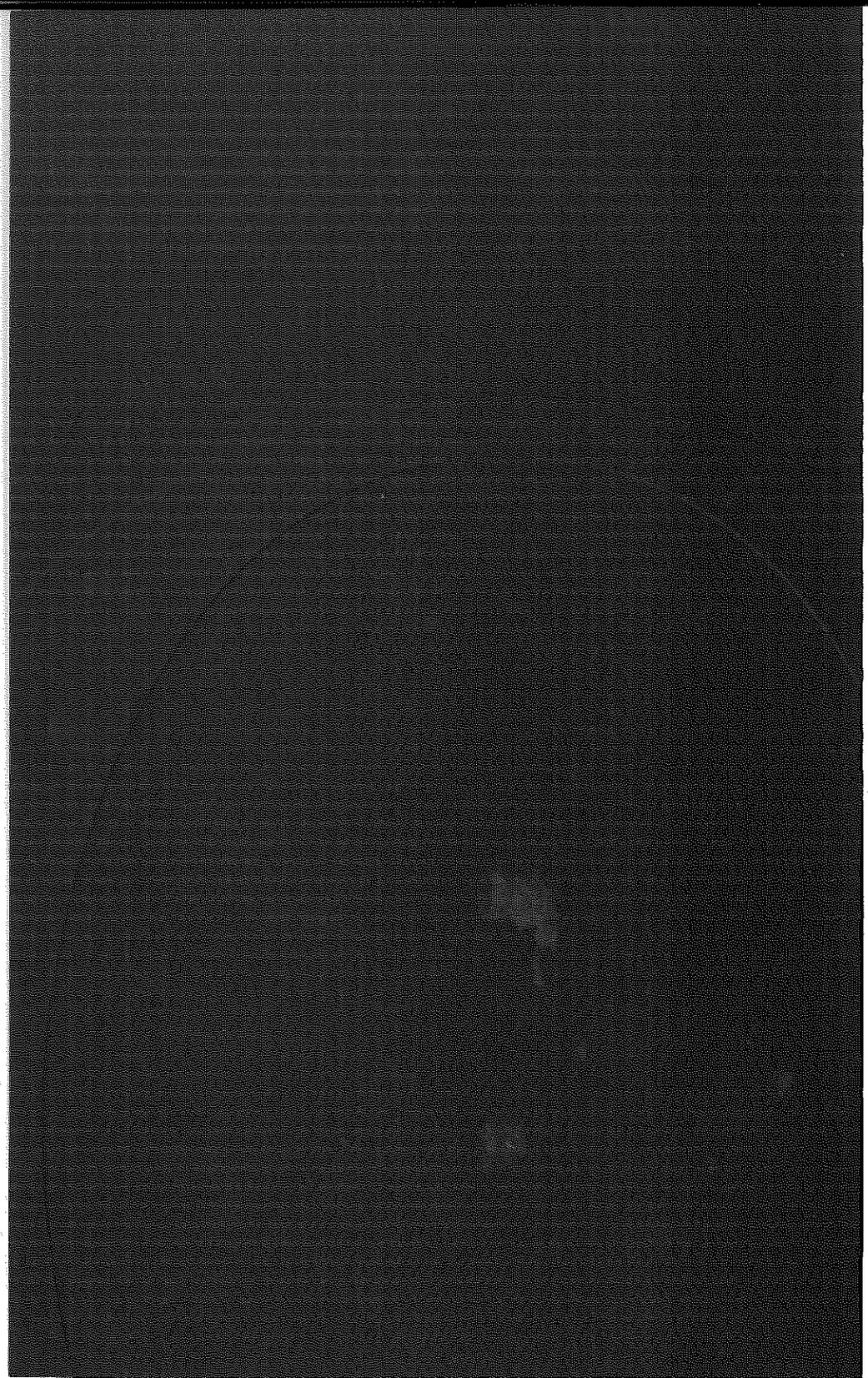
# University of Ontario Institute of Technology

Calendar 2003/2004



University of Ontario
Institute of Technology

Academic Year 2003-04

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# Our Vision

The University of Ontario Institute of Technology will be a market-driven university, integrating inquiry, discovery and application — through excellence in teaching and learning, value-added research and vibrant student life.

# Our Mission

The mission of the University of Ontario Institute of Technology is to:

- provide undergraduate and postgraduate university programs with a primary focus on those programs that are innovative and responsive to the individual needs of students and to the market-driven needs of employers;
- advance the highest quality of learning, teaching, research and professional practice;
- contribute to the advancement of Ontario in the Canadian and global contexts with particular focus on Durham Region and Northumberland County;
- facilitate student transition between college-level programs and university-level programs; and
- fulfill its special mission of providing career-oriented university programs and to design and offer programs with a view to creating opportunities for college graduates to complete a university degree.

# Important Notice

The University of Ontario Institute of Technology reserves the right to make changes in the information contained in this calendar, in its printed or electronic form, without prior notice. Though all reasonable efforts are made to ensure the publication of accurate information, the University does not warrant that all general information and course references are accurate.

In the event of an inconsistency between this calendar and the regulations and policies established by the Schools, Academic Council or Board of Governors of the University, the regulations and policies established by the Schools, Academic Council and Board of Governors shall prevail.

Not every course listed in this calendar will necessarily be available every year. Lists of available courses will be provided on the University Web site each year.

The University reserves the right to limit access to courses or programs, and at its discretion, to withdraw particular programs, options or courses altogether. Under such circumstances the University strives to the best of its ability to enable students registered in affected programs to complete their degree requirements.

The regulations and policies published herein apply only for the academic year indicated on the cover page of the publication.

Students have a responsibility to

- familiarize themselves with degree requirements;
- familiarize themselves with regulations and policies of the University and its schools; and
- ensure they register for the courses necessary to satisfy their degree requirements.

Students agree by the act of registration to be bound by the regulations, policies and bylaws of the University of Ontario Institute of Technology that are in effect at the time of registration.

**Notification of Disclosure of Personal Information to Statistics Canada**

Under the federal Privacy Act, individuals can request access to their own, individual information held on federal information banks, including those held by Statistics Canada.

The federal Statistics Act provides the legal authority for Statistics Canada to obtain access to personal information held by educational institutions. The information may be used only for statistical purposes, and the confidentiality provisions of the Statistics Act prevent the information from being released in any way that would identify a student.

Students who do not wish to have their information used may ask Statistics Canada to remove their identifying information from the national database.

Further details on the use of this information can be obtained from Statistics Canada's Web site: **http://www.statcan.ca** or by writing to the Postsecondary Section, Centre for Education Statistics, 17th Floor, R.H. Coates Bldg, Tunney's Pasture, Ottawa, Ontario, Canada K1A 0T6.

# Message from the President

Welcome to the very first edition of the academic calendar of the University of Ontario Institute of Technology.

