offered at St. Jerome's College

Course Descriptions
History

Hist255   0.5
Ancient Civilization
A survey of the social, political and economic history of Greece and Rome with an introduction to the civilization of the Ancient Near East.
(Cf. CCiv251/252 which is an acceptable alternative for History credit; but Hist255 and CCiv251/252 may not both be taken for credit).
Instructor: Wynne
Offered at St. Jerome's College

Hist258   Y   1.0
History of Medieval Europe
The political, cultural, economic and ecclesiastical development of Europe from 300 to 1300.
Instructor: MacKinnon

Hist260   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: Davis

Hist262   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

Hist263   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

Hist264   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

Hist265   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.
Instructors: Walker, 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 I 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
Hist277 Y 1.0
British Empire and Commonwealth History
A topical rather than chronological treatment, divided into halves on the broad themes "The British Influence" and "The Colonial Identity". In the first term there will be sections on the institutional framework, imperial biographies and communications; in the second, sections on native peoples, colonial economics and history of the Commonwealth.
Instructor: Craton

Hist282 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

Hist284 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

Hist285 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

Hist291 Y 1.0
Colonial and Independent Africa
An African history survey course from ancient times, through the Colonial period, and to the present, with particular attention to the African response to European control and to contemporary issues in independent Africa.
Instructor: Beachey

Hist295 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, Eagles

Hist295A F 0.5
History of the United States, 1776-1865
(Part 1 of 295)

Hist295B W 0.5
History of the United States, since 1865
(Part 2 of 295)

Level 3 Specialized courses
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 Foundation course appropriate to the subject, or the permission of the instructor. These courses grant Honours credit. General students taking these courses will therefore be expected to work at Honours-level standard.

Hist340 Roman History to 337 A.D.
Not offered 1978-79.

Hist343G F 2C, 1L 0.5
Mystical and Utopian Movements from the 12th to the 17th Century 1
A study of the recurring dream of the coming golden age in the High Middle Ages beginning with Joachim of Fiore, including the Spiritual Franciscans and the Taborites, and ending with the Revolutionary of the Upper Rhine.
Instructor: Klaassen

Hist344G W 2C, 1L 0.5
Mystical and Utopian Movements from the 12th to the 17th Century 2
A study of the Utopian theme from the German Peasant Revolt to the fifth Monarchy Men including More's Utopia, and several other lesser known statements.
Instructor: Klaassen

Hist347G Radical Reformation 1 (also RS 321)
Not offered 1978-79

Hist348G Radical Reformation 2 (also RS 322)
Not offered 1978-79

Hist349 History as an Avocation
Not offered 1978-79
Hist 351 A, B, C, D
Special Subjects
Seminars and lectures in special fields. (See current
department brochure for future information).

Hist 351 A Y 1.0
Black History from Slavery to Revolution
A study of the impact of modern racism and the assertion
of black independence and identity. International
dimensions illustrated from Africa and the United States,
with special emphasis on the black experience in
Canada.
Instructor: Walker

Hist 351 B Y 1.0
A study in depth of selected themes in modern Irish
history.
Instructor: MacGillivray

Hist 352 The United States in World Affairs
Not offered 1978-79

Hist 353 Medieval Church History from 312-1449
Not offered 1978-79

Hist 354 Y 1.0
Africa and East Asia from World War II 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 capitalistic
alternatives as developmental models in China and
Japan.
Instructors: Beachey, Guisso

Hist 354 A F 0.5
Part 1, East Asia
(The first half of 354)
Instructor: Guisso

Hist 354 B W 0.5
Part 2, Africa
(The second half of 354)
Instructor: Beachey

Hist 355 Russian History 1613-1825
Not offered 1978-79

Hist 356 Russian History Since 1825
Not offered 1978-79

Hist 357 German History 1648-1890
Not offered 1978-79

Hist 358 German History 1890-1950
Not offered 1978-79

Hist 359 F 0.5
France in Revolution 1780-1914
A study of French society and the four revolutions that
affected it with particular attention to social and
institutional forces.
Instructor: Harrigan

Hist 360 W 0.5
French History Since 1914
Major developments in French politics, economics, social
structure, culture, and international roles since 1914,
with the emphasis on France's adjustments to decline
from Great Power status and its domestic regeneration
since 1945.
Instructor: Baker

Hist 361 Y 1.0
English History 1485-1660
A study of achievements and crises in the Tudor and early
Stuart periods.
Instructors: New, MacGillivray

Hist 362 British History Since 1760
Not offered 1978-79

Hist 363 Y 1.0
Medieval English History
A study of government, church and society
Instructor: Cherniavsky

Hist 364 R 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 365 R 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
Russian.
Instructor: Packull

Hist 366 A 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
Hist366B  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*

Hist368  Y  1.0
**International History Since 1870**
A study of the international relations of the European states from the Franco-Prussian War to the Cold War. Particular emphasis will be placed on an examination of the origins and consequences of the two World Wars.
*Instructor: Stubbs*

Hist368B  W  0.5
**International History Since 1870 (Second half of 368)**
Admission by permission of Instructor only.

Hist369  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*

Hist370  Y  1.0
**West Indian History**
A study of the circum-Caribbean region from aboriginal times including European imperialism, the history of plantations, slavery and slave society, independence movements, and the problems posed by modernisation, underdevelopment and neo-colonialism.
*Instructor: Craton*

Hist372  East Africa History
*Not offered 1978-79*

Hist374G  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*

Hist381A  F  0.5
**Studies in Canadian Regionalism 1 (before 1867)**
An examination of Canada's historical experience from the vantage points of Halifax, Saint John, Montreal and Toronto. A number of theoretical approaches confront the hard social and economic realities of historical evidence.
*Instructor: Cornell*

Hist381B  W  0.5
**Studies in Canadian Regionalism 2 (since 1867)**
The point of departure is an analysis of Canadian regions and regional cultures in the decades after Confederation. The further analysis of the Canadian experience is viewed from the vantage point of several regional metropolises.
*Instructor: Cornell*

Hist382  Canadian Intellectual History
*Not offered 1978-79*

Hist386  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: Johnson*

Hist387  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: Johnson*

Hist388  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*

Hist389  Canada in World Affairs: The Twentieth Century
*Not offered 1978-79*

Hist390  History of North American Indians
*Not offered 1978-79*

Hist392  The Foundations of American Civilization
*Not offered 1978-79*
Hist 393 Y 1.0
**History of American Nationalism 1790-1920**
A study of cultural nationalism, expansionism, sectionalism, imperialism, anti-imperialism and the idea of "the American mission" in the world.
Instructor: Ostrander

Hist 394 Y 1.0
**Twentieth Century Latin America**
A topical examination of Latin America's historical experience in this century. A thematic approach will be followed.
Instructor: Smith

Offered at St. Jerome's College

Hist 394A F 0.5
**Twentieth-Century Latin America 1**
(The first half of 394)
Offered at St. Jerome's College

Hist 394B W 0.5
**Twentieth-Century Latin America 2**
(The second half of 394)
Offered at St. Jerome's College

Hist 395 Law in Ancient World
Not offered 1978-79

Hist 397 The Origins of the Common Law
Not offered 1978-79

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.

The following seminars will not be offered in 1978-79: Hist 411, Hist 415, Hist 418, Hist 421, Hist 426, Hist 429, Hist 436, Hist 450.

Hist 400 Roman History: Keresztes
Hist 401 Medieval History: MacKinnon
Hist 405 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 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
Hist 432 African History; Beachey
Hist 435 The History of Native Response to Colonial Rule; Patterson
By permission of instructor only

Hist 436 Black History in North America; Walker
Hist 440 Far East; Guisso
Hist 450 Marxism and Canadian History; Johnson
Hist 453 20th Century International History; Stubbs

**Other Senior Courses†**

These courses are limited to senior Honours students

Hist 465 Y 1.0
**The History and Theory of Historical Writing**
3 hours. Lectures and seminars. (For Make-up year students only)

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
Course Descriptions

Kinesiology

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 (UBC), MS (Indiana), PhD (NYU)

Assistant Professor, Associate Dean of Undergraduate Affairs of the Faculty of Human Kinetics and Leisure Studies
W. N. Widmeyer, BA (Western Ontario), 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 (Western Ontario), PhD (Wisconsin)

Assistant Professor, Associate Chairman Undergraduate Affairs
P. J. Bishop, BSc, BPE (Waterloo), MSc (Western Illinois), PhD (Minnesota)

Assistant Professor, Associate Chairman Health Studies
H. W. Gruchow, BSc, MSc, PhD (Wisconsin)

Assistant Professor, Associate Chairman Graduate Affairs
K. C. Hayes, Dip, PE (St. Lukes College), MSc, PhD (Massachusetts)

Professors
J. Loy, BS (Lewis & Clark College), MA (Iowa), PhD (Wisconsin)
D. A. Winter, BSc, MSc (Queen's), PhD (Dalhousie)

Associate Professors
J. A. Best, BA (Queen's), PhD (Waterloo)
J. H. Green, BA, BPHE (Queen's), MA (Alberta), PhD (Wisconsin)
M. E. Houston, BSc (Toronto), PhD (Waterloo)
R. G. Martin, BPE, MA (Alberta), EdD (Berkley)
R. W. Norman, BS, BPE (McMaster), MSc (Alberta), PhD (Penn State)
D. A. Rammy, BA (Toronto), MD (Toronto), FRCS (England)
R. P. Schlegel, BA (Western Ontario), MSc (Illinois), PhD (Wisconsin)

Assistant Professors
F. Allard, BA, BPE, PhD (Waterloo)
D. Gill, BS (SUNY Courland), MS, PhD (Illinois)
R. Hughson, BSc (Western Ont.), MSc (UBC)
R. Love, BA, MA, PhD (Houston)
S. McColl, BSc (McGill), PhD (Purdue)
C. H. Pierce, BA (Merrill), MA (Depauw), PhD (Kansas)
E. Roy, BSc (Waterloo), MPE (UBC), PhD (Waterloo)
M. T. Sharratt, BA, MA (Western Ontario), PhD (Wisconsin)
J. A. Thomson, BA, MSc (McMaster), PhD (Waterloo)
I. D. Williams, MS, PhD (Illinois)

Lecturers
R. Hughson, BSc (Western Ont.), MSc (UBC)

Part Time
N. Theborgo, BA (Massachusetts), MA (Boston), PhD (Massachusetts)

Adjunct Associate Professors
E. English, MBA (UCLA), MD (Toronto), FRCS (Canada)
J. A. Israel, MD (Toronto), FRCS (Canada)

Adjunct Assistant Professor
D. Rainham, MD, BB, Bch (Wales)

Faculty member holds cross appointments as shown
1Sociology
2Psychology
3Systems Design
4Psychology

Course Descriptions

Courses in Kinesiology and Health Studies are offered within the Department of Kinesiology. Descriptions of courses in Health Studies are listed under 'H' in this chapter. For details of both programmes see Chapter 10.

Kin102 F 3C, 1T 0.5
Biphysical Basis of Kinesiology
Human physical movement is discussed from meechanical, anatomical and physiological viewpoints. The course provides a general orientation to the study of Kinesiology.

Kin103 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.

Kin116 W 3C 0.5
General and Organic Chemistry
An introduction to fundamentals in general and organic chemistry.
**Course Descriptions**

**Kinesiology**

**Kin171 W 3C 0.5**

**History of Sport and Physical Activity**
A cultural historical review of the development of sport and physical activity from the early Greek period to modern times. Special emphasis is placed on the development of sport in Canada since 1900 and the role of physical activity of all kinds in today's society.

**Kin200 F 3C,2L 0.5**

**Anatomy of Human Locomotion**
A functionally-oriented study of the limbs and back by regions including a brief introduction to Neuroanatomy. **Prereq:** Kinesiology and Dance students or permission of instructor. Dance students should register in lab 5, which is reserved for Dance students only.

**Kin201 W 3C,2L 0.5**

**Human Anatomy of the Head and Neck**
A study of the human anatomy of the head and neck. Particular emphasis is given to the anatomical structure and function of the brain, cranial nerves, and sense organs of the head. An introduction to the histology of the nervous system is included. **Prereq:** 2 Biology courses and Kin 200.

**Kin205 W 3C,3L 0.5**

**Physiology of Exercise**
An examination of the transient and persistent effects of exercise on physiological functions. Topics include muscular and cardio-respiratory function and the effects of varying environments upon their performance. **Prereq:** Honours Dance students only.

**Kin222 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.

**Kin252 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.

**Kin255 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.

**Kin280 W,S 3C 0.5**

**Administration**
A study of the principles underlying general administrative behaviour with an emphasis upon understanding the role and mechanics of decision making. Case study analysis and practical project work are utilized to foster the development of the student's administrative technique.

**Kin300 F 3C,2L 0.5**

**Physiology of Physical Activity (Part 1)**
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 303, 304.

**Kin317 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.

**Kin321 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.

**Kin330 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.

**Kin335 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.
Course Descriptions  
Kinesiology

Kin340  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: Kin200, 3rd and 4th year students only

Kin341  W  3C,2L  0.5  
**Selected Topics in Sports Medicine**  
A course for those students wishing additional study in the area of athletic 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: Kin340, 300, 317

Kin346  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: Kin340 or equivalent

Kin348  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: Soc101 and one other Soc course  
Offered even years only

Kin349  W,  S  3C,2L  0.5  
**Motor Learning**  
An introduction to the concepts and theories of learning motor skills. Laboratory sessions enable the student to participate in a variety of commonly used experimental procedures which relate to concepts and theories presented in lectures.  
Prereq: Kin 222

Kin350  F,S  3C,2L  0.5  
**Physiology of Physical Activity (Part 2)**  
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 neuroendocrine mechanisms involved.

Kin352  W,S  3C  0.5  
**Group Processes in Physical Activity (formerly Kin 455)**  
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

Kin356  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: Kin357 or instructor's consent

Kin357  W  3C,2L  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: Kin300

Kin402  F,S  3C  0.5  
**Applied Kinesiology**  
Principles of physiology and movement analysis as they apply to the development of maximal human motor performance are examined. Consideration is given to the effects of environmental, psychological and social factors on such development.  
Prereq: Kin300 and 321

Kin410  F  3C  0.5  
**Growth, Development and Aging (Health Studies 410)**  
The changing capacities and interest of man are studied as he grows and develops. The contribution of physical activity to growth, and psychological development is examined.  
Prereq: Kin200 and Biol 203

Kin420  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: Kin321 and 340

Kin422  W  3C  0.5  
**Administration of Facilities**  
A study of the problems involved in the planning and maintenance of various plants used by schools and recreation agencies and the selection and care of the equipment and supplies used with these facilities.
Kin425 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: Kin321

Kin426 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: Kin321, Kin300, Kin357 or permission of instructor.

Kin431/432 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. Kin431 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. Kin432 includes the completion of the project begun in Kin431.
Prereq: Kin431

Kin442 W 2C,2L 0.5
Adapted Physical Activity
The study of individual problems and their implications for the Kinesiologist. Body mechanical problems orthopaedic disabilities, neurological disabilities, heart disturbances and respiratory problems are discussed.
Prereq: Kin300

Kin452 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: Soc101 and one other Soc course

Kin453 W,S 1C,2S 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: Kin353

Kin456 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 Psych206, 207, or Kin356
Cross-listed as Psych307

Kin470 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.

Kin472 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

Kin480 F,W,S 0.5
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:
Kin481T-Volleyball, Kin482T-Basketball, Kin483T-Gymnastics, Kin484T-Racquets, Kin485T-Football, Kin486T-Ice Hockey, Kin487T-Field Hockey, Kin488T-Aquatics, Kin489T-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
KIN 288 Elem. Wrestling, W
KIN 289 Elem. Rugger, F
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 489A 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

Department of Management Sciences

Professor, Chairman of the Department
S. D. Saleh, BA (Cairo), MA, PhD (Case Western Reserve)

Professor, Associate Chairman,
E. A. Silver, BEng (McGill), ScD (MIT), PEng

Professors
D. J. Clough², BASc, MBA (Toronto), PEng
D. W. Conrath, BA (Stanford), MS (Carnegie Tech) MA, PhD (UC, Berkeley)
P. M. Reilly¹, BASc (Toronto), DIC PhD (London), FSS, PEng
S. S. Sengupta, MA, DPhil (Calcutta)

Associate Professors
I. Bernhardt, BA (NYU), PhD (UC, Berkeley)
F. E. Burke, BA (London), PEng
K. C. Kapur, BS in Mech Eng (Delhi U), MTech (IIT), MS, PhD (Berkeley), PEng (Visiting)
M. J. Magazine, BS (CCNY), MS (NYU), MEng, PhD (Florida)
J. B. Moore, BASc (Toronto), MMath, PhD (Waterloo), PEng
H. G. Vickson, BSc (UBC), PhD (MIT)

Assistant Professors
M. E. El-Gazzar, BSc, MSc (Cairo), PhD (Waterloo), PEng (Visiting)
J. T. Janz, BA (Winnipeg), PhD (Minnesota)
B. S. Jung, BS (Seoul), MASc (Waterloo), MBA, PhD (Toronto)

Adjunct Professor
M. Saltsman, MP

Faculty Members holding cross appointment as shown.
¹Department of Chemical Engineering
²Joint appointment with Department of Civil Engineering

Course Descriptions

MSci21 F,W 3C 0.5

Probability and Statistics 1
(formerly Applied Probability and Statistics)
MSci23  F,W,S  2C,1T  0.5
Managerial and Engineering Economics I
(formerly MSci 405)
Economics of the firm with emphasis on managerial
decisions. Price and output decisions. Choosing among
alternative production processes and input
combinations. Evaluating make-or-buy decisions,
equipment service life, and new products. Analytical
tools include marginal analysis, linear programming, and
capital budgeting techniques.

MSci31  F,W  2C,1T  0.5
Probability and Statistics II
(formerly Industrial Statistics and Design of
Experiments)
Linear statistical models. General regression theory and
applications. Design of orthogonal experiments and
industrial applications. Correlation coefficient analysis.
Elementary time series analysis. Finite population
sampling and sample survey methods.
Prereq: MSci 21 or equivalent

MSci43  W  2C,1T  0.5
Managerial and Engineering Economics II
(formerly Economics of Enterprise and Benefit
Cost Analysis)
Applications of models of household and enterprise
behaviour. 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.
Prereq: MSci 23 or equivalent

MSci44  F,S  3C  0.5
Organizational Behaviour I
(formerly MSci 404)
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.

MSci46  F,W,S  2C,1T  0.5
Operations Research I
(formerly MSci 406)
Imputed costs and benefits. Special applications:
transportation, goal programming, decentralization
through transfer prices, multiple objectives. Integer
linear programming, zero-one, and network flow
problems. Linearization techniques. Projected gradient
methods. Chance-constrained linear programming.

MSci47  F,S  2C,1T  0.5
Operations Research II
(formerly MSci 407)
Classification of stochastic processes. Recurrent events
including birth and death processes, and branching
processes. Waiting line models and applications. Markov
processes and decision problems. Applications include
inventory control, reliability, equipment replacement,
maintenance, design of service facilities, etc.
Prereq: MSci 21 or equivalent, and MSci 46.

MSci53  F,W,S  3C  0.5
Organizational Behaviour II
(formerly Decision Theory and Organization)
Group interactions and the problems of industrial
macro-organizations. Discussion of organizational
decision-making and control process, with particular
emphasis on the relevant theories of structural relations
of organizations.
Course Descriptions

Man-Environment Studies

Env St 111 Introduction to the Study of The Future
See Env St course descriptions, page 286.

M Env 120 Environmental issues and the Natural Sciences
Not offered 1978-79

M Env 130 Y 3C 1.0
Environmental Issues and the Social Sciences
Survey and analyses of selected environmental issues drawing upon concepts and theories from the social sciences and humanities. Content of course closely integrated with M Env 120 and organized into same thematic units.
Prereq: Honours Man-Environment Studies
To be taken concurrently with M Env 120

M Env 150 Y 3C 1.0
Environmental Issues: Methods & Techniques
Series of concurrent six week workshops to introduce methods and techniques appropriate for investigating different environmental problems. Students to select any four 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 190 Y 4S, 1wkshp 1.0
Seminar-Workshop
Faculty supervised individual or small group investigation of selected environmental issues to help develop skills for defining and resolving problem situations. Related or different topics may be selected for the fall and winter terms.
Prereq: Honours Man-Environment Studies

Env St 195A Introduction to Environmental Studies
See Env St course descriptions, page 286.

Env St 195B Introduction to Environmental Problems
See Env St course descriptions, page 286.

Env St 200 Field Ecology
See Env St course descriptions, page 286.

Department of Man-Environment Studies

Associate Professor, Chairman
G. B. Priddle, BA (Western), MA, PhD (Clark)

Lecturer, Undergraduate Officer
J. E. Fauquier, BA, MAsc (Waterloo)

Professors
G. R. Francis, BA (Toronto), BA (McGill), MA (UBC), PhD (Michigan)
C. K. Knapper*, BA Hons (Sheffield), MA, PhD (Saskatchewan)
P. H. Nash*, BA, MA (UC LA), CE (Grenoble), MCP, MPA, PhD (Harvard), MCIP

Associate Professors
D. Estrin*, BA, LLB (Alberta)
E. J. Farkas, BSE (Princeton), ScD (M.I.T.)
D. W. Fischer, BS (Trinity), MS (Michigan State), PhD (Colorado State)
R. F. Keith, BSA (Guelph), MA, PhD (Michigan State)

Adjunct Associate Professor
A. T. O'Brien, BS (Marymount), PhD (Fordham)

Assistant Professors
C. E. De'ath*, BA (Auckland), ASOPA Cert (Sydney), MEd, PhD (Pittsburgh)
S. K. Gupta, BSc, MSc (Punjab), MA, PhD (Toronto)
S. C. Lerner, BA (Ohio State), MA (Columbia)
G. O. Michalenko, BA, PhD (Saskatchewan)
A. V. Morgan*, BA (Leicester), MA (Calgary), PhD (Waterloo)
T. McL. Semple, BA (Western Ontario), MA, PhD (Waterloo) (on sabbatical leave 1978-79)

Lecturers
J. E. Robinson, BSc (Waterloo), MES (York)
C. S. Farkas, BSc (Delaware), MEd (Tufts Univ.) (part time)

Instructor
J. C. Boyer, BES, MA (Waterloo)

Faculty members holding cross/and/or joint appointment(s) as shown
*Geography, Planning and School of Landscape Architecture, Univ. of Guelph
& Man-Environment Studies and Anthropology
Man-Environment Studies and Earth Sciences
Murphy Environmental Studies
Psychology
Environmental Studies
Environmental Studies
MEnv230 W 3C 0.5
Interpreting Man-Environment Interrelationships
Review and comparison of different analytical approaches and modes of reasoning appropriate for understanding man-environment interrelationships including systems reasoning, the scientific method of enquiry, models of Man, anticipation of futures, and subjective modes of knowing.
Prereq: Honours Man-Environment Studies

MEnv240 Small Groups and the Environment
Not offered 1978-79

MEnv241 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.
No prereq

MEnv247 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

MEnv250 F,W 3C 0.5
Environmental Issues: Methods & Techniques
Series of concurrent six week workshops to continue the methods and techniques offerings of MEnv 150. 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 286.

Env St 253 Media Tools for Environmental Studies - Advanced Level
See Env St course descriptions, page 286.

MEnv260 Visual Perception and Communication
Not offered 1978-79

Env St 271 Introduction to Quantitative Research Methods
See Env St course descriptions, page 286.

Env St 272 Computer Programming in Environmental Studies
See Env St course descriptions, page 286.

MEnv275 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

MEnv290 Y 6S, wkshp 1.0
Seminar-Workshop
Individual or small group investigation of selected environmental issues. Topics chosen to reflect a "futures studies" orientation
Prereq: Honours Man-Environment Studies

MEnv310 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.

MEnv320 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

MEnv330 Psycho-Social Aspects of Environmental Design
Not offered 1978-79

MEnv335 Anthropology and Education
Not offered 1978-79

MEnv340 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.

MEnv350 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.
Course Descriptions
Man-Environment Studies

MEnv 351 W 3S 0.5
Organization and Environmental Management
Analysis of selected governmental or other organizations performing important functions of policy issues and goals. Programme planning, budgeting, and delivery processes. Role of different specialists and "generalists", nature and extent of public participation.

MEnv 356 Canadian Non-Renewable Resources
Not offered 1978-79 except by correspondence

MEnv 357 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 and Plan 357.
Prereq. EnvSt 200

EnvSt 358 Environmental Pollution and its Control
See EnvSt course descriptions, page 286.

MEnv 360 Man and Nature
Not offered 1978-79

MEnv 361 Contemporary Media of Communication and Human Environment
Not offered 1978-79

MEnv 375 F,W 2R 0.5
Special Readings or Seminar on Selected Topics
Prereq: Consent of instructor

The following courses were given in 1977-78 and will likely be offered in 1978-79:
MEnv 375E/475E Land and Leisure: Concepts and Methods in Recreational Land Use
MEnv 375F/475F The Work Environment
MEnv 375H/475H Man-Made Environmental Health Hazards
MEnv 375K/475K Issues in Resources Law
MEnv 375M/475M Systems Dynamics
MEnv 375T/475T Technology/Lifestyles for a Conserver Society
Prereq: Consent of instructor

EnvSt 380/381 Environmental Studies Workshop
See EnvSt course descriptions, page 286.

EnvSt 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

EnvSt 401 Environmental Law
See EnvSt course descriptions, page 286.

EnvSt 402 Planning Law
See EnvSt course descriptions, page 286.

MEnv 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. Dependent on student demand and faculty availability.
Prereq. Hon. Man-Environment Studies or instructor consent

EnvSt 411 Alternative Future Environments 1
See EnvSt course descriptions, page 286.

EnvSt 412 Alternative Future Environments 2
See EnvSt course descriptions, page 286.

EnvSt 417 Land Use History and Landscape Change 1
See EnvSt course descriptions, page 286.

EnvSt 418 Land Use History and Landscape Change 2
See EnvSt course descriptions, page 286.

MEnv 431 W,S 2C 1.0
Comparative Approaches to Environmental Management
Environmental programmes of other nation states compared to Canadian approaches. Case studies from U.S., British and European situations, and other countries. Course meets on campus during Winter term and in the field in other countries during Spring term. Spring term limited to a period of 6-8 weeks. Laboratory fee varies with field observation. Dependent on student demand and faculty availability.
Prereq: Honours Man-Environment Studies and consent of instructor; non-majors, consent of instructor
MEnv 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. Dependent on student demand and faculty availability.
Prereq: Honours Man-Environment Studies fourth year or consent of instructor.

MEnv 450 Honours Seminars: Environmental Design
Not offered 1978-79

MEnv 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

MEnv 475 F,W 2R 0.5
Special Readings or Seminar on Selected Topics
See MEnv 375 for selected topics which were offered in 1977-78 and will likely be offered in 1978-79.
Prereq: Consent of instructor

MEnv 476 Y 2R 1.0
Special Readings or Seminar on Selected Topics
Prereq: Consent of instructor

MEnv 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

MEnv 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

Course Descriptions
Man-Environment Studies/Mathematics/Applied Mathematics

Faculty of Mathematics

Dean of the Faculty of Mathematics
W. F. Forbes, PhD, DSc (London), DIC

Associate Deans, Undergraduate Studies
K. D. Fryer, BA (Western), PhD (Toronto)
P. J. Ponzo, MA (Toronto), PhD (Illinois)

Associate Dean, Graduate Studies
D. D. Cowan, BASc (Toronto), PhD (Waterloo)

Assistant to the Dean
R. G. Dunkley, BA (Western)

Director of Undergraduate Affairs
P. C. Brillinger, BA (McMaster), MA (Waterloo)

Director, Mathematics Computing Facility
W. M. Gentleman, BSc (McGill), PhD (Princeton)

Lecturers
R. J. Beach, MMath (Waterloo)
Z. Dvoracek, MS, RNDr (Charles University, Prague),
PhD (Czechoslovak Academy of Sciences, Prague)
J. Lester, BSc (Memorial), PhD (Waterloo)
R. G. Scoins, MMath (Waterloo)
C. Struthers, MMath (Waterloo)

Adjunct Professors
D. B. Sumner, MSc (Cantab), DPhil (Witwatersrand)
R. E. Woolsey, PhD (Texas)

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)
Course Descriptions

Applied Mathematics/Combinatorics and Optimization

Professors
J. Cizek*, RNDr (Charles University, Prague) CSc (Czechoslovak Academy of Sciences, Prague)
H. F. Davis, PhD (MIT)
B. Forte*, PhD (Pisa), Habil DSc (Rome)
J. A. George*, MSc (Alberta), PhD (Stanford)
F. O. Goodman, BSc (London), PhD (London),
DSc (London), FinstP, FAIP
M. S. Klamkin, BChE (Cooper Union), MS (Brooklyn),
Leave of Absence

Professors
M. A. McKiernan*, MA (Loyola), PhD (IIT)
J. Paldus*, RNDr (Charles University, Prague), CSc (Czechoslovak Academy of Sciences, Prague)
P. J. Ponzo, MA (Toronto), PhD (Illinois)
D. G. Wertheim, BA (McMaster), PhD (Toronto)

Associate Professors
C. B. Collins, BSc (London), PhD (Cambridge)
S. G. Davison, PhD (Manchester)
J. Froese, BA (Manitoba), MA (Queen’s), PhD (UBC)
W. H. Hui, BSc (Peking), PhD (Southampton)
G. J. Lastman, MA (UBC), PhD (Texas)
F. R. McCourt*, BSc, MSc, PhD (UBC)
M. R. Pintar*, BSc, MSc, PhD (Ljubljana)
J. Wainwright, BSc (Natal), PhD (South Africa)
R. A. Wentzell, BSc (Acadia), PhD (Western)

Assistant Professors
G. W. Horndeski, BSc (Washington University),
PhD (Waterloo)
S. P. Lipshitz, BSc Hons (Natal), MSc (South Africa),
PhD (Witwatersrand)
R. G. McLennagh, MSc (Queen’s), PhD (Cantab)
Sabbatical Leave
M. E. Snyder, BSc (Western), MSc (Waterloo)

Lecturer
B. J. Marshman, PhD (Waterloo)

Research Associate
J. Hamilton, BSc, PhD (Southampton)

Research Assistant Professor
P. E. S. Wormer, PhD (Nijmegen, Holland)

Research Assistant
J. Inciura, PhD (Waterloo)

Postdoctoral Fellows
A. D. Klemm, PhD (Flinders University)
A. J. Thakkar, BSc, PhD (Queen’s)

Adjunct Professors
Y. C. Cheng, PhD (UBC)
M. L. Glasser, PhD (Carnegie-Mellon)
D. J. Henderson, BS (UBC), PhD (Utah), FinstP
D. Lovelock, PhD, DSc (Natal)
H. Rund, PhD (Cape Town), Habilitation (Freiburg)

Faculty Members holding cross-appointments as shown
*Applied Mathematics and Chemistry
†Applied Mathematics/Statistics/Computer
Science/Pure Mathematics
‡Computer Science and Applied Mathematics
¶Pure Mathematics and Applied Mathematics
§Applied Mathematics and Physics

Department of Combinatorics and Optimization

Professor and Chairman of the Department
R. C. Mullin, BA (Western), PhD (Waterloo)

Professor and Associate Chairman of the Department
D. H. Younger, PhD (Columbia)

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 (Western), PhD (Toronto)
P. L. Hammer, PhD Math (Bucharest)
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)
J. A. Bondy, DPhil (Oxon)
R. N. Burns, BSc (Toronto), PhD (Waterloo)
C. E. Haff, BS (Stanford), PhD (Waterloo)
D. M. Jackson, PhD (Cantab)
U. S. R. Murty, MA (Osmania), PhD (Indian Stat. Inst.)
H. Shank, MSc (Chicago), PhD (Cornell)

Associate Professors
M. Best, MMath (Waterloo), PhD (UC Berkeley)
J. A. Bondy, DPhil (Oxon)
R. N. Burns, BSc (Toronto), PhD (Waterloo)
C. E. Haff, BS (Stanford), PhD (Waterloo)
D. M. Jackson, PhD (Cantab)
U. S. R. Murty, MA (Osmania), PhD (Indian Stat. Inst.)
H. Shank, MSc (Chicago), PhD (Cornell)
Assistant Professors
A. R. Conn, BSc (Imperial College), MSc (Manitoba), PhD (Waterloo)
L. J. Cummings, PhD (UBC)
G. B. Faulkner, BSc (Toronto), 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 (Western)

Postdoctoral Fellows
L. Caccetta, BSc, PhD (Western Australia)
P. Eades, BA, PhD (Australian National)
R. Haggkvist, PhD (Umea)
V. Rosta, PhD (Budapest)

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, D Hab (Karlsruhe)

Adjunct Lecturer
J. W. Dodd, BASc (Toronto), MSc (Waterloo)

Faculty Member holding cross-appointment as shown

Department of Computer Science

Professor and Chairman of the Department
J. D. Lawson, BASc (Toronto), PhD (Waterloo), FIMA

Professor and Associate Chairman for
Undergraduate Studies
J. A. Brozozowski, MASc (Toronto), PhD (Princeton)

Associate Professor and Associate Chairman for
Graduate Studies
J. L. Morris, BSc (Leicester), PhD (St. Andrews)

Professors
K. Culik, MSc, RNDr (Prague), PhD (Czechoslovak Acad Sci)
B. Forte, PhD (Pisa), Habil DSc (Rome)
J. A. George, MSc (Alberta), PhD (Stanford)
W. M. Gentleman, BSc (McGill), PhD (Princeton)
J. W. Graham, MA (Toronto)
E. G. Manning, MSc (Waterloo), PhD (Illinois)
T. Pietrzykowski, MA (Warsaw), PhD (Polish Acad Sci)

Faculty Members holding cross-appointments as shown

Associate Professors
E. A. Ashcroft, BA (Cantab), PhD (Imperial College)
D. E. Morgan, BSc (Rose Polytechnic Inst), MS (Michigan), PhD (Waterloo)
J. I. Munro, BA (New Brunswick), MSc (UBC), PhD (Toronto) [Sabbatical Leave 1977-78]
R. B. Simpson, MASc (Toronto), PhD (Maryland)

Assistant Professors
P. C. Brillingen, BA (McMaster), MA (Waterloo)
J. C. Beatty, AB (Math) (Princeton), PhD (UC Berkeley)
K. S. Booth, BS (Calif Inst Tech), PhD (UC Berkeley)
P. T. Cox, BSc, MSc (Auckland), PhD (Waterloo)
V. A. Dyck, MMath (Waterloo)
M. van Emden, MEngMath (Technische Hogeschool, Delft, The Netherlands), PhD (Amsterdam)
K. O. Geddes, BA (Saskatchewan), MSc, PhD (Toronto)
J. F. Gentleman, MS (Chicago), PhD (Waterloo)
T. S. E. Maibaum, BSc (Toronto), PhD (London)
M. Malcolm, BSc, MS Eng (Denver), MS, PhD (Stanford)
R. W. Peebles, BSc (McGill), PhD (Pennsylvania)
(on leave 1977-78)
D. Rotem, BSc (Hebrew Univ Jerusalem), PhD (Witwatersrand)
G. Sager, PhD (Washington)
J. A. Smith, PhD (Waterloo), PEng
D. J. Taylor, BSc (Saskatchewan), MMath, PhD (Waterloo)
F. W. Tompa, ScM (Brown), PhD (Toronto) (part-time)
J. H. Vellinga, BA (Western), MA (Waterloo) (part-time)
J. W. Welch, BSc (McGill), PhD (Waterloo) (part-time)
J. W-N. Wong, PhD (UC Los Angeles)

Lecturers
R. J. Beach, BMath, MMath (Waterloo)
R. L. Newkirk, BSc, MSc (Western) (part-time)

Adjunct Professors
P. H. Dirksen, MA (Waterloo)
P. C. Fischer, MB (Michigan), PhD (MIT), FSA
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 (UBC), MMath (Waterloo)

Faculty Members holding cross-appointments as shown

Course Descriptions
Combinatorics and Optimization/Computer Science
Department of Pure Mathematics

Professor and Chairman of the Department
R. A. Staal, PhD (Toronto)

Distinguished Professor
J. Aczel, PhD (Budapest), Habilitation (Hungarian Acad Sci), FRSC

Professors
G. E. Cross, MA (Dalhousie), PhD (UBC)
D. Z. Djokovic, PhD (Belgrad)
B. Forte, PhD (Pisa), Habilitation (Rome)
H. Haruki, PhD (Osaka)
P. Hoffman, BA (Toronto), PhD (Manchester)
M. A. McKiernan, MA (Loyola), PhD (IIT)
G. E. Cross, MA (Dalhousie), PhD (UBC)
J. A. Baker, MA (Saskatchewan), PhD (Waterloo)
S. Burris, PhD (Oklahoma)
L. J. Cummings, PhD (USC)
G. Dankert, DiplMath (TH Hanover), PhD (Cologne)
W. J. Gilbert, MA (Canad), DPhil (Oxon)
D. A. Higgs, BScHons (Witwatersrand), MA (Canad), PhD (McMaster)
A. Kerr-Lawson, BA (Toronto), MA (Chicago), PhD (McMaster)
D. Mowat, BA (Quebec), PhD (Waterloo)
C. T. Ng, BSc (Chinese Univ), PhD (Waterloo)
F. C. Y. Tang, BSc (Hong Kong), MS (South Carolina), PhD (Illinois)
P. de Witte, MSc Theor. Phys (Gent), MScMath PhD (Brussels)

Assistant Professors
L. L. Dickey, MA (Arizona), PhD (Wisconsin)
J. W. Lawrence, MSc (McGill), PhD (Carleton)
J. Maizan, PhD (Toronto)
E. Moskal, BA (Toronto), PhD (Illinois)
K. A. Rowe, BSc (Toronto), MS (Wisconsin), PhD (Illinois)
F. Zorzitto, MSc (Windsor), PhD (Queen's)

Research Associate Professor
G. T. Diderrich, PhD (Wisconsin)

Adjunct Professor
H. H. Crapo, AB (Michigan), PhD (MIT)

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

Professor and Chairman of the Department
J. G. Kalbfleisch, BSc (Toronto), MA, PhD (Waterloo)

Associate Professor and Associate Chairman of the Department
J. F. Lawless, BSc, MSc, PhD (Waterloo)

Associate Professor and Associate Chairman of the Department
J. C. Young, BASc (Toronto), MSc (Waterloo), PhD (Edinburgh)

Professors
H. M. Atrubin, BA (Manitoba), FSA, FCIA (part-time)
G. A. Barnard, MA, DSc (Cambridge)
W. F. Forbes, PhD, DSc (London), DIC
B. Forte, PhD (Pisa), Habilitation (Rome)
J. Gani, BSc, DIC (London), PhD (ANU), DSc (London), FAA
W. M. Gentleman, BSc (McGill), PhD (Princeton)
V. P. Godambe, MSc (Bombay), PhD (London)
P. M. Reilly, BSc (Toronto), DIC, PhD (London), FSS
D. A. Sprott, BA, MA, PhD (Toronto)
M. D. Vogel-Sprott, BA (McMaster), PhD (Toronto)

Associate Professors
W. H. Aitken, BA (Toronto), BSc, FSA, FCIA
W. H. Bennett, BSc, BA, PhD (Adelaide)
M. A. Bennett, BA (Nottingham), FSA, FCIA
W. H. Cherry, BSc, PhD (Melbourne)
J. F. Gentleman, BA, MS (Chicago), PhD (Waterloo)
J. D. Kalbfleisch, BSc, MM, PhD (Waterloo)
W. S. Rickert, BSc, PhD (Waterloo)
J. C. Robinson, MASc, PEng, PhD (Waterloo)
K. R. Shah, BA, MA (Bombay), PhD (Indian Stat Inst)
M. E. Thompson, BSc (Toronto), MSc, PhD (Illinois)
R. V. Thysell, BSc (Montana), PhD (Iowa)
J. B. Whitney, BA, MA (Western), PhD (Toronto)
Statistics/Strategy Board Members

Assistant Professors
B. Abraham, BSc (Kerala), MSc (Guelph), PhD (Madison)
A. Brender, BSc (McGill), MA, PhD (UC Berkeley)
K. S. Brown, BMath, PhD (Waterloo)
R. L. Brown, BMath, (Waterloo), ASA
R. J. MacKay, BSc (Waterloo), MSc, PhD (Toronto)
D. E. Matthews, BA, MA (Western), PhD (London), DIC
C. Minner, DiplMath (Basel), PhD (Waterloo)

Lecturers
F. G. Reynolds, BSc, MSc (Manitoba), FSA, FCIA
C. Springer, BSc, MSc (McGill)

Adjunct Professors
I. P. Fellegi, PhD (Carleton)
A. Finch, PhD, DSc (London), DIC
R. C. Frecker, BSc (Memorial), MD (Dalhousie)
L. P. Lefkovitch, BSc (London)

Adjunct Lecturer
J. A. Jackson

Faculty Members holding cross-appointments as shown
1Applied Mathematics/Statistics/
   Computer Science/Pure Mathematics
2Computer Science and Statistics
3Chemical Engineering and Statistics
4Statistics and Psychology
5Psychology and Statistics
6Statistics and Computer Science

Strategy Board Members

University of Waterloo Faculty of Mathematics

R. S. Aberg
   General Manager
   Corporate Planning
   Shell Canada Limited

J. Babbin
   Manager
   Information Systems
   Reed Paper Limited

M. W. Bainbridge
   Director
   Post-Secondary Recruitment Programme
   Public Service Canada

E. G. Burton
   President
   Simpsons Limited

R. G. Clifford
   Vice President
   Central Region
   IBM Canada Limited

G. Corlett
   Deputy Comptroller
   Noranda Mines Limited

B. Graham
   Partner
   Coopers and Lybrand

W. D. Jones
   Senior Systems and
   Data Processing Manager
   The Steel Company of Canada

J. V. Masterman
   Vice President (Operations)
   Mutual Life Assurance Company of Canada

E. L. Pursey
   Vice President and Comptroller, Account & Control
   Canadian Imperial Bank of Commerce

Dr. C. D. Sadleir
   Vice President, Development
   Bell-Northern Software Research

G. F. Sekely
   Director
   Information Systems
   Canadian Pacific

R. P. Wismer
   Director,
   Business Systems Services
   Northern Telcom Canada Limited

Dr. D. I. Wright
   Deputy Provincial Secretary
   Secretariat for Social Development
   Province of Ontario

The University of Waterloo Strategy Board was
established to provide liaison between the Faculty of
Mathematics and knowledgeable representatives from
key sectors of the economy. Board meetings are
normally held twice a year.
Mathematics Course Descriptions

Note
Course descriptions are given under the new course numbers introduced in 1976.

Math 120a  F,W,S  3C,1T  0.5
Calculus
Functions and limits, differentiation of algebraic and trigonometric functions, applications of the derivative, the differential, Riemann sums, the first and second fundamental theorems of the integral calculus. 
Prereq: Year 5 Calculus

Note
Math 120a is not open to Honours Mathematics students.