Canada's newest university was established to realize a special vision. We bring together a long and storied tradition of university education with a strong emphasis on preparing our graduates for the world of work or graduate school. All of this takes place in an atmosphere that offers a rich and vibrant student life.

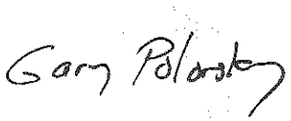
You will be taught by highly qualified and respected faculty who are engaged in leading-edge research. Our focused degree programs will give you an edge in whatever field you choose. Our Mobile Learning environment provides every student with laptop technology and the opportunity to learn through both traditional and innovative means. Imagine flipping open your computer and surfing the Internet or completing and submitting an assignment in one of our wireless cafeteria environments.

We are also building a beautiful new campus, designed for learning and living innovatively. Our residences are unexcelled and exciting new athletic facilities are being designed and built.

Amidst all of this activity, we are committed to every student as an individual. You will find our staff caring and helpful.

This calendar will introduce you to the University and help you navigate our program offerings. Of course, more information can be found on our Web site at **www.uoit.ca** or by e-mailing us at **admissions@uoit.ca**.

If you are planning to attend the University's first year in September 2003, we look forward to welcoming you to our first class, and to your role as a founding student of a great university.



**Gary Polonsky**

# Glossary of Terms used in this Calendar

**Academic standing:** A student's official status of enrolment at the University as evaluated at the end of each semester; used to assess whether students are meeting the standards prescribed for continuing in the University and/or their programs.

**Academic year:** The period from September 1 to August 31.

**Appeal:** The request for review of a judgment regarding the application of regulations.

**Auditing student:** A student attending classes but not receiving credit for courses. Auditing students will be charged full course fees. No indication of an audited course is given on an official transcript.

**Award:** A general term used to mean any presentation, monetary or otherwise, made to a student.

**Bursary:** A monetary award to a student where the primary criteria is not academic performance.

**Challenge for credit:** The request for academic credit resulting from experience or knowledge gained elsewhere for which transfer credit cannot be awarded.

**Co-requisite:** A course which must be successfully completed prior to or taken concurrently with the course for which it is required.

**Course:** A unit of work in a particular subject normally extending through one semester or session, the completion of which carries credit toward the requirements for a degree.

**Credit hour:** The measure used to reflect the relative weight of a given course toward the fulfilment of degree requirements. Unless otherwise indicated, a course normally has a credit value of three credit hours.

**Credit restriction:** Where two or more courses are closely related, credit may be limited to one of the courses.

**Cross-listed course:** A course that is listed under two or more Schools and can be taken for credit from one School only.

**Degree:** An academic designation awarded for the completion of a specified program of study.

**Exchange student:** A student participating in a formalized exchange program with another University. Such students normally pay fees at their home institution and take courses at the host institution.

**GPA:** The abbreviation for grade point average. A semester GPA is the average of the grade points awarded on the basis of academic performance during a single semester. The cumulative GPA is the average of the grade points awarded in all courses completed by a student at the University.

**Prerequisite**: A course which must be successfully completed prior to commencing a second course for which it is required.

**Program**: A series of courses, the successful completion of which qualifies the candidate for a degree, provided all other academic and financial requirements are met.

**Registration**: The process of selecting, enrolling in, and being assessed fees for courses.

**Registration period**: In a semester, the period extending from the first day of registration to the 10th lecture day, as stated in the academic schedule. In a session, it is the period extending from the first day of registration to the fifth lecture day.

**Scholarship**: A monetary award to a student based primarily on academic merit, although other criteria may be considered based on donors' requirements.

**Semester**: A period of approximately 14 consecutive weeks consisting of 64 days of lectures and nine days of final examinations.

**Session**: A period of approximately seven consecutive weeks in the summer semester consisting of 32 days of lectures. The first half of summer semester is designated as spring session; the second half is designated as summer session.

**Special student**: A student taking courses but not seeking a degree. With the permission of the dean, such a student may subsequently be admitted to a degree program in which case courses already taken may be used to satisfy degree requirements. Special students register formally in courses, with the consent of the instructor; such students submit assignments, write examinations, receive grades and may request an official transcript. Such students are charged full course fees.

**Transcript**: The complete report of a student's academic record.

**Transfer credit**: Academic credit granted for work completed at an institution other than the University of Ontario Institute of Technology.

**Visiting student**: A student admitted to another post-secondary institution, attending the University of Ontario Institute of Technology on a letter of permission.

**Waiver**: Permission granted by the appropriate authority for exemption from a particular program requirement and/or a particular university regulation.

# Table of Contents

# Section 1: General Information

## 1.1 History of the University

The University of Ontario Institute of Technology was announced May 9, 2001 in the Ontario government's budget speech, which signalled an investment of $60 million toward its establishment through Ontario's SuperBuild Corporation.

The University became a legal entity on June 27, 2002 with the passage of Bill 109 by the Legislative Assembly of Ontario. The University of Ontario Institute of Technology is part of the government's plan to provide students and researchers with greater choice and flexibility in programs directly related to the changing needs of the marketplace, thereby attracting investment to the province and boosting Ontario's economy.

The University offers nine career-focused degree programs in areas of engineering, science, business and information technology, justice studies and education. The initial set of programs was developed following a needs assessment to ensure that each would respond to and support the industries in the broader Ontario economy that are expected to grow at above average rates. Additional undergraduate programs and graduate programs are being developed.

The University of Ontario Institute of Technology is located in Oshawa, Ontario, less than an hour east of Toronto in Durham Region. The region's population is projected to grow faster than the total population of the province of Ontario, reaching a million people within a generation.

The University is being built on very beautiful countryside, in the concept of an academic village. The university will comprise a dozen new buildings, with the last phase completed in 2006. The student-centred campus, with its river valleys and rolling landscape will boast many green spaces and meeting places.

The University welcomes its first class of students in September 2003. These students will be greeted by the University's accomplished deans and professors, as well as a new five-storey, 114,000-square-foot academic building and a beautiful, new residence. The "rez" overlooks a deer-filled valley and offers two students per suite, a private bedroom per student, a private washroom, kitchenette and sitting area per suite.

As Ontario's first laptop-based university, students and faculty have an opportunity to pioneer innovative education. Both will use the latest educational technologies to ensure that graduates have a competitive advantage and the skills needed in tomorrow's workplace.

## 1.2 Mobile Learning environment

The University of Ontario Institute of Technology is committed to advancing the highest quality of learning, teaching, research and professional practice. This means using educational technologies to enhance the learning experience, inspire innovative teaching and foster student success. This is learning and teaching for the 21st century.

At the heart of the program is a personal laptop for each student. Every student has an equal opportunity to communicate with faculty, access course materials, make quality presentations, conduct research and pursue personal knowledge. The laptop facilitates access to information and gives professors the opportunity to use advanced learning technologies.

Classrooms at the University of Ontario Institute of Technology feature ergonomic seats and connections to server and printer services. Classrooms include large electronic projection equipment and full multimedia support.

The latest wireless technology is available in common public areas such as seminar rooms, the learning commons, cafeterias and other special areas. Every laptop includes a wireless network modem to ensure connectivity for the student's convenience as well as connection to wired laptop classrooms. A comprehensive data network - part of the campus and residence infrastructure - provides each student with access to peers, faculty, program materials and the Internet.

Technology is an integral part of today's workplace. Graduates of the University of Ontario Institute of Technology will easily make the transition from school to work, bringing with them computer experience and lifelong learning skills so highly valued by employers.

For more information on the Mobile Learning environment visit our Web site at **www.uoit.ca.**

## 1.3 University library

The goal of the University of Ontario Institute of Technology library is to enrich the research, teaching, study and conversation of the University by providing exceptional library and information services and facilities to support all academic programs.

The University's Mobile Learning environment provides students with access to library resources using their laptop anytime, from anywhere. Digital resources and complementary print collections are provided for students in both a physical and virtual environment. Librarians are available to provide students with the skills to navigate effectively through the information environment.

A new, state-of-the-art, 55,000-square-foot library is scheduled for completion by September 2004. The design accommodates new and emerging technologies while maintaining the values of a traditional library. It will offer a variety of learning spaces to suit individual learning styles and user needs. For more information about the library and its services, please visit **www.uoit.ca.**

# Section 2: Academic Schedule 2003-04

| | |
|---|---|
| **September 2-3, 2003** | Fall semester orientation. |
| **September 3, 2003** | Deadline for payment of fees, fall semester. |
| **September 4, 2003** | Lectures begin, fall semester. |
| **September 17, 2003** | End of regular registration period; last day to add courses, fall semester.<br>Last day to drop courses and receive a 100 per cent refund of tuition fees, fall semester. |
| **October 1, 2003** | Last day to withdraw from fall semester courses without academic consequences. Courses dropped after this date will be recorded on the academic transcript with a grade of 'W' to indicate withdrawal.<br>Last day to drop courses and receive a 50 per cent refund of tuition fees, fall semester. |
| **October 13, 2003** | Thanksgiving Day. No lectures. |
| **November 11, 2003** | Last day to withdraw from fall semester courses. |
| **December 3, 2003** | Lectures end, fall semester. |
| **December 5-15, 2003** | Fall semester final examination period. |
| **January 6, 2004** | Deadline for payment of fees, winter semester. |
| **January 7, 2004** | Lectures begin, winter semester. |
| **January 15, 2004** | Last day to submit to the Registrar notice of intention to graduate at the spring session of convocation. |
| **January 20, 2004** | End of regular registration period; last day to add courses, winter semester.<br>Last day to drop courses and receive a 100 per cent refund of tuition fees, winter semester. |
| **February 3, 2004** | Last day to withdraw from winter semester courses without academic consequences. Courses dropped after this date will be recorded on the academic transcript with a grade of 'W' to indicate withdrawal.<br>Last day to drop courses and receive a 50 per cent refund of tuition fees, winter semester. |
| **February 16-20, 2004** | Mid-term break. |
| **March 19, 2004** | Last day to withdraw from winter semester courses. |
| **April 9, 2004** | Good Friday. No lectures. |
| **April 13, 2004** | Lectures end, winter semester. |
| **April 15-24, 2004** | Winter semester final examination period. |
| **May 4, 2004** | Deadline for payment of fees, summer semester. |
| **May 5, 2004** | Lectures begin, summer semester (including 14-week summer semester and seven-week spring session). |
| **May 11, 2004** | Last day to add courses, seven-week spring session.<br>Last day to drop seven-week spring session courses and receive a 100 per cent refund of tuition fees. |
| **May 18, 2004** | Last day to add courses, 14-week summer semester.<br>Last day to drop 14-week summer semester courses and receive a 100 per cent refund of tuition fees.<br>Last day to withdraw from seven-week spring session courses without academic consequences. Courses dropped after this date will be recorded on the academic transcript with a grade of 'W' to indicate withdrawal.<br>Last day to drop seven-week spring session courses and receive a 50 per cent refund of tuition fees. |
| **May 24, 2004** | Victoria Day. No lectures. |
| **June 2, 2004** | Last day to withdraw from 14-week summer semester courses without academic consequences. Courses dropped after this date will be recorded on the academic transcript with a grade of 'W' to indicate withdrawal.<br>Last day to drop 14-week summer semester courses and receive a 50 per cent refund of tuition fees. |
| **June 8, 2004** | Last day to withdraw from seven-week spring session courses. |
| **June 18, 2004** | Lectures end, seven-week spring session. |
| **June 21-23, 2004** | Spring session final examination period. No lectures for the 14-week summer semester during this period. |
| **June 24, 2004** | Lectures begin, seven-week summer session. 14-week summer semester lectures resume. |
| **June 30, 2004** | Last day to add courses, seven-week summer session.<br>Last day to drop seven-week summer session courses and receive a 100 per cent refund of tuition fees. |
| **July 1, 2004** | Canada Day. No lectures. |
| **July 8, 2004** | Last day to withdraw from seven-week summer session courses without academic consequences. Courses dropped after this date will be recorded on the academic transcript with a grade of 'W' to indicate withdrawal.<br>Last day to drop seven-week summer session courses and receive a 50 per cent refund of tuition fees. |
| **July 16, 2004** | Last day to withdraw from 14-week summer semester courses. |
| **July 28, 2004** | Last day to withdraw from seven-week summer session courses. |
| **August 2, 2004** | Simcoe Day. No lectures. |
| **August 10, 2004** | Lectures end, 14-week summer semester and seven-week summer session. |
| **August 12-21, 2004** | Summer semester final examination period. |

# Section 3: Governing Bodies and Staff 2002-03





## 3.1 Board of Governors

**Chair**
Robert Strickert

**Vice-Chair**
Garry Cubitt

**Chancellor**
To be named

**President and Vice-Chancellor**
Gary Polonsky

**Members**
Peter Bagnall
Joanne Burghardt
Michelle Carter
William Hunter
Denise Jones
Gail MacKenzie
Mark Moorcroft
Mike Shields
Phillip Simmons
Lorraine Sunstrum-Mann
Doug Wilson

## 3.2 Academic Council

**Members of the Council**
Gary Polonsky, President and Chair
Michael Finlayson, Provost
George Bereznai, Dean, School of Energy Engineering and Nuclear Science
Carolyn Byrne, Dean, School of Health Science
Murray Genoe, Principal and Associate Dean, Trent University
Margaret Greenley, Vice-President, Student Services
Ronald Hinch, Dean, School of Integrated Justice Studies
William Hunter, Dean, School of Education
Marc A. Rosen, Dean, School of Manufacturing Engineering
Bernadette Schell, Dean, School of Business and Information Technology
William Smith, Dean, School of Science
Bill Muirhead, Director, Learning Technologies
Richard Levin, Vice-President, Strategic Enrolment Management and Registrar
Susan Barclay-Pereira, University Librarian
MaryLynn West-Moynes, Vice-President, Communications and Marketing