Math 120b  F,W,S  3C,1T  0.5
Calculus
Differentiation and integration of exponential and logarithmic functions, techniques of integration, applications of integration, indeterminate forms, sequences, convergence of series, power series. 
Prereq: Math 120a or Math 130a

Note
Math 120b is not open to Honours Mathematics students.

Math 124a  F,W  3C,1T  0.5
Algebra and Geometry
Elementary number theory, mathematical induction, binomial theorem, monotone sequences, inequalities, complex numbers, elementary functions of a complex variable, polynomials and polynomial equations. 
Prereq: Year 5 Algebra

Note
Math 124a is not open to Honours Mathematics students.

Math 124b  F,W,S  3C,1T  0.5
Algebra and Geometry
Determinants and matrices, vectors in two and three space, quadric surfaces, systems of equations, elementary linear transformations. 
Prereq: Year 5 Algebra

Note
Math 124b is not open to Honours Mathematics students.

Math 130a  F  3C,1T  0.5
Calculus
Functions and limits, the derivative, differentiation of algebraic and other functions, applications of the derivative, the integral, applications of the integral. 
Prereq: Year 5 Calculus
Also offered at St. Jerome’s College

Math 130b  W,S  3C,1T  0.5
Calculus
Techniques of integration, convergence of series, power series. Some elementary differential equations. 
Prereq: Math 130a or 80% in Math 120a
Also offered at St. Jerome’s College

Math 134a  F  3C,1T  0.5
Algebra and Geometry
Integers and diophantine equations, congruences, induction and the binomial theorem, rational and real numbers, inequalities, complex numbers, polynomial equations. 
Prereq: Year 5 Algebra
Also offered at St. Jerome’s College

Math 134b  W,S  3C,1T  0.5
Algebra and Geometry
In 2 and 3 dimensions: vectors, lines and planes, linear transformations, matrices, determinants, circles and spheres, geometry of the triangle, quadric surfaces, inequalities. 
Prereq: Year 5 Algebra (Math 134a desirable)
Also offered at St. Jerome’s College

Math 220a  F,W,S  3C,1T  0.5
Advanced Calculus
Differential calculus for functions of several variables. 
Prereq: Math 120b or Math 130b

Note
Math 220a is not open to Honours Mathematics students.

Math 220b  F,W,S  3C,1T  0.5
Advanced Calculus
Prereq: Math 220a or Math 230a

Note
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 or Math 134a/b

Note
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 or Math 231a

**Note**
Math 221b is not open to Honours Mathematics students.

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
Also offered at St. Jerome’s College

Math 230b  F,W,S  3C,1T  0.5  
**Advanced Calculus**
Prereq: Math 230a
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
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
Also offered at St. Jerome’s College

Math 232a  F,W,S  2C,1T  0.5  
**Modern Algebra**
Groups, monoids and Boolean algebras with selected applications.
Prereq: Math 134a/b or Math 134a/b (Math 221a or Math 231a desirable)

**Note**
Math 232a is not open to Honours Mathematics students.

Math 232b  F,W  2C,1T  0.5  
**Modern Algebra**
Rings and fields with selected applications.
Prereq: Math 331a

Math 321a  F,W,S  3C  0.5  
**Modern Algebra**
Rings and fields with selected applications.
Prereq: Math 231a or Math 331a

Math 321b  F,W,S  3C  0.5  
**Modern Algebra**
Rings and fields with selected applications.
Prereq: Math 321a or Math 331a

**Note**
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 or Math 230a (Math 220b or Math 230b desirable)

**Note**
Math 322a 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 Math 124a/b (Math 231a desirable)

Math 331b  F,W  2C,1T  0.5  
**Modern Algebra**
Rings and fields with selected applications.
Prereq: Math 331a

Math 332a  F,W,S  3C  0.5  
**Real Variables**
Prereq: Math 230a (Math 230b desirable)
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

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

Note
Course descriptions are given under the new course numbers introduced in 1976.

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, 130 or consent of instructor

Note
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 220

Note
Credit will be given for only one of AM 240, 270.

AM 260 F 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 130

AM 270 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

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 220 or equivalent, or consent of instructor

AM 362 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 230, or consent of instructor

AM 365 W 2C, 1T 0.5
Introduction to Continuum Mechanics

AM 371 F 2C, 1T 0.5
Partial Differential Equations of Applied Mathematics I
First order partial differential equations and method of characteristics, second order partial differential equations, boundary value problems and related numerical methods, vibrating string, 2-D membranes, heat equation and related problems; introduction to vector analysis. Prereq: AM 260, Math 230, or consent of instructor
<table>
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<th>Semester</th>
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**Introduction to General Relativity**

Flat space-time and Lorentz transformations, relativistic mechanics and collision phenomena, Maxwell's equations; curved space-time and the Einstein field equations, the Schwarzschild solution and some experimental tests of general relativity, the weak field limit; introduction to black holes; introduction to cosmology.

*Prereq: AM362 or consent of instructor*

**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 230*

**Ordinary Differential Equations 2**


*Prereq: AM381*

**Mechanics**


*Prereq: Math 230, or consent of instructor*

**Reading Course**

*AM389 F 0.5*

**Reading Course**

*AM399 W 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: AM381/391, or consent of instructor*

**Measure and Integration**

The theory of measure and the Lebesgue integral.

**Introduction to Differentiable Manifolds**

Differentiable manifolds, vector fields, linear connections, tensor fields, differential forms, and the structure equations.

*Prereq: AM362, or consent of instructor*

**Quantum Mechanics**


*Prereq: Math 231, AM371, 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: AM365*

**Topics in Applied Mathematics**

A selection of topics given by members of the Applied Mathematics Department. Typical topics are: elasticity, fluid mechanics, electromagnetic theory, statistical mechanics, perturbation theory, calculus of variations, partial differential equations, distribution theory.

*Prereq: Consent of instructor*

**Linear Operators**

Linear operators in Hilbert spaces. Compact operators. Introduction to functional analysis.

*Prereq: AM462, or consent of instructor*
AM473 W 2C 0.5
Selected Topics in Applied Differential Geometry
Prereq: AM362, or consent of instructor.

AM476 W 3C 0.5
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

AM478 W 2C 0.5
Topics in Applied Mathematics
Same as in AM 468
Prereq: Consent of instructor

AM481 Y 2C 1.0
Partial Differential Equations of Applied Mathematics 2
Second-order partial differential equations and characteristics; d'Alembert's 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: Consent of instructor

AM482 F 2C,1T 0.5
Calculus of Variations
Prereq: Math 230, or consent of instructor

AM485 F 2C 0.5
Electromagnetism
Applications of Maxwell's equations. Introduction to wave guides and antennae.
Prereq: Consent of instructor

AM486 F 2C 0.5
Statistical Mechanics
Applications of probability theory to theoretical Physics.

AM488 F 2C 0.5
Control Theory
Prereq: Consent of instructor

AM489 F 0.5
Reading Course

AM495 W 2C,1T 0.5
Elasticity
Basic equations of elasticity for homogeneous isotropic bodies; bending of beams; plane elastic waves; Rayleigh surface waves. Solution of problems by potentials, variational methods and Saint Venant's principle.
Prereq: AM365

AM499 W 0.5
Reading Course

Course Descriptions

Combinatorics and Optimization

Note
Course descriptions are given under the new course numbers introduced in 1976.

C&O239a F 2C,2T 0.5
An Introduction to Combinatorics
Prereq: Math 124a/b or 134a/b
Also offered at St. Jerome's College in Winter Term.

C&O239b W,S 2C,2T 0.5
An Introduction to Optimization
Prereq: Math 124a/b or 134a/b
Also offered at St. Jerome's College in Fall Term.
C & O 249b W 2C,1T 0.5
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

C & O 330a F,S 2C 0.5
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: Stat 230

C & O 330b W 2C 0.5
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: Stat 230

C & O 337a F 2C 0.5
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 or 231a.
Offered at St. Jerome’s College.

C & O 337b W 2C 0.5
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. A course in linear algebra will be helpful but not essential. No text is required. As a reference text H. Ryser’s Combinatorial Mathematics is suggested.
Prereq: C & O 337a
Offered at St. Jerome’s College.

C & O 350a F,W,S 2C,1T 0.5
Graph Theory With Applications 1
Basic definitions; shortest paths; minimum-weight spanning trees; connectivity and communication networks, Euler tours and the Chinese postman problem; Hamilton cycles and the travelling-salesman problem; matchings and the optimal assignment problem.
Prereq: Math 221a or 231a.

C & O 350b F,W 2C,1T 0.5
Graph Theory With Applications 2
Edge colourings and the timetabling problem; vertex colourings and the storage problem; planar graphs; directed graphs, and sequencing and ranking problems.
Prereq: C & O 350a

C & O 351a F,W,S 3C 0.5
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 or 231a/b

C & O 351b F,W 3C 0.5
Introduction to Graph Theory 2
Independent sets and cliques; vertex colourings; planar graphs; face colourings and Hamilton cycles; directed graphs.
Prereq: C & O 351a

C & O 352a F,W,S 3C 0.5
Fundamentals of Optimization 1
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 or 231a/b

C & O 352b F,W 3C 0.5
Fundamentals of Optimization 2
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 352a

C & O 353a F,W,S 2C 0.5
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 or Math 231a/b

C & O 353b W 2C 0.5
Modelling and Optimization 2
An applications oriented course complementary to C & O 353a.
Prereq: C & O 353a
Course Descriptions
Combinatorics and Optimization

C & O 360a F 2C,1T 0.5
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

C & O 360b F 2C,1T 0.5
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
Coreq: Math 331a (or P Math 341a/b)

C & O 437a F,S 2C 0.5
Network Flow Theory
Prereq: C & O 352a

C & O 437b W 2C 0.5
Combinatorial Optimization
Prereq: C & O 437a or consent of instructor

C & O 438a F,S 3C 0.5
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: Polya's theorem and variations. Applications.
Prereq: Math 321a/b or 331a/b (or P Math 341a/b) and two of CS 140, CS 160, CS 240, 250

C & O 438b W 3C 0.5
Combinatorial Applications of Computers 2
Prereq: C & O 438a

C & O 446a F 2C 0.5
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: Third year standing

C & O 446b W 2C 0.5
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 for elementary number theory, a collection of outstanding problems in geometry (Fagnano, Seiner-Lehmus, Morley).
Prereq: Third year standing.

C & O 450a F 2C 0.5
Linear and Quadratic Programming 1
Prereq: Math 220a/b or 230a/b and C & O 352a

C & O 450b W 2C 0.5
Linear and Quadratic Programming 2
Algorithms. Conjugate directions, the basic projection algorithm for quadratic programming. The simplex method for linear programming as a special case. Numerically effective modifications of the projection method. Parametric cost and/or right-hand side algorithms.
The course is designed to be of particular interest to engineers, management scientists, economists, statisticians and operations researchers.
Prereq: C & O 450a

C & O 451a F 2C 0.5
Nonlinear Optimization 1
Recent algorithms for constrained and unconstrained optimization problems will be presented. Topics will include Newton, quasi-Newton, conjugate gradient, feasible direction, and penalty algorithms.
Recommended for students interested in operations research, industrial engineering, computer science and for those wishing to pursue graduate courses in mathematical programming.
Prereq: One of Math 322a, 322a, P Math 341a/b, CS 370, CS 371, CS 472, CS 474.
C&O 451b W 2C 0.5
Nonlinear Optimization 2
Nonlinear Programming; convergence conditions and
convergence rates for some unconstrained optimization
methods, introduction to the Kuhn-Tucker conditions
and duality theory for nonlinear programmes, optimality
conditions for a quadratic programme.
Prereq: C & O 451a or consent of the instructor

C&O 452a F 2C 0.5
Linear Programming
Integer and mixed-integer programming by cutting plane
methods, branch-and-bound and implicit enumeration.
Prereq: C & O 352a

C&O 452b W 2C 0.5
Numerical Linear Programming
Large scale systems. Numerically stable methods.
Decomposition. Non-simpex techniques. Applications
to large scale economic models, quadratic programming
and statistical problems.
Prereq: C & O 452a

C&O 453a F,S 2C 0.5
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 of parallel with homogeneous and heterogeneous
servers. Models incorporating customer behaviour
including balking, reneging and jockeying.
Prereq: Stat 230

C&O 454a F,S 2C 0.5
Game Theory 1
A mathematically-oriented course on the basis of game
theory, with applications to economics, bargaining, and
strategy. Classification of games; solution to matrix
games and their relationship to linear programming;
infinite zero-sum games; utility theory; bimatrix games
and the bargaining problem.
Prereq: Math 221a/b, or 231a/b; Stat 230; C & O 352a

C&O 454b W 2C 0.5
Game Theory 2
N-person games; Shapley value; metagames.
Prereq: C & O 455a

C&O 455a F 2C 0.5
Mathematical Programming 1
Dynamic Programming—deterministic decision
process problems; monotonic path problems, equipment
replacement, single and multi-dimensional
resource allocation, reduction of dimension by use of
Lagrange multipliers, optimal reliability, shortest path
problems, cargo loading problem, the travelling
salesman problem, introduction to optimal control, an
aggregate scheduling problem of inventory.
Prereq: C & O 352a or consent of instructor

C&O 455b W 2C 0.5
Mathematical Programming 2
Dynamic Programming—stochastic decision process
problems; stopping time problem, time delay, certainty
equivalence, stochastic path problems, series and
parallel feedback control, discrete time variational
problems, irregular problems.
Prereq: C & O 455a

C&O 456a F,S 2C,1T 0.5
Scheduling 1
Single machine job shops, parallel machines, flow-shop
scheduling, the general m/job shop. Capital budgeting,
distribution problems occurring in scheduling trucks,
trains, and in warehouse movements.
Prereq: C & O 352a or C & O 353a

C&O 456b W 2C,1T 0.5
Scheduling 2
Topics complimentary to those of C&O 456a.
Prereq: C & O 456a and C & O 352b

C&O 457a F 2C 0.5
Integer Programming
Integer programmes arising in practice. Modelling
techniques. Methods of solution, including an
introduction to Boolean methods. Problems with
special structure.
Prereq: C & O 352a

C&O 457b F 2C 0.5
Boolean Methods in Discrete Optimization
Elements of Boolean algebra, Boolean functions and
expressions. Implicants, prime implicants. Solving linear
programmes in 0-1 variables. Minimization of quadratic
functions. Monotonicities, assumability, thresholdness.
Applications to graphs, games. Theoretical and
algorithmic developments. Research problems.
Prereq: C & O 457a
C&O 458a  F  2C  0.5  
**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.

Recommended for students who have taken a course in graph theory and wish to study additional topics not normally covered in an introductory course.

Prereq: C&O 351a or consent of instructor

C&O 458b  W  2C  0.5  
**Graph Theory 2**

Continuation of topics covered in 458a

Prereq: C&O 458a

C&O 459a  Algebraic Graph Theory 1  
Not offered 1978-79

C&O 459b  Algebraic Graph Theory 2  
Not offered 1978-79

C&O 460a  W  2C  0.5  
**Enumerative Mathematics**

Enumerative Mathematics, Combinatorial identities, generating functions, counting of labelled and unlabelled objects. theorems of Polya, Redfield-Read and de Bruijn, permanents, combinatorial decompositions.

Recommended as a useful preliminary for Math 785 "Planar graphs" and Math 792 "Enumerative combinatorial theory".

Prereq: C&O 360b

C&O 460b  W  2C  0.5  
**Combinatorial Design**

This is a continuation of C&O 460a. Topics covered include error correcting codes, resolvable designs, affine designs, weighing matrices, and their interaction.

Prereq: C&O 360a or consent of instructor

C&O 499  F.W.S  2R  0.5  
**Readings in Combinatorics and Optimization**

Prereq: Consent of department.

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**Department of Computer Science**

**Course Descriptions**

**Note**

Course descriptions are given under the new department course number introduced in 1976. More detailed course descriptions and course outlines are available upon request from the Computer Science Department.

CS 112,  F,W  2C,1T  0.5  
**Introduction to Solving Business Problems 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 procedure-oriented languages (FORTRAN IV and/or BASIC); execution of these programs using several systems.

Prereq: none

Note

Credit will only be granted for one of CS 112, CS 116, CS 118 or CS 140.

CS 112 cannot be counted for credit toward a BMath degree.

CS 113  W  3C  0.5  
**Modelling & Simulation for Business Applications**

An introduction to the techniques of modelling, simulation and analysis of business systems. Simulation is developed as an effective tool for studying various types of business system environments. Students will be required to develop and run simulation models using both GPSS and DYNAMO programming languages.

Prereq: CS 112 or the equivalent. An introductory statistics course

Note

CS 113 cannot be counted for credit toward a B Math degree.

CS 114  W  2C  0.5  
**The Computing Process**

For students who must have an understanding of the terminology, hardware (computing machinery), software (computer programs), and financial and management aspects of the computing process. Topics include: development of computing machinery and programming languages; methods of job processing; development and maintenance of application programs; organization and management of a computer installation; use of specialized applications packages.

Prereq: CS 112 or the equivalent

Note

Credit will only be granted for one of CS 114, CS 117 or CS 250.

CS 114 cannot be counted for credit toward a B Math degree.
CS 115  F,W  2C,2T  0.5
Introduction to File Processing
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 712 or the equivalent

Note
Credit will only be granted of one of CS 115 or CS 180. CS 115 cannot be counted for credit toward a B Math degree.

CS 116  F  2C,1T  0.5
Introduction to Computers
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, representation of information, programming in a higher level language, concept of a compiler.
Prereq: none

Note
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 B Math General or Honours degree.

CS 117  W  2C,1T  0.5
Applications and Implications of Computers
A continuation of the concepts introduced in CS 116—the applications of computers to several fields and the impact (past, present and future) of computing on society.
Prereq: CS 116 or the equivalent

Note
Credit will only be granted for one of CS 114, CS 117 or CS 250. CS 117 cannot be counted as a credit toward a B Math General or Honours degree.

CS 118  F,W,S  2C,2T  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.

Note
Credit will only be granted for one of CS 112, CS 116, CS 118 or CS 140.

CS 140  F,W,S  3C,2T  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.

Note
Credit will only be granted for one of CS 112, CS 116, CS 118 or CS 140.

CS 180  F,W  2C,2T  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.

Note
Credit will only be granted for one of CS 112, CS 116, CS 118 or CS 140.

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.

Note
Students in honours mathematics will not be given credit for this course.
CS 240 F,W,S 2C,2T 0.5
Principles of Programming Languages and Data Structures
This course covers a number of basic principles of programming languages and data structures. The emphasis will be on fundamental concepts, including block structure, recursion, text processing, and pattern matching, with motivation for programming languages arising from practical examples. ALGOL and SNOBOL will normally be the languages used.
Prereq: CS 140 or CS 180 or the equivalent. CS 250 is recommended.

CS 250 F,W,S 2C,2T 0.5
Introduction to Computer Science - Characteristics of Computers
Introduction to machine and assembly language programming and basic machine architecture. Addressing modes, indexing and indirection, 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

Note
Credit will only be granted for one of CS 114, CS 117 or CS 250

CS 330 F,W,S 2C 0.5
Computer Applications In Business
A discussion of algorithms for the storage and retrieval of information using storage media such as discs 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

Note
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
A continuation of the topics presented in CS 330.
Prereq: CS 330

Note
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

Note
Credit will only be granted for either CS 340 or for courses in the CS 330/331 sequence.

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 Turning 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
Prereq: CS 250

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 or 230a/b and Math 221a/b or 231a/b.
CS371 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 CS370, 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 or 230a/b and Math 221a/b or 231a/b

CS442 F,W,S 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

CS446 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

CS448 W 3C 0.5
Introduction to Database Management
The course introduces the student to the techniques that have been developed for processing very large collections of data. The requirement that data be held on secondary storage (discs and tapes) has an enormous impact on the design of algorithms to access that data. Prereq: CS 340 and CS 350

CS450 F,S 3C 0.5
Computer Architecture
The course is intended to prepare the student to choose a suitable computer for a given application. Review of 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

CS452 F,W,S 3C 0.5
Real Time Applications of Minicomputers
This course is intended to give students experience with mini-computers 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

CS454 F,W,S 3C 0.5
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 multiprogramming; operating system nucleus, file systems; reliability; protection; system performance, measurement and evaluation. Prereq: CS 340 and CS 350

CS456 W 3C 0.5
Data Communications
This course is intended to introduce students to the basic concepts of data communications, the computer communication interface, and new telecommunications services. Topics include: basic queueing 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, Stat 230/231, Stat 340 or C & O 453a

CS462 F,S 3C 0.5
Formal Languages and Parsing

CS464 W 3C 0.5
Computability and Recursive Function Theory
Models of the computational process as reflected by computers, linguistic systems, functional specifications, transformational systems, formal logic, etc. Equivalence of these models. Computational complexity for specific models and abstractions fitting all models. Formal reducibilities between computational problems, and the complexity of theses reducibilities. Prereq: CS 360

CS466 W 3C 0.5
Algorithm Design and Analysis
Design of good algorithms and analysis of the resources they consume. Lower bounds on the resource requirements of algorithms to compute certain functions. Problems from the following areas are discussed in this light: sorting and order statistics, data structures, arithmetic computations, the NP-complete problems. Prereq: CS 340. CS 360 is recommended.
CS 460 W 3C 0.5
**Programme Verification**
Methods of programme verification. Implications for structured programming. Inductive reasoning about recursive programmes and recursively defined data structures.
Prereq: CS 360

CS 472 W 3C 0.5
**Numerical Linear Algebra**
Prereq: CS 370

CS 474 F 3C 0.5
**Numerical Approximation**
Prereq: CS 371 and Math 332b

CS 476 F 3C 0.5
**Numerical Solution of Differential and Integral Equations**
Prereq: Consent of the instructor

CS 478 W 3C 0.5
**Numerical Solution of Partial Differential Equations**
Prereq: Consent of the instructor

CS 482 W 3C 0.5
**Business Systems Analysis**
Prereq: CS 330 and CS 331, or CS 340.

CS 484 F,W,S 3C 0.5
**Simulation**
Simulation techniques are used to study systems which do not lend themselves to analysis. Introduction to simulation; random number generators; stochastic processes; modelling; simulation programming languages; the GPSS language.
Prereq: Stat 220 or Stat 230 and CS 330 and CS 331, or CS 340 and fourth year standing.

Department of Pure Mathematics
Course Descriptions

Note
Course descriptions are given under the new department course numbers introduced in 1976.

P Math 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.

P Math 230b W 2C,1T 0.5
**Introduction to Pure Mathematics**
Similar to, but independent of, P Math 230a.

P Math 341a F,S 3C 0.5
**Algebra**
Fundamentals of group, ring, field theory, and other algebraic structures.
Coreq: Math 231a.

P Math 341b W 3C 0.5
**Algebra**
Continuation of P Math 341a
Prereq: P Math 341a

P Math 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, diferentiation, and integration.
Prereq: Math 230a, b

P Math 351b W 2C,1T 0.5
**Real Analysis 1b**
Continuation of P Math 351a
Prereq: P Math 351a

P Math 352a F,S 2C,1T 0.5
**Complex Analysis 1a**
Analysis of complex numbers; fundamental theorems of holomorphic functions; meromorphic functions.
Prereq: Math 230a,b
P Math 352b W 2C, 1T 0.5
Complex Analysis 1b
Continuation of P Math 352a
Prereq: P Math 352a

P Math 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.

P Math 362 F 3C 0.5
Projective Geometry
Projective spaces over fields, collineations and correlations, quadric curves and surfaces. References to non-euclidean geometries.
Prereq: Math 231

P Math 365/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 231

P Math 365/AM 362 F 2C, 1T 0.5
Elementary Differential Geometry and Tensor Analysis
Curves in Euclidean 3-space (E³) and the Serret-Frenet formulas; 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 230, or consent of instructor

P Math 367 F 3C 0.5
Topology
Intuitive set theory, metric spaces, point set topology.

P Math 399
Readings in Pure Math

P Math 430a F, S 2C, 1T 0.5
Introduction to Mathematical Logic
Prereq: Consent of instructor

P Math 430b W 2C, 1T 0.5
Introduction to Mathematical Logic
Continuation of P Math 430a. Gödel’s incompleteness theorem (in outline). Logicism, intuitionism, formalism. Selected topics (some of intuitionistic logic, modal logic, the representation theorem for Boolean Algebras normally are treated).
Prereq: P Math 430a

P Math 432a F 2C 0.5
Mathematical Logic
First order languages and theories. This course is more specialized and at a more advanced level than P Math 430.

P Math 432b W 2C 0.5
Mathematical Logic
Continuation of P Math 432a. A treatment of at least one of the following: set theory, model theory, undecidability.
Prereq: P Math 432a

P Math 441a F 2C 0.5
Theory of Numbers 1
Multiplicative-algebraic theory of numbers. Foundations of natural number theory. Elements of additive-combinatorial number theory.
Coreq: Math 331 or P Math 341

P Math 441b W 2C 0.5
Theory of Numbers 2
Continuation of Theory of Numbers 1
Prereq: P Math 441a

P Math 443 F 2C 0.5
Lattice Theory 1
Ordered sets, lattices, and Galois connections. Applications in algebra, geometry and logic.
Prereq: Consent of instructor

P Math 444b W 2C 0.5
Lattice Theory 2
Continuation of Lattice Theory 1
Prereq: P Math 444a

P Math 445a 2C 0.5
Ring Theory 1
Continuation of the theory of rings and modules.
Prereq: P Math 331 or P Math 341

P Math 445b 2C 0.5
Ring Theory 2
Continuation of Ring Theory 1
Prereq: P Math 445a

P Math 446a F 2C 0.5
Group Theory 1
Permutations, Cayley Theorem, Sylow Theorem, Jordan-Hölder Theorem, nilpotent and solvable groups, direct and semidirect products, free groups.
Coreq: Math 331 or P Math 341
P Math 446b  W  2C  0.5
**Group Theory 2**
Continuation of Group Theory 1
*Prereq: P Math 446a*

P Math 447a  2C  0.5
**Field Theory 1**
Field extension and Galois theory.
*Prereq: Math 331 or P Math 341*

P Math 447b  2C  0.5
**Field Theory 2**
Continuation of Field Theory 1
*Prereq: P Math 447a*

P Math 451a  F  2C  0.5
**Real Analysis 2a**
An introduction to integration and measure theory with emphasis on the real line.
*Prereq: P Math 332a or P Math 351*

P Math 451b  W  2C  0.5
**Real Analysis 2b**
Continuation of Real Analysis 2a.
*Prereq: P Math 451a*

P Math 452a  F  2C  0.5
**Complex Analysis 2a**
Further properties of holomorphic and meromorphic functions. Riemann surfaces.
*Prereq: Math 332b or P Math 352*

P Math 452b  W  2C  0.5
**Complex Analysis 2b**
Continuation of Complex Analysis 2a
*Prereq: P Math 452a*

P Math 461  W  2C  0.5
**Finite Geometries**
*Coreq: P Math 362*

P Math 462  **Foundations of Geometry**
Not offered 1978-79

P Math 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: P Math 365/AM 362 or consent of instructor*

P Math 464  W  2C  0.5
**Algebraic Geometry**
An introduction to the theory of algebraic varieties. Special topics such as the Theorem of Riemann-Roch.
*Prereq: Math 331 or P Math 341*

P Math 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: P Math 463/AM 463, or consent of instructor*

P Math 466  **Combinatorial Topology**
Not offered 1978-79

P Math 467  W  2C  0.5
**Topology 2**
Continuation of general topology; selected topics from other branches of topology.
*Prereq: P Math 367*

P Math 470  Y  2C  1.0
**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.

P Math 499
**Readings in Pure Math**

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**Department of Statistics**

**Course Descriptions**

**Note**
Course descriptions are given under the new departmental course numbers introduced in 1976.

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.

**Note**
Stat 202 is for Science Students only.

Stat 204  F  2C,1L  0.5
**Statistics for the Physical Sciences 1**

**Note**
Stat 204 is for Science students only.
Stat205  W  2C,1L  0.5
Statistics for the Physical Sciences 2
Prereq: Stat 202 or 204

Note
Stat205 is for Science students only

Stat210  F,W  3C,1T  0.5
Applied Probability and Statistics

Note
This course is for students in Mechanical Engineering, and is cross listed in Management Sciences as MSci 21.

Stat220  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 120 or Math 130, one of CS 116, CS 118, CS 140.

Note
Stat220 is not open to Honours Mathematics students. Credit will be given for only one of Stat220, 230.

Stat221  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: Stat220 or 230

Note
Stat221 is not open to Honours Mathematics students. Credit will be given for only one of Stat221, 231.

Stat230  F,W,S  3C,1T  0.5
Probability
The laws of probability, discrete and continuous random variables, expectation, central limit theorem.
Prereq: Math 120 or Math 130.

Note
Credit will be given for only one of Stat220, 230.

Stat231  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.

Note
Credit will be given for only one of Stat221, 231.

Stat270  F,W,S  3C  0.5
Mathematics of Investment
The theory of rates of interest and discount. Annuities and sinking funds with practical appreciations to mortgage and bond questions. Yield rates.

Note
Only one of Stat 270, 273 can be taken for credit. Students planning to enroll in Honours Actuarial Science must take Stat 273.

Stat273  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: First year calculus.

Stat284  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: Stat270 or 273

Stat300  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.

Note
Stat300 cannot be taken for credit towards a Mathematics degree.

Stat330  F,W  3C  0.5
Introduction to the Theory of Statistics
Prereq: Stat221 or 231
Note
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 231 or the equivalent.

Note
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 231 or the equivalent.

Note
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

Note
Credit will be given for only one of Stat 330, 340

Stat 340 F, S 3C 0.5
Probability and Stochastic Processes 1
Prereq: Stat 221 or 231

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 t, chi-squared, and F, and their applications. Large sample theory.
Prereq: Math 230, Stat 231 or consent of instructor

Note
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 231

Note
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 numerical analysis.

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

Note
Credit will be given for only one of Stat 430, 452.

Stat 431 F, S 3C 0.5
Experimental Design 2
Factorial experiments, confounding, fractional replication. Applications of designs. Incomplete block designs. Analysis of covariance.
Prereq: Stat 430

Note
Credit will be given for only one of Stat 431, 453.
Course Descriptions
Statistics

Stat440  F,S  2C  0.5
Exploratory Data Analysis
Prereq: Stat331 or 351, and ability to programme in FORTRAN.

Stat442  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: Stat221 or 231; Math 220 or 230

Stat444  S  2C,1S  0.5
Statistical Methods with Socio-Economic Applications 1
Prereq: Stat331 or 351

Stat445 Statistical Methods with Socio-Economic Application 2
Not offered 1978-79
Prereq: Stat 444

Stat450  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: Stat350/1

Stat451  W  2C  0.5
Statistical Inference with Small Samples
Logic of 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 permission of instructor

Stat452  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: Stat331 or 351 or consent of instructor.

Note
Credit will be given for only one of Stat 430, 452.

Stat453 Theory of Experimental Design 2
Not offered 1978-79
Prereq: Stat452 or consent of instructor

Note
Credit will be given for only one of Stat 430, 453

Stat454  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: Stat331 or 351

Stat455 Sample Survey Design
Prereq: Stat 454
Not offered 1978-79

Stat464  W  2C  0.5
Topics in Probability Theory
Prereq: Stat340/1 or consent of instructor

Stat466 Topics in Statistics 1
Prereq: Stat350/1 or consent of instructor
Not offered 1978-79

Stat467 Topics in Statistics 2
Not offered 1978-79

Stat468 R  0.5
Readings in Statistics 1
Note
May or may not be offered 1978-79. See pre-registration lists.

Stat469 R  0.5
Readings in Statistics 2
Note
May or may not be offered 1978-79. See pre-registration lists.

Stat470 F  3C  0.5
Seminar in Actuarial Mathematics 1
Selected topics for the advanced actuarial student.
Note
May or may not be offered 1978-79. See pre-registration lists.

Stat474 F,S  3L  0.5
Advanced Topics in Actuarial Mathematics
Topics in Actuarial Mathematics for students intending to take the professional examinations.
Prereq: Stat284, 374, 384, or consent of instructor
**Mathematics Electives**

**Stat475** 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: Stat273, 284, or consent of instructor

**Stat476** 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 or coreq: Stat284 or consent of instructor

**Stat477** F,S 3C 0.5  
**Risk Theory 1**
Prereq: Stat330, Math332b or consent of instructor.

**Stat480** W 3C 0.5  
**Seminar in Actuarial Science 2**
Selected topics for the advanced actuarial student.  
Prereq: Consent of instructor

**Stat486** W 3C 0.5  
**Graduation of Life Tables**
Methods for determining the underlying trends and eliminating fluctuation in disease, disability, and death data.  
Prereq: Stat373

**Stat487** W 3C 0.5  
**Risk Theory 2**
Calculations of net premiums and reinsurance premiums. Ruin theory. Utility theory.  
Prereq: Stat 477

**Stat500** W 2C,lT 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

**Note**
Stat500 is intended for senior undergraduate and graduate students in faculties other than Mathematics. It cannot be taken for credit towards a Mathematics degree.

**Stat520** 1.0  
**Introduction to Mathematical Statistics**

**Note**
May or may not be offered 1978-79. See pre-registration lists.

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**Electives for Mathematics Students**

The following courses may be counted as non-mathematics electives by mathematics students.

**MTHEL100** F,W,S 2C 0.5  
**Commercial Law for Mathematics students**

**MTHEL206a** F 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.

**Note**
This course is offered only to students in the co-op Teaching Option.

**MTHEL302a** F 2C,1T 0.5  
**Applications of Mathematics to the Biological Sciences 1**
The course material has been selected with particular reference to some of the fundamentals of Medical Science including Macromolecular processes, Environmental Health, Genetics and aging processes and quantitative models which describe events in these areas. Theories and models for age-related changes: (i) Qualitative and quantitative changes in structural and functional proteins.

**MTHEL302b** W 2C,1T 0.5  
**Applications of Mathematics to the Biological Sciences 2**
Theories and models for age-related changes: (ii) Nucleic acids, genetics and cellular organization; (iii) Biochemical evolution.

**MTHEL303a** F,W,S 2C 0.5  
**Readings in Modern Mathematics**
A course based upon readings from the works of modern mathematicians selected to illustrate the nature of contemporary mathematics, its achievements, and its range of application. The course requirements will consist of prose reports upon assigned readings.  
Prereq: Consent of instructor

**MTHEL304a** F,W 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,W  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  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, standard and non-standard risks, and principles of reinsurance.  

No prereq

MTHEL 305b  W  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

AM111  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.

Math 101a  Number Systems and Functions (For Arts Students)  
Not offered 1978-79  
(Students are encouraged to take Math 103 instead.)

Math 101b  Geometry and Calculus (For Arts Students)  
Not offered in 1978-79  
(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.

Math 104  W  3C,1T  0.5  
Introductory Calculus (For students in Arts/Social Sciences)  

Note  
Math 103/104 are specially designed for students enrolled in Arts programmes and are normally not available to students with Grade 13 Mathematics or equivalent.

Math 105  F,W  3C  0.5  
Mathematics (For Environmental Studies Students)  
Quantitative analysis in environmental research. Elementary concepts in Algebra: notation, terminology, operations. Probability Theory. Permutations and Combinations, approaches to probability, dependent and independent events, conditional probability, distribution functions, including the Binomial, Poisson and Normal distributions, with applications to problems in Environmental Studies.

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.

Note  
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.

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.

Math 110b  W,S  3C,2T  0.5

Calculus 1b  (For Engineering Students)

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.

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.

Math 113  Y  3C,2T  1.0

Calculus  (For Arts and Science Students)

Math 114  F  3C,2T  0.625

Algebra and Vector Geometry  (For Engineering Students)

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 or equivalent

Math 211  F,W  2C,2T  0.5

Calculus 2  (For Electrical Engineers)
Differential calculus functions of several variables. Differential equations. Multiple integrals.
Prereq: Math 110a/b or equivalent

Math 212  F,S  2C,2T  0.5

Advanced Calculus  (For Electrical Engineers)
Prereq: Math 211

Math 213  Y  3C  1.0

Calculus  (For Science Students)
Prereq: Math 113

Math 215  F,W  3C  0.5

Differential Equations  (For Chemistry Students)
Prereq: Math 113

Math 216  F,S  3C  0.5

Differential Equations  (For Physics or Chemical Engineering Students)
Prereq: Math 113

Math 226  Y  2C  1.0

Elementary Differential Equations  (For Science Students)
Prereq: Math 113
**AM 405 Y 2C 1.0**

**Applied Analysis** (For Science Students)


**Prereq:** Consent of instructor.

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**Course Descriptions**

**Mechanical Engineering**

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**Department of Mechanical Engineering**

**Professor, Chairman of the Department**

D. J. Burns, BSc, PhD (Bristol), CEng, PEng

**Professor, Associate Chairman Graduate Studies**

C. E. Hermance, BE (Yale), MA, MSE, PhD (Princeton)

**Associate 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

**Professors**

S. A. Alpay, Dipl Ingr, Dr Ing (Berlin)

E. Brundrett, BSA (OAC), BASc, MASc, PhD (Toronto), PEng

M. B. Danard, BSc (UBC), MA (Toronto), PhD (Chicago)

D. French, BSc, CEng, PEng

E. L. Holmes, BSc (Bristol), MSc, PhD (Toronto), PEng

J. H. G. Howard, BSc (Queen's), MSc, PhD (Birmingham), PEng

H. W. Kerr, BASc, PhD (Toronto), PEng

H. R. Martin, BSc, MSC (Queen's Belfast), PhD (Nottingham), PEng

W. B. Nicoll, SB, SM (MIT), Engineer (Stanford), PhD (London), DIC (Imperial)

P. Niessen, BSc, (McMaster), MASc, PhD (Toronto), PEng

G. F. Pearce, BSc (UBC), MASc (Toronto), PEng

K. R. Piekarski, Dipl Ing (London), PhD (Cambridge), PEng

A. Plumtree, BSc, PhD (Nottingham), PEng, FIM

J. A. Schey, Dipl Ing, CSc (Budapest), PEng

D. M. R. Taplin, BSc (Aston), DPhil (Oxford), PEng

M. M. Yovanovich, BSc (Queen's), MS (Buf.), MSc (MIT), PEng

**Associate Professors**

K. G. Adams, BSc (Queen's), MASc, PhD (Waterloo), PEng

G. C. Andrews, BASc, MASc (UBC), 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 Brunswick), BASc (Toronto), MSc, PhD (Waterloo), PEng

K. G. T. Hollands, BASc (Toronto), PhD (McGill), PEng

W. M. Mansour, BSc (Cairo), MSc, PhD (Toronto)

U. H. Mohaupt, BASc, MSc, PhD (Waterloo), PEng

R. J. Pick, BASc (UBC), MSc (Imperial College), PhD (Waterloo), PEng
-course Descriptions

Mechanical Engineering

G. D. Raithby, BESc, MESc (Western), PhD (Minnesota), 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)
G. E. Schneider, BASc, MASc, PhD (Waterloo)
J. L. Tevaarwerk, BASc, MASc (Waterloo), PhD (Cambridge)

Adjunct Professors
R. G. R. Lawrence, QC
R. M. Pilliar, BASc (Toronto), PhD (Leeds)

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

ME01 F,W 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.

ME02 0.5
Statistics for Engineers (Equivalent to MSci 21)

ME03 S,F 3C,1T 0.5
Ordinary Differential Equations

ME04 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.

ME05 S,W 3C,1T 0.5
Partial Differential Equations

ME12 F,W 3C,1T 0.5
Dynamics

ME15 F,W 2C,3L 0.5
The Mechanical Behaviour of Materials
The relevance of materials engineering to the ascent of man, the internal structure of materials, electrical, magnetic and optical properties of materials, structure of imperfect solids, microscopy of materials, elasticity and anelasticity, stress-strain behaviour in metals, plasticity in metals, non-metallic behaviour, fracture of materials, improving materials.

ME19 F,W 2C,1D,1T 0.5
Mechanics of Deformable Solids 1

ME20 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 unsymmetrical bending, torsion of circular members, columns and stability, and virtual work.
ME21 3C,1L 0.5
Kinematics and Dynamics of Machines

ME22 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 gear.

ME30 S,F 2C,3L 0.5
Control of the Behaviour of Materials
The stability and control of micro-structure, phase diagrams, vacancies and diffusion, reaction rate theory, solid state transformations in materials, materials at high temperatures, alloying and strengthening, composite materials and bio-materials, environmental degradation of materials, review of materials engineering.

ME32 S,F 3C 0.5
Physical Metallurgy 2
Elasticity and plasticity of metals. Hardening mechanisms. Failure in metals.

ME33 F,W 6L 0.5
Experimental Materials Science
This course is designed to acquaint students with materials phenomena using an experimental approach. Microstructural changes and their effects on the mechanical properties in various materials will be studied using such techniques as optical and scanning electron microscopy together with electron probe microanalysis and X-ray analysis. The student may work on a project of his own choice provided it meets the objectives of this course.

ME35 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.

ME40 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.

ME44 F,W 3C 0.5
Production Engineering
Introduction to a number of problem areas in production/industrial engineering. Topics will be selected from product and process design including value analysis; location and layout of facilities; job design and work measurements; production planning, scheduling and inventory control; planning and control of large-scale projects; quality control; reliability and maintenance.

ME46 Polymer Processing
Not offered 1978-79

ME47 Analysis and Design of Manufacturing Systems
Not offered 1978-79

ME48 W†† 3C,2T 0.5
Analysis and Design of Manufacturing Systems 2
Analysis and design of the plant layout and materials handling systems as basic components of a manufacturing facility and system. Product range and mix and their effect on these systems. Proven systematic analysis and synthesis and evaluation techniques for efficient and effective plant design.

ME50 S,F 3C,1L 0.5
Thermodynamics

ME51 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.
ME52 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.
Prereq: M E 54

ME53 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.

ME54 F,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.

ME55 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.

ME56 W† 3C 0.5
**Internal Combustion Engines**
Reciprocating SI and CI engines, gas turbines, jets, rockets: principles of operation, modern developments (for pollution control and improvements in efficiency).
Prereq: M E 54

ME57 F,S 3C 0.5
**Energy Conversion**
Applications of fundamental principles of thermodynamics, fluid mechanics, combustion and heat transfer to the design of power plants using fossil and nuclear fuel heat sources. Economics and pollution problems associated with power equipment. Other energy conversion devices such as batteries, fuel cells, solar cells, thermionic and thermoelectric devices and MHD generators.
Prereq: M E 54

ME58 S,W 3C,2T 0.5
**Introduction to Control Systems**

ME59 S,W 3C 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.

ME60 S,W 3C,2T 0.5
**Tribology**
The science of friction, lubrication and wear. The topography and contact mechanics of real surfaces. The measurement of friction and wear. Friction and wear theories for elastic and plastic contact. Lubrication mechanisms; hydrostatic, hydrodynamic, elastohydrodynamic, boundary, extreme pressure, and solid film. Physical and chemical properties of lubricants. Bearings and their selection.