**Non-voting officers:**
Donald Wallace, Secretary
Ann Mars, Assistant

## 3.3 University Officers and Staff

**President and Vice-Chancellor**
Gary Polonsky, BSc, MA

**Provost**
Michael Finlayson, BA (Hons), MA, PhD

**Vice-President, Communications and Marketing**
MaryLynn West-Moynes, BSc (Hons), MA

**Vice-President, Finance and Administrative Services**
Don Hargest, BA, MBA, CA

**Vice-President, Human Resources and Legal Services**
Don Sinclair, BA, BPHE, CHRP

**Vice-President, Information Technology**
Gerry Pinkney

**Vice-President, Strategic Enrolment Management and Registrar**
Richard Levin, BA (Hons), MA

**Vice-President, Student Affairs and Services**
Margaret Greenley, BA

**Vice-President, Advancement**
Terrence Slobodian, BA

**Project Manager, University of Ontario Institute of Technology**
Catherine Drea, BA, MA

**Director, Learning Technologies**
Bill Muirhead, BEd, MEd, PhD

**Director, Academic Planning**
Donald Wallace, BA, MA, PhD

**University Librarian**
Susan Barclay-Pereira, BA (Hons), MLS, MEd

**DEANS**

**Dean of Business and Information Technology**
Bernadette Schell, BA, MSc, PhD

**Dean of Education**
William Hunter, BA, PhD

**Dean of Energy Engineering and Nuclear Science**
George Bereznai, BEng (Hons), MEng, PhD

**Dean of Health Science**
Carolyn Byrne, RN, MHSc, PhD

**Dean of Integrated Justice Studies**
Ronald Hinch, BA, MA, PhD

**Dean of Manufacturing Engineering**
Marc A. Rosen, BASc, MASc, PhD, PEng, FCSME, FEIC

**Dean of Science**
William Smith, BASc, MASc, MSc, PhD, PEng

# Section 4: Admission

With the exception of part-time students, all students apply to the University of Ontario Institute of Technology through the Ontario Universities' Application Centre (OUAC).

Students attending an Ontario secondary school are normally informed of OUAC application procedures and deadlines through their schools in September. Canadian residents not attending an Ontario secondary school, and international applicants, also apply through OUAC (**www.ouac.on.ca**).

Part-time students will complete an application form at **www.uoit.ca** to be submitted directly to the University's Registrar's Office. Part-time students may also pick up an application at the Registrar's Office. Call 1.866.844.8648 or 905.721.3190, or e-mail **admissions@uoit.ca**.

**Registrar's Office**
University of Ontario Institute of Technology
SW205, South Wing
2000 Simcoe St. North
Oshawa, ON L1H 7K4

## 4.1 Admission requirements

Grade requirements stated below are normal minimum cut-off levels. The actual required grades for admission cannot be determined until all applications are received. Students whose grades have been affected by exceptional circumstances which can be documented are encouraged to write to the Registrar's Office with appropriate information.

Ontario universities support the full disclosure of all marks achieved in all attempts at a secondary school course. The University of Ontario Institute of Technology will use the highest grade obtained in a course in the calculation of averages.

Students apply through the Ontario Universities' Application Centre (OUAC). See **www.ouac.on.ca**. Students should consult with their school guidance offices for deadline dates.

### 4.1.1 Bachelor of Education

- An undergraduate degree in science from a recognized university; preference will be given to students with an Honours degree in the Sciences, Mathematics, or Computer Science.
- Completion of a minimum of 30 credit hours in university courses (equivalent to five full courses, or 10 one-semester courses) in a first teachable subject and 18 credit hours (equivalent to three full courses, or six one-semester courses) in a second one.
- A minimum "B" overall average in the last year of full-time study with a minimum "B" average in courses applicable to each teachable subject.
- Personal profile addressing skills and related work experience
- Three letters of reference

#### 4.1.2 Four-year undergraduate programs

- Graduation from an Ontario secondary school with a minimum overall average of 70 per cent.
- Admission will be based on the six highest grades at the OAC or Grade 12 (U or M) level. These six courses must include course prerequisites for the selected program of study as indicated in the school sections of this calendar.

### 4.2 Non-Ontario applicants

Applicants from outside of Ontario apply through the Ontario Universities' Application Centre (OUAC). See **www.ouac.on.ca** for information. Applicants seeking information on the applicability of their educational backgrounds may seek informal guidance from the Registrar's Office if their circumstances are straightforward. Applicants wanting a formal assessment of their credentials prior to application should contact a credential evaluation service. Official determination of admissibility and transfer of credit cannot be made until the point of application.

#### 4.2.1 Applicants from other Canadian provinces

Specific information on admissions requirements for students completing secondary school in other provinces is available from the Registrar's Office. The normal minimum requirement is completion of Grade 12 with a minimum overall average of 70 per cent. Quebec applicants must have one year beyond the Secondary V diploma. Equivalent subject prerequisites will apply to out-of-province applicants.

#### 4.2.2 Applicants from the United States

The minimum requirement is secondary school graduation with a minimum C average. All applicants must present an SAT or an ACT score; a minimum combined SAT score of 1200 or an ACT score of 27 is recommended.

#### 4.2.3 Applicants from British-patterned education (GCE)

The minimum requirement is the General Certificate of Education, including a minimum of two Advanced Level courses. No grade can be below a 'C'.

#### 4.2.4 Applicants from other countries

Applicants from other countries should be in contact with the Registrar's Office for information.

#### 4.2.5 International Baccalaureate students

Full diploma candidates who achieve passes in six subjects with at least three at the Higher Level, and who accumulate a grade total of 24 with no score lower than 4, are eligible for admission to first year. Students must hold the appropriate prerequisite subjects at the Higher Level. English may be held at either Higher or Standard Level. Applicants offering prerequisites at Standard Level will be given individual consideration. See Section 4.5 for information on advanced standing.

### 4.3 Students transferring from other universities

Credits from other Ontario universities will be recognized in a student's program as appropriate, subject to the residency requirement (see Section 5.16). The same practice will apply to other Canadian degree-granting universities and accredited American institutions. Credits from universities in other countries will be evaluated individually.



### 4.4 Mature students (policy under review)

Applicants who do not hold the published admission requirements may be considered for admission if:

i) they are at least 21 years of age in the calendar year of registration;

ii) they are Canadian citizens or permanent residents of Canada or convention refugee claimants; or

iii) they have been away from post-secondary studies for a minimum of two years.

As the University of Ontario Institute of Technology offers specialized programs requiring proficiency in prerequisite subjects, mature students must be able to demonstrate the capacity to succeed in such programs. Evidence of such ability may include academic upgrading, work experience and/or scores on standardized tests such as the SAT.

### 4.5 Advanced standing based on courses taken in secondary school

Applicants who have completed Advanced Placement (AP) or International Baccalaureate (IB) examinations may be granted up to a maximum of 18 credit hours toward their University of Ontario Institute of Technology degree. Other university-level courses taken while attending secondary school will be considered on an individual basis. Official documents must be supplied directly from the issuing institution to the Registrar's Office to ensure granting of credit. Minimum subject scores of 4 in the Advanced Placement Examinations and 5 in the International Baccalaureate examinations are required for advanced standing.

Credit and exemption will not be given for completion of secondary school International Baccalaureate or Advanced Placement courses unless an acceptable score is attained on the examination administered by the appropriate board.

### 4.6 English language proficiency

All applicants are required to give evidence of their oral and written proficiency in English. This requirement can be satisfied with one of the following criteria:

i) their mother tongue or first language is English

ii) they have studied full-time for at least three years (or equivalent in part-time studies) in a secondary school or university where the language of instruction and examination was English

iii) they have achieved the required proficiency on one of the tests in English language acceptable to the University of Ontario Institute of Technology (see below)

Recommended scores - English language proficiency tests
(higher scores may be required)

| | |
|---|---|
| TOEFL (computer based) | 220 |
| TOEFL (paper based) | 560 |
| IELTS | 7 |
| MELAB | 85 |

### 4.7 Application deadlines

Specific dates pertaining to the current year are provided on the University's Web site at **www.uoit.ca**. Applications submitted after published deadlines may be considered on an individual basis. Applicants should consult the Ontario Universities' Application Centre and school guidance counsellors for more information.

### 4.8 Conditional admission

If an applicant is currently completing courses at a secondary or post-secondary institution, a conditional admission decision will be made. This decision will be based upon the applicant's eligibility for admission subject to successful completion of the courses for which he/she is currently registered. This decision will remain conditional until final results for the applicant's current program of study are available.

The University may, in other circumstances, grant conditional acceptance to a student who is eligible for admission subject to satisfying specified conditions. These conditions will be outlined in the conditional offer of admission.

### 4.9 Deferral of offers

Applicants who are offered admission and who have accepted may defer their admission by one year, with permission of the dean. Students should write to or e-mail the Registrar's Office to request a deferral.

### 4.10 Students with disabilities

The University welcomes supporting documentation from applicants with disabilities. Any documentation should be forwarded directly to the Registrar's Office within the application deadline dates and will become a part of the applicant's file. The Registrar's Office, in cooperation with the Centre for Students with Disabilities, will ensure that each applicant is treated in a fair and equitable manner.

### 4.11 Expiration of credit

University courses taken more than eight years prior to admission will not be accepted for credit.

### 4.12 Challenge for credit

Schools may offer examinations which allow students to demonstrate their competence in a subject for the purpose of advanced standing. Please consult the dean's office. The fee for such examinations is 50 per cent of the applicable course fee. Unsuccessful attempts are counted as failures on the transcript.

### 4.13 Program changes

Students wishing to pursue a program of study other than the one to which they were originally admitted should submit a request in writing to the Registrar's Office. Such requests will be subject to the admission requirements of the new program of study and final approval rests with the dean of the School. Changes will be permitted only if space is available and all academic requirements are met.

### 4.14 Re-admission

Students previously admitted to the University of Ontario Institute of Technology who have not been in attendance for a period of one academic year and have not received a deferral will be required to apply for re-admission. Applications for re-admission are submitted directly to the Registrar's Office.

A student who has attended another institution since attending the University of Ontario Institute of Technology will be required to submit official transcripts from that institution.



### 4.15 Honesty in applications

Students must declare fully their educational history upon applying to the University. Students must also advise the Registrar should they attend another post-secondary institution while a student at the University of Ontario Institute of Technology. Failure to declare previous or concurrent post-secondary education, or the falsification of any documents related to such academic pursuits, may result in suspension or expulsion from the University, including possible revocation of degrees awarded.

### 4.16 Appeal of admission decisions

Individuals may appeal their admission decision in writing within 10 days to the Registrar's Office. A charge for such appeals is refundable if the appeal is successful. Admission appeals are referred to the Admission Appeals Committee.

# Section 5: General Academic Regulations

### 5.1 Selecting courses

Requirements for programs of study are listed in the school sections of this calendar. Students should become familiar with the program requirements and plan their programs accordingly. Academic advice is available to those who experience difficulty when selecting courses.

Not all courses are offered in any one term or academic year. Elective offerings may vary from semester to semester.

### 5.2 Course changes and voluntary withdrawal

Students may add courses within the first two weeks of each semester. Students may withdraw from any or all courses within four weeks of the start of semester without academic consequences. Between four weeks and 48 teaching days (approximately 75 per cent through a semester), a "W" will be placed on the student's record indicating withdrawal. The "W" will not affect the grade point average. However, a large number of "W" grades may affect the way a transcript is viewed by graduate schools or potential employers. Courses may not be dropped after the 48th day. Withdrawal deadlines are not the same as the refund deadlines. Students should consult the academic schedule in this calendar when considering withdrawal.

Withdrawal from a course may have implications for your academic program or your full-time status. A dropped course does not count toward degree requirements and cannot be used to satisfy prerequisites for further courses. In addition, the course you drop may not be available in the next semester or session. Please consider all course changes carefully or consult an advisor.

### 5.3 Auditing courses

Students may audit a course provided they obtain the permission of the course instructor(s). They are not permitted to write examinations or receive any form of evaluation. They must register formally as auditors with the Registrar's Office. However, audited courses will not appear on a student's transcript.

### 5.4 Letters of permission

Students wishing to complete courses at another post-secondary institution must advise the Registrar's Office of their intentions and obtain a Letter of Permission. This will ensure that the courses to be taken at the host institution will be recognized for credit at the University of Ontario Institute of Technology and are applicable to the student's program of study. The student will then be able to attend the host institution without formal admission. Students are responsible for having copies of official transcripts of all post-secondary studies sent to the University of Ontario Institute of Technology for award of transfer credit.

### 5.5 Repeating courses

Students will be allowed to repeat courses in which they have received a grade of D or lower. Students will need to make arrangements with the Registrar's Office to repeat a course.

All instances of a course will appear on the academic transcript. The highest grade will be taken into account in the grade point average.

### 5.6 Prerequisites/co-requisites

Some courses have prerequisites or co-requisites. Where a prerequisite is specified, the prerequisite must be successfully completed prior to taking the course in question. Where a co-requisite is specified, the co-requisite must be successfully completed prior to or taken at the same time as the course in question. Prerequisites and co-requisites may be waived with the instructor's permission. Any student who requests such a waiver is responsible to ensure that he/she is adequately prepared to proceed with the level of study required in the course. Inadequate preparation is not a basis for appeal of final grade in a course for which a student requested a waiver of prerequisite or co-requisite.