ME61 S,W 3C 0.5
**Introduction to the Environmental Sciences**

ME62 S,F,W 3L 0.5
**Mechanical Engineering Projects**
Engineering assignments requiring the student to demonstrate initiative and assume responsibility. Student activity is guided and co-ordinated by 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.
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 copy-right, 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. The ME 100Z section 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 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 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 523 W,S  3C  0.5
Mechanical Design 2
Principles of optimum design of machine elements; minimum cost, minimum weight, maximum power, etc. Statistical considerations in factors of safety and tolerances. Effect of manufacturing errors on product performance. Introduction to value engineering and reliability.
Prereq: ME 22

ME 524 Advanced Dynamics
Not offered 1978-79

ME 525  W  3C  0.5
Mechanical Vibrations in Machines

ME 527  W  3C  0.5
Mechanics of Deformable Solids 3

ME 528 Experimental Mechanics
Not offered 1978-79

ME 531  F,W  3C  0.5
Physical Metallurgy 1

ME 534  S  3C  0.5
Nonmetallic Materials
This course is designed to give an understanding of the behaviour of non-metallic materials for applications in mechanical engineering, including mechanical and other properties.

ME 541  F,S  4C  0.5
Deformation Process

ME 542  W††  3C  0.5
Mechanics of Machining Processes
ME 543 W 3C 0.5
Metal Casting Processes

ME 544 W 3C 0.5
Welding Processes
Static and dynamic design of welding details. Temperature distributions, distortion and residual stresses. Solidification in welding: Fracture modes and mechanical destructive tests.

ME 548 S,F 3C,4L 0.5
Numerical Control of Machine Tools

ME 555 Thermodynamics 3
Not offered 1978-79

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 560 S,F 2C,2T,3L 0.5
Instrumentation
Choice of instrumentation systems, sensing devices and conversion devices. Examples and experiments of techniques used in the measurement of flow, pressure, temperature, position, velocity acceleration, strain, sound, surface finish and dimensions.

ME 561 S,F 3C 0.5
Fluid Power Control System
ME570 W 3C 0.5
Atmospheric Dynamics
Hydrodynamic equations of motion on a rotating earth. Geostrophic balance in the atmosphere and oceans, vertical variation of wind and pressure fields in the atmosphere, mechanisms of pressure change, vorticity equation.

ME571 F,S 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.

† † The offering of this course is contingent on sufficient demand and/or available teaching resources.
Clinic Supervisors – Part-time (1977-1978)
W. A. Andrews, OD (College of Optometry of Ontario)
R. R. Bock, OD (College of Optometry of Ontario)
K. S. Chhatwal, OD (Waterloo)
A. N. Fruman, BA (Saskatchewan), OD (Waterloo)
G. A. Grant, OD (College of Optometry of Ontario)
R. M. Haber, BSc (Toronto), OD (Waterloo)
D. M. Hector, OD (Waterloo)
V. A. Kuraitis, OD (Waterloo)
P. E. Martinello, OD (Waterloo)
M. S. Munn, Dip Opt (College of Optometry of Ontario)
M. A. Oiffer, BSc (York University), OD (Waterloo)
R. J. Pace, OD (Waterloo)
J. Parr, OD (Waterloo)
J. S. Peaker, OD (Waterloo)
J. M. Robertson, Dip Opt (College of Optometry of Ontario)
V. M. Russell, OD (College of Optometry of Ontario), BA (Toronto)
R. L. Saari, OD (Waterloo)
L. E. Springer, OD (Waterloo)
N. Van Ymeren, OD (Waterloo)
W. Woolner, OD (Waterloo)

Clinic Residents (1977-1978)
D. R. Freson, BA, OD (Indiana)
J. F. Jantzi, OD (Waterloo)
R. Miller, OD (Waterloo)
R. Scheid, OD (Waterloo)
R. A. Wiggins, BS, OD (Indiana)

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, innervalional 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
Course Descriptions
Optometry

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

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 extracocular striate muscles, the lacrimal apparatus, the cornea, the iris, the lens, the ciliary body and the vitreous body. Production and drainage of aqueous and related influences on intraocular pressure. The vascular supply of the eye. Prereq: Optom 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 F 8 Clinic 0.5
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. No credit given until successful completion of Optom 418. 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. Prereq: Optom 401

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 418 W 18 Clinic 0.5
**Optometry Clinic**
A continuation of 408.
*Prereq: Optom 408*

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*

Optom 428 S 1.0
**Spring Clinic**
Each student is required to complete 120 hours of clinical practice during the spring term. Times will be arranged by the student with the approval of the clinic staff.
*Prereq: Successful completion of Year 4 programme.*

Optom 500 F 2C 0.5
**Optometrical Praxis**
Practice management, financial management, establishing a practice, interprofessional relations, office design, optometric assistants, professional associations.

Optom 501 F 3L 0.5
**Optometry Research Project**
Students with an interest in research may arrange with a professor to undertake a research project of mutual interest. This course serves as an alternative to Psych 357. Contact the course co-ordinator for details.

Optom 502 F 3C 0.5
**Advanced Contact Lens Practice**
A series of lectures and practical demonstrations of the principles and procedures of advanced contact lens materials and resources including their physiological implications.

**Pediatric Optometry**
Special aspects of the Management of vision problems of infants and young children are discussed.

**Course Descriptions**
Optometry

**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.
*Prereq: Optom 302, 312, 402, 412*

Optom 504 F 4C,1L 0.5
**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.
*Prereq: Optom 404, 405, 415*

Optom 508 F 24 Clinic 0.5
**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.
*No credit given until successful completion of Optom 518.*
*Prereq: Permission of Clinic Director*

Optom 509 F 4C 0.5
**Community Health Optometry**
Governmental and social aspects of health and vision care delivery are discussed in relation to the epidemiology of vision problems.

Optom 510 W 2C 0.5
**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
**Optometry Research Project**
A continuation of 501. This course serves as an alternative to Optom 513.
*Prereq: Optom 501*

Optom 512 W 3C 0.5
**Advanced Contact Lens Practice**
A continuation of Optom 502

**Visual Gerontology**
Aspects of the aging process on the visual system and the optometrical management of the visual problems of older persons.
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
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.

Peace and Conflict Studies
Assistant Professor, Director 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, RD (McMaster), PhD (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 (UBC)

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
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
389  Canada and World Affairs

Philosophy
125  Fundamentals of Social and Political Philosophy
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
225  Political Theory 1
226  Political Theory 2
281  International Politics 1
282  International Politics 2
321  Marxism 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
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
303 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
303 Crises in Social Structure and Character
331 Theories of Social Change
332 Social Conflict and Modernization
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 (Western Ontario), BTh (Huron),
PhD (Columbia)

Associate Professor, Associate Chairman
J. W. VanEvra, BA (Valparaiso),
MA, Ph (Michigan State)

Professors
E. J. Ashworth, BA, MA (Cambridge), PhD (Bryn Mawr)
T. L. Batke1, MASc, PhD (Toronto)
R. A. George, MA, PhD (Michigan State)
L. L. Haworth, BA (Rollins), MA, PhD (Illinois)
J. S. Minas, BA (Wayne), PhD (Illinois)
J. F. Narveson, BA (Chicago), MA, PhD (Harvard)
B. H. Suits, BA, MA (Chicago), PhD (Illinois)
J. W. Tucker1, 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) J
D. T. DeMarco, BS (Stonehill, Mass.), MA, PhD (St. John's) J
B. P. Hendley, BA (Marquette), MA, PhD (Yale)
J. Heurtas-Jourda, BA (Florida), MA, PhD (New York),
(part-time)
A. Kerr-Lawson1, BA (Toronto), MA (Chicago),
PhD (McMaster)
A. C. Minas, BA (Radcliffe), MA, PhD (Harvard)
D. D. Roberts, BA (Roosevelt), MA, PhD (Illinois)
A. C. Minas, BA (Radcliffe), MA, PhD (Harvard)
D. D. Roberts, BA (Roosevelt), MA, PhD (Illinois)

Assistant Professors
C. G. Brunk, BA (Wheaton), MA, PhD (Northwestern) G
G. T. Campbell, BA (Western Ontario), PhL, PhD (Laval) J
C. R. Girodat, BA (Western), MA (Detroit), PhD (Toronto) J
R. H. Holmes, BA, MA (Montana), PhD (Washington)
M. F. McDonald, BA (Toronto), MA, PhD (Pittsburgh)
J. Wubnig, BA (Swarthmore), MA, PhD (Yale)

Faculty members holding joint appointments as shown
1Department of Pure Mathematics
2Department of Chemical Engineering
Course Descriptions

Note 1
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. The Department will publish each Spring 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 2
Any full course or two half courses in Philosophy can be used to satisfy the group A(i) requirement.

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 an 'R' are administered by Renison 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 111 F,W 3C 0.5
Philosophy of Life
"Who am I?" "What can I hope for after death?" "How can I tell what do 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 125 F,W,S 2C,1D 0.5
Introduction to Social and Political Philosophy
Introduction to basic value-questions about society. Theories about the meaning and basis of rights, justice, and government are examined. Both classical writers (Hobbes, Mill, Marx) and contemporary writers (Rawls) may be used. Sample issues: civil disobedience, racial and sexual discrimination, and socialism versus capitalism.

Phil 135 F,W 3C 0.5
Introduction to Philosophy of Religion
A philosophical consideration of problematic aspects of religious belief. Topics to be discussed will include: attempts to prove the existence of God, the problem of evil, faith and reason, religious experience, and religious language. Classical and contemporary readings will be used.

Phil 140 F,W,S 3C 0.5
Introduction to Formal Logic
Elementary sentence and predicate logic. Translation from the 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, the critical assessment of information, common fallacies, problems of clarity and meaning.

Phil 150 F,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 3C 0.5
Philosophy of Women
A study of some of the issues raised by the Women's Liberation movement, such as the nature of Women and her rights and liberties in various contexts—family, childbearing, economic, political and social.

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 3C 0.5
Philosophical Literature
Certain works of literature will be studied for their relevance to philosophical problems. Those interested in this course may consult the Department regarding which works of literature are to be studied in any given year.
Phil221  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.

Phil222  W  3C  0.5

**Contemporary Ethical Theory**

Continues the history and discussion of ethics begun in Phil221 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. Phil221 recommended

Phil223  3C  0.5

**Moral and Social Philosophy**

An investigation of what constitutes the good life and the good society. Such topics as the role of reason, the nature of the good, right and wrong, justice, individual rights, ecology, human nature and animal behaviour are considered. Classical and contemporary readings. **Prereq:** Second year standing or consent of instructor.

Phil224  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.

Phil225  W  3C  0.5

**Social and Political Philosophy: Canadian Problems**

This is a philosophical study of various Canadian social and political problems such as foreign control, nationalism, the redistribution of wealth, native rights, and the War Measures Act. Canadian socialist, liberal, conservative, and anarchist approaches to such problems will be examined from a moral point of view. **Prereq:** Phil125 or consent of instructor.

Phil226  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:** Phil125, 221, 222, or consent of instructor

Phil235  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.

Phil236  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.

Phil240  Logic

*Not offered 1978-79*

Phil241  F,W  3C  0.5

**Intermediate Logic**

The course begins with a brief review of the materials covered in Phil 140. Axiom systems of logic are developed and compared with natural deduction procedures. Then certain properties of these logical systems, such as consistency, completeness, compactness, will be investigated. **Prereq:** Phil 140 or familiarity with elementary sentence and predicate logic

Phil242  F,W  3C  0.5

**Philosophical Logic**

The course begins with a brief review of the materials covered in Phil 140. Then systems of modal logic will be developed and applied to such philosophical problems as obligation, belief and knowledge, essentialism, future contingencies, existence of God. **Prereq:** Phil 140 or familiarity with elementary sentence and predicate logic

Phil243  F,W  3C  0.5

**Risk, Decision, Games, Amalgamation**

Fundamentals of probability and game theory. Problems of decision making 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 preferences. Some applications to the Social Sciences. **Prereq:** Phil140, 145 or consent of instructor

Phil250  Knowledge and Reality

*Not offered 1978-79*
Phil258 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.

Phil265 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.

Phil270/271 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.

Phil280 F 3C 0.5
History of Ancient Philosophy 1
From the beginnings to Plato.
Prereq: Second year standing or above, or consent of instructor

Phil281 W 3C 0.5
History of Ancient Philosophy 2
From Aristotle to the close of classical antiquity.
Prereq: Phil280

Phil282 F 3C 0.5
History of Modern Philosophy 1
Earlier period beginning with Descartes.
Prereq: Second year standing or above, or consent of instructor

Phil283 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. Phil282 recommended.

Phil284 3C 0.5
19th Century Philosophy
The 19th century. Philosophers covered may include Hegel, Mill, Schopenhauer, James, and Kierkegaard.

Phil285 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.

Phil300 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: eg., ethics and aesthetics.

Phil301 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 largely determined by student interest.
Prereq: At least second year standing or consent of instructor

Phil311 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

Phil312 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: Phil311 or consent of instructor

Phil321/324 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: Phil221/222. See Note 1

Phil325 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: One full or two half Philosophy courses

Phil326 3C 0.5
Political Philosophy 2
A detailed discussion of contemporary theories.
Prereq: Phil325, or consent of instructor
Phil 327 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, 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

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

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 3C 0.5
Epistemology 1
The first part of Phil 350.
Prereq: One full or two half courses in Philosophy

Phil 350B 3C 0.5
Epistemology 2
The second part of Phil 350.
Prereq: One full or two half courses in 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 Social Science
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 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 3C 0.5
Philosophy of Language
The first part of Phil 363
Prereq: At least second year standing or consent of instructor
Course Descriptions

Philosophy

Phil363B 3C 0.5
Linguistic Analysis
The second part of Phil363.

Note
Either Phil363A or Phil363B may be taken separately.

Phil365-366 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

Phil370-372 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

Phil380-389 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: Phil280/281 and 282/283. See Note 1

Phil390 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

Phil391 3C 0.5
Medieval Philosophy 2
The later period from the 13th century. Among those considered will be: Bonaventure, Aquinas, Scotus, and Ockham.
Prereq: Phil390

Phil398a-b R 0.5
Directed Reading in Special Areas
Prereq: Consent of instructor

Phil399 T 1.0
Tutorial for Honours Students
Students wishing to enrol in 399 should consult the Department.

Phil425 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

Phil435-439 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

Phil440-444 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: Phil240, 241, 242 or 340 or Math 346. See Note 1

Phil446 3C 0.5
Philosophy of History
Consideration of various possible views about ultimate nature of history and historical knowledge. Offered in sequence with Hist466.
Prereq: One full course equivalent in Philosophy, or consent of instructor

Phil455 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 Phil.

Phil465 3C 1.0
Existential Philosophy
An in depth study of the thought of some major existentialist figures such as Kierkegaard, Unamuno, Nietzsche, Heidegger, Sartre, Camus, Marcel, Jaspers, Ortega y Gasset.
Prereq: Consent of instructor

Phil470 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

Phil471-473 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?
Offered at St. Jerome's College

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 at St. Jerome's College

Phil 130J  W  3C  0.5
Philosophy of Discontent
A study of what some of the great philosophers have said
about the causes of discontent. Social disobedience and
the extent to which ethical principles can be altered to
accommodate changing conditions are possible topics
for discussion.
Offered at St. Jerome's College

Phil 200J  F,J  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.
Offered at St. Jerome's College

Phil 205J  F  3C  0.5
Philosophy of Nature
An examination of ancient and modern accounts of the
natural world. Problems include whether matter alone
can account for change, whether there is more than one
cause, whether nature operates by purpose or chance.

Phil 206J  W  3C  0.5
Philosophy of Science
A philosophical study of the approaches to the material
world used by contemporary physical science. The
nature and the value of the experimental method in the
writings of scientists past and present will be examined.

Phil 210J  F,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?
Offered at St. Jerome's College

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.
Offered at St. Jerome's College

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.
Offered at St. Jerome's College

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.
Offered at St. Jerome's College
Phil 237J  W  3C  0.5  
Ethics and Society
This course examines the nature and purpose of community living as well as such traditionally controversial issues as private and public morality, the individual good and the common good, personal freedom and group responsibility.
Offered at St. Jerome's College

Phil 260J  W,A  3C  0.5  
Issues in Higher Education
Why to to college? What are the present realities today in Canada? What is the role of the liberal arts? The primary interest will be upon what can be done in practice rather than upon ideal schemes.
Offered at St. Jerome's College

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.
Offered at St. Jerome's College

Phil 301J  W  3C  0.5  
The Western Philosophical Tradition (1600 - Present)
A continuation of 300J. Descartes to Existentialism.
Prereq: Second year standing.
Offered at St. Jerome's College

Phil 321J Canadian Philosophy
Not offered 1978-79

Phil 333J  Y  3C  1.0  
Contemporary Philosophical Problems in Art
An examination of some of the many philosophical problems especially in music, painting, and poetry, which confront today's artist as well as his audience. Traditional aesthetic categories are re-evaluated and contemporary philosophies of art considered.
Offered at St. Jerome's College.

Phil 349J Philosophy of Human Cognition
Not offered 1978-79

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 discussion.  
Prereq: Consent of instructor  
Offered at St. Jerome's College

Phil 399J  Y  1.0  
Tutorial
Students wishing to enrol in 399J should consult the College Department.  
Offered at St. Jerome's College

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  
Offered at St. Jerome's College

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  
Offered at St. Jerome's College

Phil 499J  Y  1.0  
Tutorial and Honours Essay
Students wishing to enrol in 499J should consult the College Department.  
Offered at St. Jerome's College
Course Descriptions

Physics

Physics

Department of Physics

Professor, Chairman of the Department
N. R. Isenor, BSc (Acadia), MSc, PhD (McMaster)

Professor, Associate Dean Graduate Affairs, Faculty of Science
R. A. Aziz, BA, MA, PhD (Toronto)

Professors
A. Anderson, MA, DPhil (Oxon)
G. A. Bakos, MA (Bratislava), MA, PhD (Toronto)
F. W. Boswell, BA, MA, PhD (Toronto)
D. E. Brodie, BSc, MSc, PhD (McMaster)
J. A. Cowan, BSc (Manitoba), MA, PhD (Toronto)
I. R. Dagg, BSc (Manitoba), MS (Penn State), PhD (Toronto)
J. Grindlay, BSc (Glasgow), DPhil (Oxon)
J. Kruuv, BASc, MSc (Waterloo), PhD (Western)
J. W. Leech, BS, PhD (London), FinstP
J. D. Leeslie, BASc (Toronto), MS, PhD (Illinois)
J. L. Ord, BASc (Toronto), MS, PhD (Illinois)
R. K. Pathria, BSc, MSc (Panjab), PhD (Delhi)

Recipient Distinguished Teacher Award
W. B. Pearson*, DFC, MA, DSc (Oxon), FRSC, FCIC

Adjunct Professor
M. L. Klein, BSc, PhD (Bristol)

Associate Professors
J. K. Brandon, BSc, PhD (McMaster), MA (Cantab)
J. M. Corbett, BASc (Toronto), MSc, PhD (Waterloo)
A. E. Dixon, BSc (Mt. Allison), MSc (Dalhousie), PhD (McMaster)
P. C. Eastman, BSc, MSc (McMaster), PhD (UBC)
H. K. Ellenton, BSc (Western), MA (Toronto)
M. P. FitzGerald, BSc, MSc (Toronto), PhD (Case)
D. Hemmings, BSc, PhD (Bristol)
C. C. Lim, BA (DePauw), MA (Nebraska), PhD (Toronto)
R. A. Moore, BSc, MSc (McMaster), PhD (Alberta)
H. M. Morrison, BSc, PhD (Edinburgh)
A. D. S. Nagi, BA, BSc, (Panjab), PhD (Delhi)
H. J. T. Smith, BSc, PhD (London)
B. H. Torrie, BASc (Toronto), PhD (McMaster)
K. A. Woolner, BSc (London)

Adjunct Associate Professor
L. A. A. Read, BA, MSc (McMaster), PhD (Waterloo)

Assistant Professors
J. R. Lepock, BS, MS (W. Virginia), PhD (Penn State)
D. R. Rayburn, BSc (Calgary), PhD (Queen's)
J. Vanderkooy, BEng, PhD (McMaster)

Research Assistant Professor
G. L. H. Harris, BA (Mount Holyoke), MA (Wesleyan), PhD (Toronto) (part-time)

Adjunct Assistant Professors
W. E. Harris, BSc (Alberta), MSc, PhD (Toronto)
P. G. Sutherland, BSc (McGill), MS, PhD (Illinois)

Senior Demonstrators
A. B. Haner, BSc, MSc (Waterloo)
D. S. McVicar, BSc (Waterloo)

Faculty members holding cross appointments as shown
*Chemistry and Physics
*Physics and Biology

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.

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 3C, 2T 0.5
Mechanics
For students in Year 1 Engineering
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.

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.
Course Descriptions

Physics

Phys 163  W  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. Cooperative students wishing to take the Phys 162/163 sequence must have their 1B term in the Winter.

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's law, potential, capacitance, properties of dielectrics, current, resistance, electromotive force, D.C. circuits and instruments.
Prereq: First year phys and calculus. Not for Hons. Phys students. 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 students. 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 students. 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.