### 5.7 Full-time/part-time status

Each program has associated with it a number of credit hours that constitute a full course load. In many programs, this number is 15 per semester or 30 per academic year. Students are considered full-time when they take 60 per cent or more of the full course load. For example, a student in a program with a full course load of 15 credit hours per semester will be considered full-time if they are taking nine credit hours or more. Full-time status may have an impact on such things as student aid and awards eligibility, fees, income tax credits, athletic eligibility, and other areas.

### 5.8 Grading

Final grades for all courses will be submitted to the Registrar's Office on a letter grade scale. The following descriptions outline the quality of work associated with each letter grade. Percentage to grade equivalencies are included as a guideline for conversion.

| Grade | Percentage | Grade Points | Description |
|---|---|---|---|
| A+ | 90-100 | 4.3 | Excellent. Strong evidence of originality and independence of thought; good organization; capacity to analyze and synthesize; superior grasp of subject matter with sound critical evaluations; evidence of extensive knowledge base; an outstanding ability to communicate. |
| A | 85-89 | 4.0 | |
| A- | 80-84 | 3.7 | |
| B+ | 77-79 | 3.3 | Good. Substantial knowledge of subject matter; some evidence of organization and analytic ability; a moderate degree of originality and independence of thought; reasonable understanding of relevant issues; evidence of familiarity with literature; an ability to communicate clearly and fluently. |
| B | 73-76 | 3.0 | |
| B- | 70-72 | 2.7 | |
| C+ | 67-69 | 2.3 | Adequate. Student is profiting from his/her university experience; an acceptable understanding of the subject matter; ability to develop solutions to simple problems in the material; some ability to organize and analyze ideas; an ability to communicate adequately. |
| C | 60-66 | 2.0 | |
| D | 50-59 | 1.0 | Marginal. Some evidence that critical and analytic skills have been developed; rudimentary knowledge of the subject matter; significant weakness in the ability to communicate. |
| F | 0-49 | 0.0 | Inadequate. Little evidence of even superficial understanding of subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature; failure to complete required work; an inability to communicate. |

### 5.9 Academic standing

Academic standing is calculated and recorded on academic transcripts at the end of each semester for every full-time student. Academic standing regulations are applied to part-time students after the completion of nine credit hours.

Academic standing is determined by the semester and cumulative grade point averages and the student's academic standing in the previous semester. The minimum cumulative grade point average required for graduation is 2.00.

**Clear standing:** Students are required to maintain a minimum cumulative grade point average of 2.00 to remain in clear standing.

**Academic warning:** Students in clear standing and first semester students whose cumulative grade point average falls between 1.50 and 1.99 will receive a letter of warning and will be encouraged to contact an academic advisor.

**Probation:** Students will be placed on probation if their cumulative grade point average falls between 1.00 and 1.49 or if they receive a second consecutive academic warning. Students on probation will be required to contact an academic advisor. The academic advisor will approve the student's schedule for the following semester with a view to raising the cumulative GPA to 2.00 within two semesters. Students failing to consult an advisor or failing to register for the approved schedule will be de-registered.

Students on probation may continue their studies as long as they continue to achieve a semester grade point average of 2.00. Students placed on probation remain on probation until their cumulative grade point average is 2.00 or higher.

**Suspension:** Students will be suspended if their cumulative grade point average falls below 1.00 or if they fail to fulfill the conditions of probation.

Following a period of at least one semester, a suspended student may apply for re-admission to the University through the Registrar's Office. This application will be considered at the discretion of the dean of the School to which application is made. The student may be asked to agree to conditions for reinstatement.

**Dismissal:** Any student re-admitted after a period of suspension will be readmitted on probation. A student who fails to comply with the conditions of his reinstatement or whose performance would result in suspension for a second time will be dismissed.

A student who exceeds the prescribed time limit for completion of a degree program will not be permitted to continue in that program, and hence will be dismissed.

### 5.10 Grade changes

After grades have been officially approved and released, any grade changes should be submitted in writing to the Registrar. Grade changes may result from the submission of course work, the writing of a deferred examination, clerical errors, or an approved examination reread. All grade changes must be approved by the course instructor and the dean or his/her designate.

### 5.11 Grade appeals

Matters concerning course work normally fall within the authority of the instructor. Students unable to comply with given deadlines must contact their instructor prior to the deadline if an extension to the deadline is requested. All course work must be submitted by the last day of classes, unless an earlier date has been specified. Instructors may grant extensions beyond their own deadlines or beyond the last day of classes up to the last day of the examination period provided that a student presents reasons of illness, etc., with appropriate documentation. Extensions beyond the last day of the examination period can only be granted by academic appeal.

Students may formally appeal a grade received for course work provided that the matter has been discussed with the instructor in the first instance in an attempt to resolve the issue without the need of formal appeal. If a student has good reason to believe a mistake has been made in the assessment of a final grade, an appeal of the assigned grade may be made. A fee may be charged for such appeals. An appealed grade cannot be lowered.

### 5.12 Deans' Honours Lists and the President's List

Students with a cumulative GPA of 3.5 to 3.79 at the end of a semester will receive the designation Dean's Honours List on their transcript. Students with a cumulative GPA of 3.8 or higher will receive the designation President's List on their transcript.

### 5.13 Documents and student files

Documents submitted to the Registrar's Office become the property of the University and are protected under the University's policy on access to student information. Original copies of documents are kept on file at the Registrar's Office and may not be returned to the student.

Official student academic records deemed to have archival value and preserved in the University archives shall be made available to researchers authorized by the University 75 years after the student ceased to be registered.

### 5.14 Curriculum Substitution

Students wishing to substitute one course for another in a set of program requirements may request permission to do so from the dean of the School. Requests are referred to School Councils for decision.

### 5.15 Academic Honesty

Faculty members and students share an important responsibility to maintain the integrity of the teaching and learning relationship. This relationship is characterized by honesty, fairness, and mutual respect for the aims and principles of the pursuit of education. Academic misconduct impedes the activities of the University community, and is punishable by appropriate disciplinary action.

The University and its members have the responsibility of providing an environment which does not facilitate the inadvertent commission of academic misconduct. Students and faculty should be made aware of the actions which constitute academic misconduct, the procedures for launching and resolving complaints, and the penalties for commission of acts of misconduct.