Phys 227L  W  3L  0.25
Optics 2 Laboratory
For students taking Phys 227.
Lab. alternate weeks

Phys 243  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.
Course Descriptions
Physics

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 physics 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 physics 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 Physics 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
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
gases.
Prereq: First year Physics 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 physics and calculus. Recommended for
students in Hons. 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 Physics 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 Physics 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 physics and calculus. Coreq: Phys 259L

Phys 259L W,S 3L 0.25
Crystallography and X-Ray Diffraction Laboratory
For students taking Phys 259.
Lab. alternate weeks

Phys 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.
Phys 301 F 2C 0.5
**Physical Instrumentation for Biologists 1**
Optics and microscopy; interference, phase contrast, polarizing, dark field and ultraviolet microscopes; polarimetry, spectra, spectroscopic techniques, luminescence.
Prereq: First year phys. Physics students may not take this course for credit.

Phys 302 W 2C 0.5
**Physical Instrumentation for Biologists 2**
Radioactivity and the use of radioactive tracers, nuclear magnetic resonance, mass spectrometry, the ultracentrifuge and elementary electronic instrumentation.
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 Astrophysics 1
Not offered in 1978-79

Phys 351 Astrophysics 2
Not offered in 1978-79

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**
Basic A.C. circuit theory and equivalent circuits. An introduction to diodes, transistors and other solid state devices, power supplies and amplifiers.

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**
Application of feedback to operational amplifiers, oscillators and multivibrators. Analogue measurements. Survey of modern electronic circuits such as TV, FM or computer elements.
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 2C 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

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 phys course

Phys 359 W 3C 0.5
**Statistical Mechanics**
Prereq: Phys 358

Phys 360A F,G 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 phys, Math 113, 213 and 216. This course is primarily intended for Hons. Phys students.*

Phys 363  W  3C  0.5  
**Classical Mechanics 2**
*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 phys 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 phys 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 434B  W  3C  0.5  
**Quantum Mechanics**
*Prereq: Phys 434A*

**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 438  Geophysics  3
Not offered in 1978-79

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**Phys 441  Y  3C  1.0**
**Electromagnetic Theory**
A generalized treatment of the basic laws of electricity and magnetism, mathematical techniques for the problems of electrostatics, solution of Maxwell’s equations in free space and the study of plane waves, theory of waveguides and introduction to radiation.  
*Prereq: Phys 222-223 or Phys 252-253, Phys 364-365*

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**
*Prereq: Phys 364-365*

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 356*

Phys 445  F  3C  0.5
**Modern Optics**
*Prereq: Phys 256, Phys 354*

Phys 449  W  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 250-251*
Phys 450  F  3C  0.5
Astrophysics 3
Solar system astrophysics (excluding the sun). The physical nature of planetary (and satellite) surfaces, atmospheres and interiors. Asteroids, meteories 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  W,S  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 450 and Phys 451.

Phys 452  F  2C,3L  0.5
Digital Electronics
Fundamentals and advanced concepts of digital logic stressing practical uses of modern integrated circuit technology.
Prereq: Phys 352-353. 18 hours experiments

Phys 453  W  3C  0.5
Analog Circuits
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

Phys 454  F  3C  0.5
Mathematical Physics 3
Applications to Physics of the theory of functions of a complex variable.
Prereq: Phys 364-365

Phys 455  W  3C  0.5
Mathematical Physics 4
Theory and applications of integral transforms (Fourier, Laplace), integral equations and Green's functions.
Prereq: Phys 464

Phys 480  F  3C  0.5
Radiation Biophysics
The effect of radiation of various kinds on cells and tissues, exposure calculations, mechanism of damage, repair theories, genetic effects, target theory, isotopic tracers in biophysical research.
Course Descriptions
Political Science

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. Jupp, BSc, MSc, PhD (London), (Visiting, 1977-78)
J. E. Kersell, BA, MA (Queen's), PhD (London)
T. H. Qualter, BA (New Zealand), PhD (London)

Associate Professors
J. D. Fraser, BA (Cambridge), PhD (Leicester)
C. H. Grant, BA, MA (Leicester), PhD (Edinburgh)
A. D. Nelson, AB, AM, PhD (Chicago)

Assistant Professors
T. J. Downey, BA (Waterloo), MA, PhD (Western)
A. Kapur, BA (Panjab), MA (George Washington),
PhD (Carleton)
J. E. Surich, BA, MA (Waterloo), (part-time)
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 (UBC)

Course Descriptions

Note
Extensive descriptions of the content of Political Science
courses are available in the Department at the time of
pre-registration.

PSci 101 F 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 102A W 0.5
Imperialism in International Relations
A discussion of the idea of imperialism in ancient and
modern international relations, the causes and motives of
imperialism, changes in imperial strategies, and the
difference between the 'old' and the 'new' imperialism.

PSci 102B W 0.5
The ABC's of Parliament
A study of the origin, function, and evolution of the
parliamentary form of government in Great Britain and
modifications of the parliamentary model in the newer
societies outside of Britain, such as Canada and
Australia, and others.

PSci 102C W 0.5
Politics in Action
An examination of the way in which society's conflicting
demands are organized, articulated, and translated in
action. The part played by the various political and
economic forces in society will be examined in a
comparative framework.

PSci 102D W 0.5
The Political Process in the Modern Democracies
A study of power and influence in the modern
democracies, based on an examination of three
contending models of the political process—the
liberal-democratic or popular rule model, the pluralist
model, and the elitist model.

PSci 102E W 0.5
Political Rights and Obligations
An introductory examination of the idea of individual
rights as a limitation on legitimate governmental
authority, the possible grounds for such claimed rights,
and their relationship to political obligations (duties).

PSci 102H W 0.5
Citizen Participation in Canada
An investigation of the relationship between political
participation and democracy—exploring the question of
how much participation is good and the ways in which it
can be exercised—leading to an in-depth examination of
the distribution of power in Canada.

PSci 102K W 0.5
Mass Political Violence
A distinctive social feature of our century is the amount of
political violence. Man-made deaths number
approximately one hundred million. This course will
describe and evaluate various theories of political
violence.

PSci 102M W 0.5
Contemporary Issues in Canadian Public Policy
An evaluation of various public policy responses to some
contemporary Canadian social, cultural, economic,
environmental, and political problems, as well as the
process of policy-making.

PSci 214 W 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.
**PSci225** 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

**PSci226** 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

**PSci231** 0.5
**Politics and the Administrator**
A study of various political factors involved in administrative decision-making in the public and private sectors. Particular attention will be given to inputs from the general public, media, special interests, and institutions and agencies of government.
No prereq but prior completion of Econ 193 would be helpful

**PSci232** **Policy Making in Canada**
Not offered 1978-79

**PSci251** F 0.5
**Comparative Politics 1**
A survey of the principal historical and contemporary forces shaping politics in Western Europe, especially Britain, France, Germany, and Italy.
Prereq: Second-year standing

**PSci252** W 0.5
**Comparative Politics 2**
A continuation of PSci251, with an emphasis on cleavage structures and conflict in European and non-European political systems.
Prereq: PSci251

**PSci260** Y 1.0
**Canadian Government and Politics**
An analysis of the structure and practices of the Canadian political system.
Prereq: Second-year standing

**PSci260A** F 0.5
**Canadian Government and Politics 1**
The first half of PSci260, for students in co-operative programmes only.
No prereq for students in the second year and above

**Course Descriptions**
**Political Science**

**PSci260B** W 0.5
**Canadian Government and Politics 2**
The second half of PSci260, for students in co-operative programmes only.
Prereq: PSci260A or consent of instructor

**PSci262** 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

**PSci264** 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

**PSci268** 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

**PSci271** 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

**PSci272** W 0.5
**Political Behaviour 2**
An examination of the political attitudes and behaviour of men and women in different political systems.
Prereq: PSci271 or consent of instructor

**PSci281** 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

**PSci282** 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: PSci281 or consent of instructor
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSci291</td>
<td>0.5</td>
<td>The Canadian Legal Process</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>PSci292</td>
<td>0.5</td>
<td>Aspects of Canadian Law</td>
<td>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: PSci291 or consent of instructor</td>
<td></td>
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<tr>
<td>PSci293</td>
<td>0.5</td>
<td>Political Journalism</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>PSci311</td>
<td>0.5</td>
<td>Methodology of Political Science: The Foundations</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>PSci321</td>
<td>0.5</td>
<td>Marxist Theory</td>
<td>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</td>
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</tr>
<tr>
<td>PSci322</td>
<td>0.5</td>
<td>Marxism and Revolution After Marx</td>
<td>A selective study of developments in Marxist theory and political movements after Marx. Prereq: PSci321</td>
<td></td>
</tr>
<tr>
<td>PSci323</td>
<td>0.5</td>
<td>Ancient Political Philosophy</td>
<td>A selective examination of political philosophy during the classical period in Greece. Prereq: Consent of the instructor</td>
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</tr>
<tr>
<td>PSci324</td>
<td>0.5</td>
<td>Modern Political Philosophy</td>
<td>A selective examination of political philosophy in the modern period. Prereq: Consent of instructor</td>
<td></td>
</tr>
<tr>
<td>PSci327</td>
<td>0.5</td>
<td>Political Science and Political Values</td>
<td>An examination of the relationship of &quot;values&quot; to a proper science of politics. Prereq: Consent of instructor Alternates with PSci311</td>
<td></td>
</tr>
<tr>
<td>PSci331</td>
<td>0.5</td>
<td>Public Administration 1</td>
<td>An introduction to the principles of public administration illustrated by the study of Canadian institutions largely at the federal level, but including provincial and municipal examples. Prereq: PSci260 or consent of instructor</td>
<td></td>
</tr>
<tr>
<td>PSci332</td>
<td>0.5</td>
<td>Public Administration 2</td>
<td>Analyses of problems and issues in the field applying the knowledge gained in PSci331. Prereq: PSci331 or consent of instructor</td>
<td></td>
</tr>
<tr>
<td>PSci333</td>
<td>0.5</td>
<td>Provincial Politics</td>
<td>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: PSci260</td>
<td></td>
</tr>
<tr>
<td>PSci341</td>
<td>0.5</td>
<td>Politics in Quebec</td>
<td>A seminar dealing with the political and social development of Quebec. The emphasis will be on the problems and issues of contemporary Quebec. Prereq: PSci260 or 341 or consent of instructor</td>
<td></td>
</tr>
<tr>
<td>PSci342</td>
<td>W</td>
<td>0.5</td>
<td></td>
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<tr>
<td>PSci343</td>
<td>0.5</td>
<td>Canadian Municipal Government</td>
<td>A study of the assumptions, structures, and performance of municipal government in Canada with reference to metropolitan and regional structural innovations (particularly in Ontario). Open to students in the third year and above with at least one previous course in Political Science</td>
<td></td>
</tr>
<tr>
<td>PSci344</td>
<td>0.5</td>
<td>The Politics of Local Government</td>
<td>A study of the political process in selected Canadian cities focusing on citizen participation, internal decision-making, leadership, and the allocation of power. Prereq: PSci343 or consent of instructor</td>
<td></td>
</tr>
<tr>
<td>PSci345</td>
<td>Y</td>
<td>1.0</td>
<td></td>
<td></td>
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<tr>
<td>PSci346</td>
<td>0.5</td>
<td>The Politics of the Developing Areas</td>
<td>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</td>
<td></td>
</tr>
</tbody>
</table>
PSci350A  F  0.5
**The Politics of the Developing Areas 1**
The first half of PSci350.
No prereq for students in the third year and above

PSci350B  W  0.5
**The Politics of the Developing Areas 2**
The second half of PSci350.
No prereq for students in the third year and above

PSci352  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

PSci353  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:* PSci262 or consent of instructor

PSci354  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:* PSci353 or consent of instructor

PSci365  0.5
**Studies in Soviet Politics**
Selected topics in the theory and practice of Soviet politics, with some discussion of comparative Communist studies.
*Prereq:* PSci262

PSci371  0.5
**Political Culture**
An analysis of the development of the concept of political culture as an analytical tool.
*Prereq:* PSci271/272 or consent of instructor

PSci372  0.5
**The Political System**
An examination of the concept of system as applied to the study of politics.
*Prereq:* Consent of instructor

PSci373  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 PSci 251, 252, 260, 264, 262 or 268

PSci374  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 PSci 251, 252, 260, 264, 262 or 268

PSci380  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*

PSci380A  F  0.5
**World Politics 1**
The first half of PSci380.
*Open only to students in the third year and above*

PSci380B  W  0.5
**World Politics 2**
The second half of PSci380.
*Open only to students in the third year and above*

PSci390-398  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.

PSci411  **Theories and Methods of Political Science**
Not offered 1978-79.

PSci424  0.5
**Contemporary Socialist and Communist Thought**
This course examines recent trends in Marxist theory and its contribution to the analysis of capitalist and socialist societies.
*Prereq:* Consent of instructor

PSci425  0.5
**English Political Theory of the Nineteenth Century**
A survey of the development of English Liberal thought from the philosophic radicals through J. S. Mill to T. H. Green.
*Prereq:* Consent of the instructor

PSci426  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 PSci 221, 222, 323 or 324, or consent of instructor*
PSci 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: PSci 221, 222, 323 or 324

PSci 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

PSci 431 0.5
Canadian Public Policy 1
An examination of the policy initiatives as taken, for example, by the cabinet and the bureaucracy itself; how policy initiatives and related information are processed at the federal level by departments, the Privy Council Office, cabinet committees, etc.
Prereq: PSci 260 or 331/332 or consent of instructor

PSci 432 0.5
Canadian Public Policy 2
A study of the internal controls and external influences on the federal bureaucracy in its role of policy implementation.
Prereq: PSci 431 or consent of instructor

PSci 434 0.5
Canadian Foreign Policy
A seminar devoted to the courses, factors and challenges of Canadian foreign policy. Some attention will be paid to how policy is made. The general patterns may, if students wish, be illustrated by case studies of major contemporary issues.
Prereq: Consent of the instructor

PSci 435 0.5
The Politics of Canadian Resource Development
A seminar focussing on the strategies of resource development policies, with an emphasis on the economic, political, environment, and cultural implications of oil, natural gas, and mineral exploitation.
Prereq: Consent of instructor

PSci 442 0.5
Politics in Ontario
A critical examination of the distinctive elements of government and politics in the Province of Ontario.
Prereq: PSci 260 or 341 or consent of the instructor

PSci 443 0.5
Politics in Western Canada
A critical examination of the distinctive elements of government and politics in the provinces of Manitoba, Saskatchewan, Alberta, and British Columbia.
Prereq: PSci 260 or 341 or consent of instructor. Alternates with PSci 445

PSci 445 0.5
Politics in the Atlantic Provinces
A critical examination of the distinctive elements of government and politics in the provinces of Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick.
Prereq: PSci 341, Alternates with PSci 443

PSci 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: PSci 251 or consent of instructor

PSci 458 0.5
The Third World
This course deals with the Third World primarily in the international context. As the problems of this group of countries are on a large scale and very diverse, they will be examined on a comparative basis.
Prereq: PSci 350 or consent of instructor

PSci 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

PSci 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 prerequisite PSci 461

PSci 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

PSci 473 0.5
Voting Behaviour
Prereq: PSci 214, 373 or consent of instructor

PSci 475 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
Course Descriptions
Political Science/Psychology

PSci 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

PSci 478 Research Seminar in Political Socialization
Not offered 1978-79

PSci 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: PSci 380 or consent of instructor

PSci 485 0.5
International Politics of Asia
This course examines Asia’s emergence after 1945. The role of the superpowers in Asia is assessed in relation to behaviour of selected middle and small states.
Prereq: Consent of the instructor

PSci 490-498 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.

PSci 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

Professor, Chairman of the Department
R. K. Banks, BA, MA, PhD (Toronto)

Associate Professor, Associate Chairman
Undergraduate Affairs
G. A. Griffin, BA (Colgate), MA, PhD (Wisconsin),
Recipient of the Distinguished Teacher Award.

Associate Professor, Associate Chairman
Graduate Affairs
T. G. Waller, BS, MS, (Southern Mississippi),
PhD (Vanderbilt)

Professors
G. A. Barnard, BA, MA (Cambridge), PhD, DSc (London)
K. S. Bowers, BA, PhD (Illinois)
M. Breidenbaugh, BA (Wittenberg), PhD (Vienna)
M. P. Bryden, BS (MIT), MSc, PhD (McGill)
W. C. Corning, BA (Heidelberg), PhD (Rochester)
D. P. Crowe, 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 (Mass)
M. Kinsbourne, BA, MA (Oxford), BM, BCh (Guy’s Hospital), DM (Oxford), (part-time)
C. K. Knapper, BA (Sheffield), PhD (Saskatchewan)
H. M. Lefcourt, BA (Antioch), MS, PhD (Ohio State)
M. Lerner, BA, MA, (Ohio State),
PhD (New York University)
D. Meichenbaum, AB (City College of New York),
MA, PhD (Illinois)
P. M. Merkle, BA (Knox), MA, PhD (Virginia)
S. Reins, MD, CSc (Charles University)
P. M. Rowe, BA (Toronto), MA (Dalhousie), PhD (McGill)
D. A. Sprott, BA, MA, PhD (Toronto), FSS
R. A. Steffy, BA (Albright), MA, PhD (Illinois)
M. D. Vogel-Sprott, BA (McMaster), MA, PhD (Toronto)

Associate Professors
D. M. Amoroso, BA, MA (Toronto), PhD (Waterloo)
J. M. Anglin, BA (Toronto), PhD (Harvard)
T. E. Cadell, BA (UBC), MSc (Massachusetts), PhD (Wisconsin)
J. A. Cheyne, WLU, MA, PhD (Waterloo)
J. M. Cornell, BA, MS, PhD (Washington)
J. G. Holmes, BA, MA (Carleton), PhD (North Carolina)
G. E. MacKinnon, BA (Queen’s), PhD (John Hopkins)
R. G. Martinuk, BPE, MA (Alberta), EdD (California)
P. J. Naus, BA, PhD (Nijmegen)
J. E. Orlando, BA (Western Ontario), MA (Detroit), MA, PhD (Michigan)
H. Ross, BA (Toronto), PhD (North Carolina)
Course Descriptions

Psychology

Psych 101 F,W,S,J 3C 0.5
Introductory Psychology
A general survey course designed to provide the student with an understanding of the basic concepts and techniques of modern psychology as a behavioural science.
Also offered through Renison College and St. Jerome's College

Psych 102 F,W,S,A, 3C 0.5
Introductory Psychology Special Topics
A more in-depth study of selected topics introduced in Psych 101.
Prereq: Psych 101. Also offered through Renison College and St. Jerome's College

Psych 203 F,W 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 206 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
Developmental Psychology
An examination of the process and factors of human development.
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
Offered at St. Jerome's College
Course Descriptions
Psychology

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  F,W  3C  0.5
A Psychological Analysis of Human Sexuality
This course will examine psychological and social psychological theories and empirical investigations of human sexuality.
Prereq: Psych 101 or permission of instructor
Offered at St. Jerome's College

Psych 241  F,W,S,J  3C  0.5
Educational Psychology: The Psychology of Classroom Learning
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 Renison College and St. Jerome's College

Psych 242  F,W,S  3C  0.5
Educational Psychology: Learning Disabilities
Analyses of learning disabilities associated with various categories of exceptionality including mental retardation, emotional problems, and receptive and expressive handicaps.
Prereq: Psych 101
Also 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
Also offered at St. Jerome's College

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 Principles and Evolution of Psychoanalytic Thought
Not offered 1978-79

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 275  Y,M  3C,1T  1.0
Statistics and Measurement
An introduction to basic statistical concepts and to the theory and use of psychological tests. Consideration is given to the assessment of personality, intelligence, aptitudes, and interests, and to the analysis of individual and group differences in behaviour.

Psych 275A  F,J  3C,1T  0.5
Statistics and Measurement
(Part 1 of 275)

Psych 275B  W,A  3C,1T  0.5
Statistics and Measurement
(Part 2 of 275)

Psych 283  F,W  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 284  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 283
Psych 285  F  3C,1T  0.5
Tests and Measurements
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 283

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 283 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 283 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 283 and Psych 261

Psych 305  W  3C  0.5
Sensory Processes
A consideration of data and theory concerning sensory processes. Topics will include psychophysical methodology, sensory mechanisms and the neuropsychological basis of perception.
Prereq: Psych 206

Psych 307 Cognitive Neurology
Not offered 1978-79
Cross listed as Kin 456 which is offered in 1978-79

Psych 311  W  3C  0.5
Behaviour and Development of Human Infants
An inquiry into the behaviour and development of human infants in the first two years of life, with emphasis on the implications of current research and theory for infant care.
Prereq: Psych 211 or permission of instructor

Psych 316 Moral Development
Not offered 1978-79

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 285

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 340  Y  3C  1.0
Community Psychology
Theory and practice are integrated in an attempt to identify and to understand the social factors which inhibit or facilitate healthy development of the individual. The adequacy of existing social structures and institutions in the treatment of various personal problems is assessed.
Prereq: Psych 253
Offered at St. Jerome's College

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*
*Offered at St. Jerome's College*

Psych 357  F,W  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*
*Also offered at St. Jerome's College*

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 372  W  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 275 or 283 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 283 and 211*

Psych 395  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 283 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 283 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  2S  0.5  
**Senior Seminar In Development Psychology**
Admission by consent of instructor.