### 5.15.1 Academic misconduct

Academic misconduct includes, but is not limited to:

- Unreasonable infringement on the freedom of other members of the academic community (e.g., disrupting classes or examinations, harassing, intimidating, or threatening others).
- Violation of safety regulations in a laboratory or other setting.
- Cheating on examinations, assignments, reports, or other work used to evaluate student performance. Cheating includes copying from another student's work or allowing one's own work to be copied, submitting another person's work as one's own, fabrication of data, consultation with an unauthorized person during an examination, or use of unauthorized aids.
- Impersonating another student or allowing oneself to be impersonated for purposes of taking examinations, or carrying out laboratory or other assignments.
- Plagiarism, which is the act of presenting the ideas, words, or other intellectual property of another as one's own. The use of other people's work must be properly acknowledged and referenced in all written material.
- Obtaining by improper means examination papers, tests, or similar materials; use or distribution of such materials to others.
- Falsifying academic records, including tests and examinations, or submitting false credentials for purpose of gaining admission to a program or course, or for any other purpose.
- Misrepresentation of facts, whether written or oral, which may have an effect on academic evaluation. This includes making fraudulent health claims, obtaining medical or other certificates under false pretenses, or altering certificates for the purposes of misrepresentation.
- Submission of work when a major portion has been previously submitted or is being submitted for another course, without the express permission of all instructors involved.

### 5.15.2 Penalties

If a student is deemed to have committed academic misconduct, one or more of the following disciplinary penalties may be imposed. The severity of the penalty will be determined by the nature of the offence and the student's past record of conduct. Students found guilty of successive acts of misconduct will receive increasingly severe penalties.

- Re-submission of the piece of academic work in respect of which the misconduct was committed, for evaluation.
- A written reprimand, warning the student that the behaviour was unacceptable and that further misconduct will lead to additional penalties. A copy of the reprimand will be placed in the student's file, but no notation will appear on the academic record.
- Submission of a failing grade in an examination, test, assignment or course.
- Disciplinary probation for the remainder of the student's registration in his current program of study. A note to this effect will be placed in the student's file, but no notation will appear on the academic record. Any further offence will lead to a more severe penalty.
- Expunging of grades or revoking of degrees.
- Restraining orders or monetary restitution where appropriate in the case of threats, harassment, or damage to property.
- Suspension from attendance in a course, program, school, or the University, for a period not exceeding three years as deemed appropriate. While suspended, a student may not register, and loses the right to attend lectures, write examinations, and receive payment from University sources. Courses taken elsewhere during the period of suspension are not eligible for transfer credit. Notice of suspension will be placed in the student's file and will appear on his/her academic record. The conditions of suspension will specify the length of time such notice will remain on the student's academic record.
- Permanent expulsion from the University. A note to this effect will be placed in the student's file and will remain on his/her academic record.
- Such other penalty as deemed appropriate.

### 5.15.3 Launching and resolving complaints

With respect to all accusations of academic misconduct, students are presumed innocent until the contrary has been established. Decisions regarding the commission of academic misconduct are based on the balance of probabilities. A record of all allegations of misconduct, along with details of the resolution, will be entered into the central academic records kept by the Registrar's Office.

Faculty, staff, or students who have reason to believe that an academic offence has been committed should report the matter promptly to the appropriate dean. In the absence of extenuating circumstances, this should be the dean of the School in which the student is enrolled. If the student has not been admitted to a degree program, the matter should be reported to the dean of the School responsible for the course in which the offence was committed. A written report of the alleged offence should be prepared, together with any relevant evidence.

The dean must decide promptly whether an attempt should be made to resolve the matter informally; otherwise, the dean should follow the procedures for formal resolution. In either case, a student will not be permitted to withdraw from the course in which the offence was alleged to have been committed until the matter is resolved and penalty imposed, if applicable.

### 5.15.4 Procedures for informal resolution

The dean must inform the student that he/she has been accused of academic misconduct. The student will have five working days in which to respond to these allegations.

If the alleged offender responds with an admission of guilt and agrees to the terms of a resolution as set out by the dean, the matter will be considered closed. The terms of the resolution should be detailed in writing and signed by both the dean and the student involved.

Informal resolution may not result in the expunging of grades, the revoking of degrees, or in the student being suspended or expelled.

### 5.15.5 Procedures for formal resolution

When an attempt at informal resolution fails or is deemed inappropriate, the dean must inform the student, in writing, of the charge and the possible penalties, as well as provide a copy of the pertinent policy statement. The student will be given five working days to prepare a response. The dean will then meet with the student to hear the response. Both the dean and the student are entitled to be accompanied by up to two advisors at this meeting, provided 48 hours advanced notice is given of the identity of the advisors.

The dean shall then conduct a thorough investigation of the allegations and response, to be concluded within 10 further working days. The dean will notify the parties of the decision in writing. A copy of the decision will be provided on a need-to-know basis to administrative units (e.g., other schools, the Registrar).

#### 5.15.6 Appeals

All formal decisions of deans may be appealed. The student will be given 10 working days to gather new evidence, if required, and to submit a letter of appeal to the University Discipline Committee. Under normal circumstances, disciplinary penalties will not be imposed before an appeal is decided, nor will official transcripts be issued. Formal registration may be revoked, but the student may continue to attend classes while an appeal is being heard. If the appeal is granted, formal registration will be reinstated. In exceptional circumstances, such as when the continued presence of the accused would unduly affect normal scholarly activity, the chair of the University Discipline Committee may vary this practice.

### 5.16 Residency requirements

At least half of a student's courses must be from among University of Ontario Institute of Technology course offerings in order to meet the residency requirements for graduation. In exceptional circumstances, with sufficient advance notice, or in the case of special agreements with other universities, a dean may reduce this requirement to 25 per cent. Such cases are reported to Academic Council for information.

### 5.17 Dual degrees

Students in clear standing after one year of academic studies may apply to the Registrar's Office to complete two degrees simultaneously.

### 5.18 Time limits

Generally, students must complete a degree program within a number of years equal to twice the length of time it would take to complete the program on a full load basis. Students taking the one-year Bachelor of Education program must complete the program within three years. Students unable to complete the degree within the time limit must apply for an extension of the degree program to ensure continued eligibility to graduate. Applications for extension will be considered at the discretion of the dean and will normally be granted only in exceptional circumstances.

### 5.19 Second degrees

Students holding a University of Ontario Institute of Technology degree may pursue a second degree in another area. In addition to meeting all requirements of that degree, at least one additional year of study is required to qualify.

### 5.20 Appeals

Every student has the right to appeal decisions resulting from the application of University regulations. Appeals will be considered in the case of illness, bereavement, or other acceptable cause. The responsibility for making an appeal rests with the student.





# Section 6: Fees and Charges

### 6.1 General information

The fees and charges indicated in this calendar are valid as of the date of printing. The University reserves the right to make changes to the regulations, fees and charges listed below.

After registration, each student will receive a detailed assessment of fees due. Students will be provided with balances owing through the online registration process. No fee statements will be mailed. Students are responsible for paying amounts owing by the fee deadlines specified in the academic schedule.

Students with fees outstanding beyond the due date will be assessed a late payment fee of $40 and will be subject to the University's hold policy. Students on hold are unable to register, order transcripts, or graduate. Other services (i.e., library access, parking passes) may also be denied.

Students expecting to receive financial aid or awards after payment deadlines should make arrangements with the Accounting Office. Deferred payment plans are available for a fee. Note that full Mobile Learning fees must be paid by the end of the first semester. In all cases, outstanding fees must be paid before subsequent registration will be allowed.