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.
Psych456  W  2S  0.5
Senior Seminar in Personality
Admission by consent of instructor
Offered at St. Jerome's College

Psych457  F,W  2S  0.5
Senior Seminar in Clinical Psychology
Admission by consent of instructor
Offered at St. Jerome's College

Psych458  F  2S  0.5
Senior Seminar in Cognitive Processes
Admission by consent of instructor

Psych459  W  2S  0.5
Senior Seminar in Motivation
Admission by consent of instructor

Psych461  W  2C  0.5
Senior Seminar in Physiological Psychology
Admission by consent of instructor

Psych462  F  2S  0.5
Senior Seminar in Animal Behaviour
Admission by consent of instructor

Psych463  2S  0.5
Senior Seminar in Special Topics
Admission by consent of instructor

Psych464  2S  0.5
Senior Seminar in Special Topics
Admission by consent of instructor

Psych465  2S  0.5
Senior Seminar in Special Topics
Admission by consent of instructor

Psych466  2S  0.5
Senior Seminar in Special Topics
Admission by consent of instructor

Psych480  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

Psych498  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

Psych499  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.

Psych120R/121R  F,W  3C,3C  0.5,0.5
Introductory Psychology

Psych220R  F  3C  0.5
Social Psychology

Psych221R  W  3G  0.5
Interpersonal Interaction

Psych322R  F  3C  0.5
Personality (Personality Theory)

Psych323R  W  3C  0.5
Abnormal Psychology (Psychopathology)

Psych367R-369R
Special Topics in Psychology

Psych369R  W  3C  0.5
Advanced Topics in Counselling Psychology

Psych370R  F  3C  0.5
Cross-Cultural Psychology

Psych398R/399R  S,F,W/S,F,W  R  0.5/0.5
Independent Study
(Open to senior Social Development Studies majors only)
Course Descriptions

Recreation

Course Descriptions

Rec 100  F  3C  0.5
Introduction to the Study of Leisure and Recreation
A course designed to develop an overview of the total field of recreation and an understanding of the leisure phenomena and the implications for contemporary society.

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  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 204  F  3C  0.5
Leisure and Recreation in Historical Perspective
Analysis of socio-cultural determinants which have influenced Canadian Leisure behavior. 
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 W 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 F 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 F 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 F, 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 W 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 or W 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 W, 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 304 W 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 305 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 S 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*
Rec316 W 3C 0.5
Principles of Recreation Planning (Plan 344)
An exploration of alternative approaches to the planning of recreation opportunities in urban-centred 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

Rec320 W 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

Rec321-324 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

Rec331 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

Rec332 F 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

Rec334 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

Rec361 W 3C 0.5
Aging and Leisure
Social parameters of the aging process with particular reference to the Leisure Service Industry.
Prereq: Rec 301

Rec370 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

Rec371 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

Rec400 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

Rec402 Colloquium on Religion and Leisure
Not offered 1978-79

Rec406 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.

Rec410 F 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

Rec432 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
Course Descriptions
Recreation/Religious Studies

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.

Religious Studies

Associate Professor and Chairperson
B. J. Hubbard, BA (Seattle), MA (Marquette), PhD (Iowa)

Professor
W. Klaassen, BA (McMaster), BD (McMaster Divinity School), PhD (Oxford)

Associate Professors
W. J. Bildstein, BA (Western), STB (Gregorian), MA (Windsor), STD (Angelicum)
F. C. Gerrard, MA (College St. Dominique, France), BD, STM (McGill), PhD (Hartford Seminary Foundation)
H. S. Kim, BA (Kyungpook), BD (Hankook), ThM (Pittsburgh), ThD (Knox)
J. W. Miller, BA (Goshen), MA (NYU), BD (Princeton), ThD (Basel)
D. Sahas, BD (Athens), STM (Christian Theological Seminary), PhD (Hartford Seminary Foundation)
A. F. Thompson, BA (Toronto), BTh (Huron), MA (Western), STM, PhD (McGill)

Assistant Professors
R. M. Bird, BA, MA, PhD (Iowa)
M. D. Bryant, BA (Concordia), STB (Harvard), MA, PhD (St. Michael's)
R. D. Legge, BA (Transylvania), STB (Harvard), PhD (McMaster)
R. J. Sawatsky, BA (Bethel, Kansas), MA (Minnesota), MA, PhD (Princeton)
J. D. Whitehead, BA (Toronto), PhD (Chicago)

Lecturers
A. L. Evans, BA (Toronto), BD (Emmanuel), STM (McGill), DMin (Andover-Newton)
J. Rempel, BA (Waterloo) MDiv (Assoc. Mennonite Seminaries)
V. G. Shillington, BA, MA (Wilfrid Laurier)

Note
Professors designated with suffix G (Conrad Grebel), J (St. Jerome's), P (St. Paul's), and R (Renison) are located in the respective Colleges.

Course Descriptions

Note
Please consult the Course Offerings List to determine which courses are offered in the church colleges.

RS 103  F,W  3C  0.5
Introduction to Biblical Studies
A survey of the literature, history and religion of ancient Israel as seen in its cultural background in the Ancient Near East.
RS 104  F,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.

RS 105  Y  3C  1.0
Elementary Biblical Hebrew
A study of elementary Biblical Hebrew grammar. Written
exercises in both Hebrew and English. Reading of
selected portions of the Hebrew scriptures.

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.

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
history and interaction of the three major religious
traditions which have shaped the image of the Western
World.

RS 130  F,S  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.

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.

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  F  3C  0.5
Wisdom, Literature in the Old Testament
A study of Proverbs, Job, Ecclesiastes and other wisdom
writings in ancient Israel, against their Near Eastern
background.

RS 204  Song and Poetry in Ancient Israel
Not offered in 1978-79

RS 205  W  3C  0.5
The Hebrew Prophets
A study of the prophetic movement from Amos to
Malachi, in the historical, social, and religious context of
Israel and the ancient Near East.

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.

RS 207  The Gospel of John
Not offered 1978-79

RS 209  F  2C,1D  0.5
The Apostle Paul: Life and Letters
An examination of the career and thought of Paul as seen
in his letters and in the Acts of the Apostles.

RS 211  F  3C  0.5
Religion in Japan
An historical survey of Religion in Japan from ancient
time 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.

RS 212  F  3C  0.5
Ancient Near Eastern Religions
An analysis of the myths, epics legends, rituals,
incantations, prayers and festival texts of ancient Near
Eastern peoples, with special emphasis on the religions
of Egypt, Mesopotamia and Canaan-Phoenicia.
RS213  W  3C  0.5
Hinduism
A study of the development of religious thought in India from the Vedic Period to the present. The course will combine an historical survey with a study of representative texts from the religious, philosophical, social and political thought of the Hindus.

RS214  W  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.

RS215A  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.

RS215B  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.

RS216A  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.

RS216B  W  3C  0.5
The Development of the Muslim Community
The evolution of the “Brotherhood of Believers” from the time of Muhammad to the present: a study of the Islamic expansion and civilization, the Khalifate, the development of Letters and Sciences and the condition of the Islamic States in the modern world.

RS217  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.

RS218  F  3C  0.5
Christianity
An introduction to the Christian tradition in retrospect; the facts and the experiences pertinent to the evolution of beliefs, institutions, practices and cultural expressions, as these elements delineate the essential identity of Christianity as one of the religious traditions of the world.

RS220  F  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.

RS221  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.

RS227-228 (Hist235-236)  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.

RS231A  F  2C,1S  0.5
The Evolution of Christian Thought
An analysis of the major theological developments in the Christian Traditions from the apostolic era to the Reformation.

RS231B  W  2C,1S  0.5
The Evolution of Christian Thought
An analysis of the major theological developments in the Christian traditions from the Reformation to the present.

RS232A  Christ and Contemporary Man
Not offered in 1978-79

RS233  Contemporary Atheism & Christian Faith 1
Not offered 1978-79

RS234  F  2C,1S  0.5
Contemporary Atheism & Christian Faith 2
Prereq: RS233 or consent of instructor
RS235 F 2C,1D 0.5
Issues in Catholic Moral Theology 1
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.

RS236 W 2C,1D 0.5
Issues in Catholic Moral Theology 2
An investigation of the moral implications of an evolving sexual consciousness in the Christian tradition. 
Prereq: Second year standing or consent of instructor.

RS236A W 3C 0.5
The Ecumenical Movement
A study of those unitive efforts which marked the history of the Christian Church, emphasizing developments from the Reformation to the present.

RS236B The Ecumenical Movement
Not offered 1978-79

RS253 F 2C,1D 0.5
History and Thought of Christian Pacifism 1
The Biblical materials. An examination of the documents of the early church, notably the Bible, with reference to their teaching on war and peace.

RS254 W 2C,1D 0.5
History and Thought of Christian Pacifism 2
The Contemporary Discussion. A survey of Christian teaching on war and peace, focusing on the twentieth century discussion.

RS255 Christian Ethics 1
Not offered 1978-79

RS256 Christian Ethics 2
Not offered 1978-79

RS260 Issues in Science, Technology and Religion
Not offered 1978-79

RS262 F 3C 0.5
Religion and Politics 1
An historical examination of the relationship between religion and politics from primitive to modern societies. Special focus will vary from year to year.

RS263 W 2C,1D 0.5
Religion and Politics 2
An examination of the relationship between religion and politics in the 20th century. Areas of concentration will vary from year to year, and will include the following topics: The Nazi phenomenon, the Christian-Marxist dialogue in Latin America and Europe, and movements for the "re-birth of politics".

RS264 Religion In Canada 1
Not offered in 1978-79

RS265 Religion in Canada 2
Not offered in 1978-79

RS266 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

RS267 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, Pintonioni, Polanski. Cross-listed as Fine 247(R)
Film fee $5.00

RS268A Religious Perspectives in Contemporary Literature
Not offered 1978-79

RS268B Religious Perspectives in Contemporary Canadian Literature
Not offered 1978-79

RS269 W 3C 0.5
Myths & Symbols of Indian Art & Civilization
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.

RS270 F 3C 0.5
Psychology of Religion
A study of theories of the psychological nature of religious experience, the sources of religious belief and religious significance of psychological phenomena. Topics include faith, doubt, evangelism, conversion, faith healing, mysticism, drugs and religious experience, tongue-speaking.

RS271 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.

RS275 Religion and Psychotherapy
Not offered 1978-79
The Parables of Jesus
Detailed examination of the stories Jesus told, their form, method, message, and significance for religious thought, past and present.

Foundations of Sacramental Theology
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.

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.

Studies in the History of Religions
Studies using the 'History of Religions' methodology will focus on specific movements or streams of religious life.

Palestinian Archaeology
Not offered in 1978-79

Palestinian Archaeology: Field Experience
Not offered 1978-79

Selected Topics in Israelite Religion
Not offered in 1978-79

Intermediate New Testament Greek
Prereq: RS 106 or consent of instructor

Intermediate Biblical Hebrew
Not offered in 1978-79

Selected Topics in Biblical Theology
Not offered in 1978-79
Course Descriptions
Religious Studies

RS 336A Contemporary Theology 1
Not offered in 1978-79

RS 336B Contemporary Theology 2
Not offered in 1978-79

RS 339 F 3C 0.5
Luther and Calvin: The Reformation
In Theological Outline
The course will examine the religious experience and the theologies of Martin Luther and John Calvin in their respective historical contexts.
Prereq: one of RS 130, RS 218, RS 227 or consent of instructor

RS 351 Contemporary Western Mysticism
Not offered in 1978-79

RS 352 Y 3C 1.0
Situation Ethics
An examination of the new morality that places the emphasis in ethical decision-making on the situation. The course will include consideration of the writings of Fletcher, H. J. Niebuhr, Barth, Bonhoeffer, and Lehmann.
Prereq: 2nd year standing or consent of instructor

RS 353 Ethics in Indian Thought
Not offered in 1978-79

RS 360 F 2C,1S 0.5
Sacred and Profane in the Arts 1
A consideration of "the holy" and of categories of sacred and profane in the arts. Thematic and methodological issues will be explored in the areas of painting, music, architecture, dance and cinema.
Prereq: Introductory RS course or consent of instructor

RS 361 W 2C,1S 0.5
Sacred and Profane in the Arts 2
A continuation of issues in RS 360.
Prereq: RS 360 or consent of instructor

RS 365 Religious Issues in Marxism
Not offered in 1978-79

RS 369A-F 0.5
Study-Travel Seminar 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 to be visited will be announced.

RS 373A-F W 3C 0.5
Religion and Social Change
Studies of issues that have arisen in the interaction of religious tradition with social change.

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 in 1978-79

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 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 course-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.
No prereq. A special division of this course may be offered to first year Eng. students in other terms if sufficient demand exists.

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. 6 weeks.


A special course available to students in the Mathematics Faculty who do not have a strong science background, especially at the Secondary School Year 5 level. Not open to students registered in the Faculty of Science.
No prereq

Sci 120 The Physical Sciences
Not offered in 1978-79

Sci 160 F 3C 0.5
Computational Methods in Science
The digital computer and graphical methods of problem solving in science will be used in the discussion of topics selected from: elementary data analysis, elementary functions, numerical and graphical differentiation and integration, solution of algebraic and differential equations, series approximation. Intended for first year Sci students. Offered on a CR/NCR basis. No prereq.

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).
No prereq

Sci 201 W 3C 0.5
Contemporary Science 2
(Students registered in Science or Engineering may not take this course for credit)

Sci 202 F 3C 0.5
Energy
Prereq: At least one year of Secondary School Physics

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 205 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 209 F,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 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 and 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).
*No prereq.*

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.

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.)
Course Descriptions
Science

Sci 260 F 2C 0.5
Man and Vision
Elementary treatment of physical, physiological and psychological aspects of vision. Emphasis will be placed upon the visual environment and man. Selected phenomena in vision will also be covered. (Open to non-Optometry students only). No prereq.

Sci 270 W 3C 0.5
Nuclear Science
A non-mathematical general treatment of the following areas of nuclear Science: historical development and discovery of new fundamental particles; artificial transmutation of elements; nuclear sources of energy; biological effects of radiation and use of radioisotopes in industry, medicine and agriculture. The impact of nuclear science on social, economic and political systems will be discussed.
Prereq: At least one year Secondary School Chemistry or Physics

Sci 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 W 3C 0.5
Physics of Music 2
Prereq: Sci 312

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 minerales 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). No prereq.

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 W 3C 0.5
Human Biology 2
Selected topics in human biology. These include hormonal regulation of metabolism and reproduction, birth control, diseases of hormone-producing glands, human embryonic development and the effects of harmful substances on the fetus. (Students whose major field is Biology may not take this course for credit).

Sci 353 F 3C 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 and co-op Applied Earth Sciences 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 3C 0.5
Biology of Food Production
A survey of world food production from the biologist's viewpoint. Topics: Nutrition; food chains; origins of agriculture; basic plants and animal food crops; primitive and modern scientific agricultural practices and the environmental implications of each. 
(Students whose major field is Biology may not take this course for credit.)
ISS 220R F 3C 0.5
The History of Development of Modern Day Social Problems
A study and examination of the development of selected trends within modern society in both their historical and contemporary aspects.
Prereq: ISS 120R or consent of the instructor

ISS 221R W 3C 0.5
Community Issues
An examination of political, social, and ethical issues in selected social problems with particular emphasis on the Kitchener-Waterloo community. Consideration will be given to various strategies for maximizing social concern and response. Emphasis on social research as a vehicle for examination and analysis.
Prereq: Social research course or consent of instructor

ISS 250R/251R F/W 3C/3C 0.5/0.5
Social Research
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 qualitative and quantitative methods.
Prereq: Second year standing or consent of instructor

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 science disciplines 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 321R A continuation of ISS 320
Not offered in 1978-79

ISS 341R W 3C 0.5
Males in Society
Exploration of psychological, sociological, cultural and biological influences upon the development of individuals, particularly males, in society. Discussion will include socialization and development, affiliation and emotional expressiveness, power, violence, fatherhood, work, sexuality and marriage.
Prereq: Introductory psychology recommended

ISS 343R S,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 346R F 3C 0.5
Women’s Problems in Contemporary Society
An examination of the evolution of women’s problems in contemporary society emphasizing the implications for social welfare. Attention given to those women who are frequent recipients of social service: poor women, single mothers, welfare recipients, women prisoners, and to the role of women in the helping professions.
Prereq: Socwk 120R or consent of instructor

ISS 350 (a-f) Special Topics in Interdisciplinary Social Science
Not offered in 1978-79

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/121R  F/W  3C/3C  0.5/0.5
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 220R  F  3C  0.5
Social Psychology
An examination of psychological principles involved in the interaction of the individual and society. Topics include conformity, mass media, attitude formation, prejudice, attraction, aggression. (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, attraction and reinforcement theories; complementary needs; rules of encounter. (Cross-listed with Psych 254)
Prereq: Psych 220R or Psych 253

Psych 322R  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  F  3C  0.5
Cross-Cultural Psychology
An examination of the findings in several areas of psychological interest in a diversity of cultural settings will provide students in psychology and other disciplines with an appreciation for the cultural relativity of psychological data and concepts.
Prereq: An introductory psychology course

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 Officer.

Sociology

Soc 120R/121R  F/W  3C/3C  0.5/0.5
Fundamentals of Sociology
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 220R  F  3C  0.5
The Individual, Society and Religion
An application of sociological analysis to the study of religion. Development of an approach or methodological perspective which can be applied to the study of other social institutions.
Prereq: An introductory Sociology course

Soc 221R  W  3C  0.5
Master Trends in Modern Society
Introduction to the major problems of urban, industrial, and political sociology studied within a framework emphasizing social change. Illustrations will be drawn from emergent as well as advanced societies.
Prereq: Introductory Sociology course
Soc225R  F   3C  0.5
Race and Culture in the Third World 1
A general introduction to contemporary problems of race, culture and ethnic relations in the developing countries of Asia and Africa.
Prereq: Introductory Sociology course or consent of instructor

Soc226R  W   3C  0.5
Race and Culture in the Third World 2
Problems of acculturation and intergroup relations in plural societies in selected areas in the Caribbean, South and Southeast Asia, East and Southern Africa.
Prereq: An introductory sociology course or consent of instructor.

Soc325R/326R  F/W   3C/3C  0.5/0.5
Issues in Third World Development
The course will examine the impact of modernization on the value systems and social structures of selected South African societies. The course will in particular investigate the functioning of the new elite including some analysis of its new habitat, the city.
Prereq: Introductory Sociology or consent of instructor

Soc327R/328R  F/W   3C/3C  0.5/0.5
Canadian Ethnic and Cultural Minorities
A detailed examination of various minorities in Canadian society. The course will stress the fundamental concepts and issues of race and ethnic relations and the application of these fundamentals to the various groups in Canadian mosaic.
Prereq: Introductory Sociology

Soc367R-369R Special Topics in Sociology
Not offered in 1978-79

Soc398R/399R  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

Socwk120R  S,F,W   3C  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.

Socwk121R  S,W   3C  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.

Socwk220R  S,F   3C  0.5
Social Casework 1
A presentation of some of the theoretical constructs necessary for the understanding of the individual in the casework relationship, as well as an introduction to some appropriate casework interventions. Emphasis in the course will be theoretical.
Prereq: Socwk120R or consent of instructor

Socwk221R  S,F   3C  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: Socwk120R or consent of instructor

Socwk222R  F   3C  0.5
Community Organization 1
An examination of social work practice as it relates to functional and geographical communities. The course will explore the theoretical foundations of organization practice as well as a variety of models.
Prereq: Socwk120R or consent of instructor

Socwk320R  S,W   3C  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: Socwk220R, or consent of instructor
Course Descriptions
Social Development Studies

Socwk321R  S,W  3C  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: Socwk221R, or consent of instructor

Socwk322R  W  3C  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: Socwk222R, or consent of instructor

Socwk326R  W  3C  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: Socwk120R, or consent of instructor

Socwk350 (a-f) Special Topics in Social Work
Not offered in 1978-79

Socwk355R  F/W  3C/3C  0.5/0.5
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: Socwk120R or consent of instructor.

Socwk365R/366R  S/S  3C/3C  0.5/0.5
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: Socwk120R or consent of instructor.

Socwk398R/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/325R  Special Topics in Chinese Thought and Culture

English
Engl109Z (R)  Basic Writing Skills
Engl140R/141R  The Use of English, 1 and 2
Engl205R  The Canadian Short Story
Engl245R  Form and Function
Engl376R/377R  Our Changing Language: Syntax and Semantics, 1 and 2
Engl385R  Twentieth Century Literature

Fine Arts
Fine246R/247R  Religion and the Film, 1 and 2
Fine348R  The Films of Chaplin
Fine349R  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.
Geog325R/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
RS 160/161 Religion and Culture, 1 and 2
RS 231A The Evolution of Christian Thought 1
RS 231B The Evolution of Christian Thought 2
RS 266/267 Religion and the Film, 1 and 2
RS 298/299 Directed Readings in Special Subjects
RS 360/361 Sacred and Profane in the Arts, 1 and 2
RS 460-463 Special Topics in Religion and Culture

Department of Sociology

Associate Professor, Chairman
K. Westhues, BA (Conception), MA, PhD (Vanderbilt)

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)
J. W. Fretz, AB (Bluffton), BD (Chicago Theol. Seminary), MA, PhD (Chicago) G
H. D. Kirk, BS (City College, N.Y.), MA, PhD (Cornell)
D. G. S. Mtimkulu, MA (S. Africa), MA (Yale), PhD (Natal) R

Associate Professors
J. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell)
F. A. Fasick, BA (Penn. State), MA, PhD (Columbia)
A. A. Hunter, BA (UBC), MA, PhD (Wisconsin)
L. A. Johnson, BA (Waterloo), MA, MPhil (Toronto)
D. Kubat, MA (Kansas), PhD (L. Maximilian, Munich)
R. D. Lambert, BA, MA (McMaster), PhD (Michigan, Ann Arbor)
W. G. Scott, BA (Western), MA (Toronto)
M. Shimp, BA (International Christian, Japan), MA, PhD (UBC)
E. W. Vaz, BA, MA (McGill), PhD (Indiana)
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 (UBC), MA (Chicago) R
R. C. Prus, BA (Manitoba), MA, PhD (Iowa)

Lecturer
I. Connidis, BA, MA (Western Ontario), PhD (Toronto)

Associated Faculty

Professors
G. S. Kenyon, BPhysEd (UBC), MS (Indiana), PhD (NYU), Kinesiology
J. W. Loy, BS (Lewis and Clark), MA (Iowa), PhD (Wisconsin), Kinesiology
D. Smucker, BA (Bluffton), BD (Princeton), MA, PhD (Chicago), Social Sciences, Conrad Grebel
Course Descriptions
Sociology

Associate Professors
G. M. Anderson, BA, MA (McMaster), PhD (Toronto), Sociology and Anthropology, Wilfrid Laurier, Adjunct
B. McPherson, BA, MA (Western Ontario), PhD (Wisconsin) Kinesiology
J. Zuzanek, MA (Moscow State Univ.), CSc, PhD (Charles Univ. Prague), Recreation

Assistant Professors
J. M. Alleyne, BA (Sir George Williams), PhD (Johannes Gutenburg), Sociology and Anthropology, St. Jerome's
L. Fischer, BA (Rutgers), MA (Northwestern), PhD (Duke)
N. Theberge, BA (Massachusetts), MA (Boston), PhD (Massachusetts), Kinesiology

Jointly with Department of History

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 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.

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 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 Social Structure and Character
Not offered 1978-79

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 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 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. *Prereq: An introductory social science course*

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 W 2C 0.5
Social Movements
The sociological analysis of varieties of social movements and their relationships to social organization and social change. *Prereq: Soc 101*

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 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 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*
Soc253  F  2C  0.5
Sociology of Corrections
Decisions to process offenders and the role of social factors in the Canadian criminal justice system are critically examined. Focal issues include police discretion, the legal profession and prison systems.
Prereq: Soc101

Soc260  W  2C,1D  0.5
French-English Relations in Canada
Application of sociological principles and methods to anglophone-francophone relations, with attention to topics such as public opinion in the two populations, community studies, bilingualism and multiculturalism, voluntary associations and institutional dilemmas.
Prereq: Soc101

Soc261  F  2C  0.5
World Population Problems: Limits to Growth
Comparative analysis of population problems in the Third World and those in more developed societies. Focus is on social factors and their relationship to population. Topics of special interest include population as a variable in development, Third World fertility, population policy, family planning and abortion.

Soc262  F  2C  0.5
Population in Canadian Society
Study of the basic demographic processes in the population of Canada. Demographic implications for selected social institutions. Use of Canadian enumeration and registration data. Emphasis on immigration and immigration policy.

Soc270  F  2C  0.5
Communication
An analysis of the role of language and other symbol systems in social interaction; the interplay between communication and the social system, the formation of attitudes through language; social and individual disorders as caused by, and reflected in, the breakdown in the communication process.
Prereq: Soc101

Soc275G  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

Soc280 Organization of Animal Societies
Not offered 1978-79
Soc315 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  

Soc316 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  

Soc320 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  

Soc321 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  

Soc322 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  

Soc323 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  

Soc324 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.  

Soc330 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).  

Soc331 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  

Soc333 The Sociology of Regional Planning  
Not offered 1978-79  

Soc335 2C 0.5  
Sociology of Science  
The study of science as an institution; its historical development and contemporary relationship with other institutions including government, education and industry.  
Prereq: Soc 101  

Soc338 Sociology of Literature  
Not offered 1978-79  

Soc340 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
Soc341 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*

Soc345 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*

Soc351 F 3S 0.5  
**Research Seminar in Canadian Society**  
A research oriented seminar dealing with selected topics in Canadian society and cross-national comparisons.  
*Prereq: Third or Fourth Year Standing*

Soc352 W 3S 0.5  
**Seminar in Nationalism and Ideology in Canada and Quebec**  
A research oriented seminar dealing with varieties of nationalism, national identity, separatism, independence and political/economic ideology and values in Canada and Quebec.  
*Prereq: Third or Fourth Year Standing*

Soc355 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 St. Jerome's College

Soc360 F 2C 0.5  
**Political Sociology**  
The sociological analysis of the institutionalization of power, political movement, parties, conflict and its accommodation.  
*Prereq: Soc 101*

Soc361 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*

Soc370G F 3C 0.5  
**Sociology of Law**  
Special attention will be paid to the growing public awareness of the failure of law to provide justice or social control in a growing number of situations. Local judges, lawyers and police officials are invited to discuss such issues as the jury system, police and violence, civil rights and mass media.  
*Prereq: Third year standing in a social science course or by permission*

Soc360 W 3C 0.5  
**Philosophy of Social and 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 Phil362).  
*Prereq: Some previous work in a Social Science or in Philosophy*

Soc372 W 2C 0.5  
**Medical Sociology**  
Examination of the medical care structures from the point of view of patients, health care professionals in the system, and systems analysis. Structures of interest are primary health care settings, hospitals, and professional associations.  
*Prereq: Soc 101*

Soc373 Aging, the Aged and Leisure: A Sociological and Social Psychological Perspective  
Not offered 1978-79

Soc374 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 Rec303 and Kin 452).  
*Prereq: Soc 101 and one other Soc course*

Soc375 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 Rec301).  
*Prereq: Two term courses in Sociology, i.e. Soc 101 and 341*
Soc377G 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

Soc382 Techniques of Demographic Analysis
Not offered 1978-79

Soc401 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

Soc402 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, Plkhanov, Lukacs, and contemporary sources.
Prereq: Fourth year Honours or graduate standing

Soc410 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 maneuvering; labeling; and ethnomethodology.
Prereq: Soc210 or 212 or consent of instructor

Soc415 Seminar: The Impact of Sex Factors on Sociological Theory and Research
Not offered 1978-79

Soc421 Secondary Analysis of Survey Date
Not offered 1978-79

Soc425 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

Soc426 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

Soc451 3S 0.5
Seminar: Problems in Contemporary Theory and Research
Examinations of current frames of reference and theories in sociology and related disciplines. Their utility in sociological problem formation and their test by current methods and techniques.
Prereq: Third or fourth year Honours

Soc466 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

Soc467 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

Soc481 Mathematical Sociology
Not offered in 1978-79

Soc499 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

Note
For other Sociology courses offered at Renison College, please see course descriptions for Social Development Studies.
Department of Systems Design

Professor, Chairman
T. M. Fraser, MB, ChB (Edinburgh), MSc (Ohio State), LMCC, FACP, PEng

Professor, Associate Dean, Graduate Studies
P. H. O’N. Roe, BASc (Toronto), MSc, PhD (Waterloo), PEng

Professor, Associate Dean, Undergraduate Studies
G. N. Soulis, BASc (Toronto), PEng

Professor, Associate Chairman, Graduate Studies
K. Huseyin, MSc, (Istanbul), PhD (London), PEng

Associate Professor, Associate Chairman
Undergraduate Studies
B. L. Wills, BASc, MASc, PhD (Waterloo), PEng.

Professors
H. K. Kesavan, BSc, BE (Mysore), MS (Illinois), PhD (Michigan State), PEng
D. A. Winter, BSc (Queens), PhD (Dalhousie), PEng

Associate Professors
M. L. Constant, BASc (Toronto)
G. F. Rabideau, BA, MA (Wisconsin), PhD (Purdue)
P. L. Seeley, BASc (Toronto)
K. Singhal, B Tech (IIT, Kharagpur), MS, EngScD (Columbia)
S. Toida, BS (Tokyo), MSc, PhD (Illinois)
A. K. C. Wong, BSc, MSc (Hong Kong), PhD (Carnegie), PEng

Assistant Professors
M. Chandrashekar, B Tech (IIT, Kanpur), MASc, PhD (Waterloo), PEng
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

Lecturer
Y. S. Ho, BSc (Taiwan), MSc (Toronto), PhD (Waterloo)

(Cross Appointment with Department of Kinesiology)

Course Descriptions

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:

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

SyDe101/102 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 course.

SyDe111 F 3C, 1T 0.5

Calculus 1


SyDe112 S 3C, 1T 0.5

Calculus 2

Techniques of systematic integration, applications of integration. Sequences, series, infinite series, power series, with applications.
Linear Algebra

Theory and Applications of Probability

Digital Computation
Introduction to electronic digital computers; hardware and software organization, basic features of Fortran, examples of efficient algorithms for engineering computations.

Engineering Economics
Cost-benefit analysis, critical path methods, interest, project economics, decision making, utility theory, project organizational theory.

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.

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.

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.

Statics
Statics of particles, vectors, equilibrium of rigid bodies, centroids, the analysis of structures, forces in beams and cables, friction and moments of inertia.

Dynamics
Rectilinear motion, plane motion, dynamics of particles, work and energy, linear momentum, rotational motion, angular momentum, harmonic motion, gravitational, wave motion.

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.

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.

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.
Course Descriptions
Systems Design

SyDe 212  F  3C,1T  0.5
Applicable Mathematics for Systems Design 2
Laplace transforms. Solution of ordinary linear
differential equations by Laplace transforms,
applications. Residue calculus and its relation to
inverse Laplace transforms. Functions of the complex

SyDe 213  W  3C,1T  0.5
Theory and Applications of Statistics
Sample statistics and their distributions. Order
statistics and their distributions. Decision making
under uncertainty. Statistical inference: Estimation and
testing statistical hypothesis. The theory of the least
squares and regression analysis. Selected applications.

SyDe 221  W  2C,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.

SyDe 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.

SyDe 261  W  1C,3L  0.5
Systems Design Workshop 1

SyDe 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.

SyDe 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, bay streams, stress-strain relationships. Elastic
and inelastic behaviour of prismatic members subjected
to axial, shearing, torsional and flexural deformations.

SyDe 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.

SyDe 284  F  3C,1T  0.5
Fluid Mechanics
Fundamental concepts in systems using fluid flow. Basic
treatment of statics, kinematics and dynamics of fluids.
Conservation laws. Similarity and dimensional analysis.
Brief introductions to boundary layers, lift and drag, ideal
and compressible flow.

SyDe 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.

SyDe 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, inter-relation of coursework, later work and
engineering practice will be discussed.

SyDe 311  S  2C,1T  0.5
Systems Operations 1
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.

SyDe 322  W  2C,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.

SyDe 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.
SyDe 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.

SyDe 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.

SyDe 351  S  2C,1T  0.5  
Physical Systems 2  
The subject matter is similar to SyDe 252 in that the development is based on other physical systems such as structural and hydraulic systems.

SyDe 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.

SyDe 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.

SyDe 361  S  1C,2L  0.75  
Systems Design Workshop 3

SyDe 362  W  1C,2L  0.75  
Systems Design Workshop 4  
A continuation of the Systems Design Workshop sequence for third year students

SyDe 364  W  3C,1T  0.5  
Manufacturing Science  

SyDe 366  W  2C,1T  0.5  
Aesthetic and Perceptual Aspects of Design  
Presentation and discussion of appropriate and possible methods for the design of systems or artifacts in which aesthetic characteristics and visual form are primary requirements of the design.

SyDe 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.

SyDe 361  SD  3C,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 artifacts for everyday use.

SyDe 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.

SyDe 391  S  1C,3L  0.5  
Systems Design Laboratory 2  
Introduction to electronic filters, attenuation, amplification oscillation, modulation and detection; application to instrumentation.

SyDe 392  W  1C,3L  0.5  
Systems Design Laboratory  
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.
SyDe 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 inter-relation of course work and engineering practice will be discussed. Non-credit courses.

SyDe 411  F  2C,1T  0.5
Systems Operations 2
A continuation of SyDe 311, with emphasis on Stochastic Operations Research Models. Topics will include; Decision making under uncertainty, queuing models and related probabilistic techniques, feedback control, probabilistic inventory, competitive strategies and related topics.

SyDe 413  F  3C,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.

SyDe 421  F  2C,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.

SyDe 432  W  2C,1T  0.5
Analysis of Large Systems
Topics include macroscopic modelling of large scale resource and societal systems, decomposition techniques, graph-theoretic and computer based methods of analysis, decision and control problems, other problems concerned with complexity, largeness and aggregation.

SyDe 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.

SyDe 434  W  3C,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 techniques for the analysis and synthesis of networks of facilities, n-job, m-machine problem.

SyDe 442  W  2C,1T  0.5
Occupational and Environmental Systems Safety
Historical development 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.

SyDe 443  F  2C,1T  0.5
Human Function
The structure and function of man in relation to the design of man-machine systems with specific emphasis on human physiology and bioengineering. The cell as micro-system and man as a complex of systems and sub-systems.

SyDe 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.

SyDe 453  F  3C,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.

SyDe 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.

SyDe 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.
Systems Design Workshop 5
Sy De 461 F 1C, 5T 0.5
Systems Design Workshop 6
Sy De 462 W 1C, 5F 0.5
Systems Design Workshop 6
A continuation of the Systems Design Workshop sequence for fourth year students.

Sy De 466 W 3C, 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.

School of Urban and Regional Planning

Professor, Director
H. S. Coblenz, BA Hons (Durham), MRP (North Carolina), MCIP, FRPTI, AIP, FSS (on sabbatical leave 1978-79)

Associate Professor, Associate Director
J. T. Horton, BA (Wheaton), MA (Northwestern)

Associate Professor, Graduate Officer
N. E. P. Pressman, BArch (McGill), MArch, urb des (Cornell), Cert USP (Manchester), MCIP, AIP, AIU. (On sabbatical leave 1979)

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 (UBC)

Associate Professor, In-Career
Development Officer
S. G. Rich, MCIP, MRAIC, ARIBA, AIP

Professors
R. S. Dorney, BSc, MSc, PhD (Wisconsin), MCIP
L. O. Gertler, BA (Queen’s), MA (Toronto), MCIP
K. Izumi, BArch (Manitoba), MCP (MIT), ARCA, FRAIC, RIBA, MCIP, AIP, CMAOP (on sabbatical leave 1979)
R. R. Krueger2, BA, MA (Western), PhD (Indiana)
P. H. Nash1, BA, MA (UCLA), CE (Grenoble), MCP, MPA, PhD (Harvard), AIP, MCIP
L. H. Russwurm2, BA, MA (Western), PhD (Illinois)

Associate Professors
N. A. M. Carter, BA (UBC), MSW (UBC)
E. A. McBean4, BASc (UBC), SM (MIT), CED (MIT), PhD (MIT)
G. G. Mulamoottil1, BSc (Mysore), MSc (Bombay), PhD (Delhi)
R. T. Newkirk2, BA, MSc, PhD (Western)
G. B. Priddle4, BA (Western), MA, PhD (Clark)
W. I. Shalinsky, BA, BSW (McGill), MSc, DSW (Western Reserve)
D. F. Walker2, BSc (London), MA, PhD (Toronto)
S. M. Weaver4, BA, MA, PhD (Toronto), Chairperson, Anthropology
D. H. Wood?, BComm, LLB (Toronto)
C. K. Knapper3, BA Hons (Sheffield), PhD (Saskatchewan)

Assistant Professors
M. E. Haight, BSc, MSc, PhD (McMaster)
S. Herzog, BArch (Toronto), MRAIC
R. C. Suffling, BSc Hons (Wales), PhD (Guelph)
Lecturer
N. M. Lazarowich, 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)
D. Estrin', BA, LLB (Alberta)
M. K. Foster, BA (Toronto), MPhil, PhD (Columbia)
H. I. Stricker, BASc (Civil) (Toronto)
N. F. White, BSc (Queens), MDCM (McGill)

Visiting Professor
R. C. Ellis, BSc (Wales), MSc (N.B.), PhD (Melbourne)

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

1 Planning and Biology
2 Planning and Geography
3 Environmental Studies
4 Planning and Man-Environment Studies
5 Planning and Anthropology
6 Planning and Civil Engineering
7 Planning and Environmental Studies
8 Planning and Architecture
9 Environmental 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

EnvSt 111 Introduction to the Study of the Future
See EnvSt course descriptions, page 286.

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).

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

EnvSt 195A Introduction to Environmental Studies
See EnvSt course descriptions, page 286.

EnvSt 195B Introduction to Environmental Problems
See EnvSt course descriptions, page 286.

EnvSt 200 Field Ecology
See EnvSt course descriptions, page 286.

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 W 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

EnvSt 252 Media Tools for Environmental Studies
See EnvSt course descriptions, page 286.

EnvSt 253 Media Tools for Environmental Studies - Advanced Level
See EnvSt course descriptions, page 286.
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 286.

Env St 272 Computer Programming in Environmental Studies
See Env St course descriptions, page 286.

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

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
Course Descriptions
Urban and Regional Planning

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 W 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 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)

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)

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 357 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 and MEnv 357.
Prereq: Env St 200
Estimated cost to student: $10

Env St 358 Environmental Pollution and its Control
See Env St course descriptions, page 286.

Plan 358 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 360 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. Cross-listed as Civ E 190
Prereq: Plan 256 or consent of instructor

Plan 370 W 3C 0.5
Land Development Planning
An examination of planning issues related to the economics and financing of public and private development projects including shopping plazas, residential subdivisions, and new towns. The course focuses on sources of financing, financial programming, effects of planning decisions on land values, and techniques of project evaluation.
Prereq: Plan 255, or consent of instructor

Env St 380/381 Environmental Studies Workshop
See Env St course descriptions, page 286.

Plan 391 W Fieldlab 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 the cost of travel accommodations for field trips. Students are responsible for the cost of their meals. Approximately $60.00 will cover the cost of meals on a one week field trip.
Prereq: Enrolment in Plan 300

Env St 401 Environmental Law
See Env St course descriptions, page 286.

Env St 402 Planning Law
See Env St course descriptions, page 286.

Env St 411 Alternative Future Environments I
See Env St course descriptions, page 286.
Env St 412 Alternative Future Environments 2
See Env St course descriptions, page 286.

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 286.

Env St 418 Land Use History and Landscape Change 2
See Env St course descriptions, page 286.

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 programmes. 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.

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.

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 2S 0.5
Professional Practice in Planning
This course is intended for undergraduate planning students in their final year who will be starting professional practice on graduation. The course discusses professional 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 F, W 2C 0.1
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
Senior 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. Courses on women are 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.

Anth 350
Sex roles in Anthropology

Engl 108E
Women in Literature

Engl 208E
Women Writers of the Twentieth Century

Hist 204H
The individual and the family in History

Phil 202
Philosophy of Women

P Sci 272
Political Behaviour 2
PSci 475
Political Socialization

PSci 476
Research Seminar in Political Behaviour

Soc 215
Sociology of Sex Roles

Soc 415
Seminar on the Impact of Sex Factors on Sociological Theory and Research
Not offered in 1978/79

ISS 346R
Women's Problems in Contemporary Society
Bodies and Antique furniture show in UW's Art Gallery located in the Modern Languages Building
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L. R. G. Martin
M. D. Vogel-Sprott
D. G. Wertheim

Undergraduate Students
M. S. Roberts
P. B. Thomas
S. Fingerote

Graduate Students
R. A. Harrington
L. van Goozen

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President, Federation of Students
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F. H. Epp, BTh, BA, MA, PhD, LL (President, Conrad Grebel)
I. L. Campbell, BA, MSc (Principal, Renison)
F. Gérard, MA, BD, STM, PhD (Principal, St. Paul’s)

The Dean of each Faculty and the Dean of Graduate Studies
J. S. Minas, BA, PhD (Arts)
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

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K. L. Ledbetter, AB, MA, PhD (Arts)
M. M. Yovanovich, BSc, MS, ME, ScD (Engineering)
L. R. G. Martin, BA, MA, MHP, PhD, MCIP (Environmental Studies)
R. Johnson, BA, MA, PhD (Human Kinetics & Leisure Studies)
R. C. Mullin, BA, PhD (Mathematics)
D. E. Irish, BSc, MSc, PhD, FClC (Science)
D. R. Letson, BA, MA, PhD (St. Jerome’s College)
M. D. Bryant, BA, MTh, MA, PhD (Renison College)
H. K. Ellenton, BSc, MA (At large)
J. H. G. Howard, BSc, MSc, PhD (At Large)
P. M. Reilly, UE, BASc, DIC, PhD, FSS (At large)
J. G. Smith, BA, MA, PhD (At large)
M. D. Vogel-Sprott, BA, MA, PhD (At large)

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 & Leisure Studies)
C. F. A. Beaumont, BA, MA (Mathematics)
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J. Van Evra, BA, MA, PhD (At large)
S. M. Weaver, BA, MA, PhD (At large)
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To 1980
B. P. Hendley, BA, MA, PhD (Arts)
P. H. Roe, BASc, MSc, PhD, PEng (Engineering)
J. H. Bater, BA, MA, PhD
(Asst. Professor, St. Jerome's College)
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, CS (At large)
J. S. Keeler, BASc, MASc (At large)
R. Listor, BA, MA, PhD (At large)
I. F. Macdonald, BEng, PhD (At large)

Student Representatives

to 1978

Undergraduate
J. R. Greig (Arts)
L. DeLoyde (Environmental/Integrated Studies)
P. B. Thomas (Science)

Graduate
S. E. Sykes, BA, MASc, PhD
L. van Goozen, BASc

To 1979

Undergraduate
S. Fingerote (Engineering)
C. Horrigan (Human Kinetics & Leisure Studies)
R. J. Hipfner (Mathematics)
B. D. Leavens (At large)

Graduate
R. A. Harrington, BASc, MASc
M. R. Levy, BASc

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J. M. Martin, BASc

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D. H. Green, BASc

To 1980
B. P. Barrett, BASc

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To 1979
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To 1980
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M. D. Vogel-Sprott, BA, MA, PhD
Associate Dean (Graduate Affairs)
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