A student dropping courses within the first 10 lecture days in any semester will not be liable for tuition fees for those courses. Any student who drops a course after the 10th day of lectures up to the 20th day of lectures will receive a 50 per cent refund of tuition fees. No tuition will be refunded for courses dropped after the 20th day of lectures. Students wishing to drop courses should consult the academic schedule in this Calendar for specific refund dates.

Non attendance is not equivalent to dropping a course. Formal withdrawl is required.

### 6.2 Methods of payment

Fees may be paid in cash or by certified cheque, money order, direct debit, Visa, MasterCard, or American Express. Payments are to be made payable to the University of Ontario Institute of Technology. Please do not send cash in the mail. Tuition deferments may be available for students experiencing financial difficulties. For more information please contact the Accounting Office at 905.721.3022.

## 6.3 Tuition fees

Tuition, ancillary, and student organization fees are assessed on a semester basis and are due the day before classes begin each semester. Any appeal of this assessment on exceptional medical or compassionate grounds must be made to the Registrar.

### 6.3.1 Fees for citizens of Canada and permanent residents

| | Per credit hour | Full course load (per year) |
|---|---|---|
| BA (Hons) | $139.47 | $4,184 |
| BCom (Hons) | $139.47 | $4,184 |
| BEd | $139.47 | $4,184 |
| BScN (Hons) | $139.47 | $4,184 |
| BSc (Hons) - Radiation Science | $116.22 | $4,184 |
| BSc (Hons) - Physical Science and Biological Science | $139.47 | $4,184 |
| BEng (Hons) - Manufacturing | $151.43 | $4,543 |
| BEng (Hons) - Nuclear | $126.19 | $4,543 |

### 6.3.2 Fees for international students

| | Per credit hour | Full course load (per year) |
|---|---|---|
| BA (Hons) | $333.33 | $10,000 |
| BCom (Hons) | $333.33 | $10,000 |
| BEd | $333.33 | $10,000 |
| BScN (Hons) | $333.33 | $10,000 |
| BSc (Hons) - Radiation Science | $277.78 | $10,000 |
| BSc (Hons) - Physical Science and Biological Science | $333.33 | $10,000 |
| BEng (Hons) - Manufacturing | $366.67 | $11,000 |
| BEng (Hons) - Nuclear | $305.56 | $11,000 |

## 6.4 Ancillary and student organization fees

Ancillary and student organization fees are charged on a semester basis and are due the day before classes begin each semester. Ancillary fees include athletics, recreation, student services, student life, counselling, student handbook, and information technology infrastructure. Student organization fees include student government and the Student Centre capital fund. Increases to student organization fees are determined by student referendum.

Students who enrol in less than the full course load prescribed for their program will be charged ancillary and student organization fees on a pro-rated basis.

| | |
|---|---|
| Ancillary fees: | $520 |
| Student organization fees: | $120 |

## 6.5 Health and dental insurance

Health and dental insurance fees are charged annually and are assessed as part of fall semester fees. These fees are charged to full-time students only. Students dropping to part-time status before the opt-out date will receive a refund of health and dental fees. The rates for both the health and dental plans and the University Health Insurance Plan (UHIP) are determined by the insurer.

International students are required to pay the University Health Insurance Plan (UHIP) fees in addition to regular health and dental insurance fees.

| | |
|---|---|
| Health and dental insurance (full-time students): | $118 |
| UHIP (international students only): | $702.78 |

## 6.6 Mobile Learning Environment

Mobile Learning fees are charged annually and are assessed as part of Fall semester fees. All full-time students are required to participate in the Mobile Learning program and part-time students are encouraged to opt in to the program. Part-time students who do not opt into full-time program will have access to IT services and a limited number of laptops available for temporary sign-out.

| | |
|---|---|
| Part-time program: | $525 |
| Full-time program: | $1,480 |

## 6.7 Residence fees

### 6.7.1 Residence fees

Residence fees are charged for an eight-month period (September - April) and are due at the beginning of the Fall semester.

**Simcoe Village:**

The South and Central Halls of Simcoe Village offer open concept rooms shared by two beds. The North Hall offers suites with two separate bedrooms. Costs are as follows:

| | |
|---|---|
| · South Hall/Central Hall | $4,300 |
| · North Hall | $4,800 |

**South Village:**

The South Village offers suites with two separate bedrooms. A meal plan is mandatory for all students living in the South Village.

| | |
|---|---|
| · All suites | $4,800 |

### 6.7.2 Meal plans

Students living in the South Village must choose one of the mandatory meal plans below. All other students may choose to purchase one of the voluntary meal plans, or may choose to opt in to a mandatory meal plan. Meal plans consist of a set number of meals per week and a credit account which may be used to purchase food from on-campus eating facilities.

**Mandatory plans:**

| Plan type | Description | Cost |
|---|---|---|
| M1 | 12 meals per week and a $250 credit | $3,000 |
| M2 | 9 meals per week and a $600 credit | $2,700 |
| M3 | 7 meals per week and a $900 credit | $2,450 |

**Voluntary plans:**

| Plan type | Description | Cost |
|---|---|---|
| V1 | 5 meals per week and an $800 credit | $1,990 |
| V2 | 3 meals per week and a $1,000 credit | $1,700 |
| V3 | A $1,200 credit | $1,200 |





### 6.8 Parking

Parking rates are determined annually. See the 2002-03 parking rate schedule below:

| | |
|---|---|
| Annual permit | $140 |
| Semester permit | $90 |
| Monthly permit | $40 |
| Weekly permit | $15 |
| Daily permit | $4 |
| Night/yearly permit | $30 |
| Pay n' Display | $1/hour |

### 6.9 Miscellaneous fees

| | |
|---|---|
| Application for admission (part-time and non-degree students) | $35 |
| Letter of permission (for taking courses at another post-secondary institution) | $25 |
| Late payment fee | $40 |
| Tuition deferment | $40 |
| Grade appeal fee (refundable if appeal is successful) | $30 |
| Supplemental/special examination fee | $25 |
| Verification of enrolment | $10 |
| Verification of fees paid | $10 |

# Section 7: Financial Aid and Awards

Financial planning is a vital element of being a successful student. There are many forms of financial aid available to students. For more detailed information about any of the programs mentioned below, please call or visit the Financial Aid Office, Room B205 or call 905.721.3036.

### 7.1 Ontario Student Assistance Program

The Ontario Student Assistance Program (OSAP) program provides repayable loan assistance to qualified students. Students can apply for OSAP online at **http://osap.gov.on.ca**. OSAP is interest free until one month after the individual is no longer a full-time student and the principle repayment begins six months after the individual is no longer a full-time student.

OSAP provides financial assistance to help students finance their education. By completing an OSAP application, students will be assessed for loan assistance from both the federal and provincial governments. A variety of government bursary programs will be administered to qualified students.

### 7.2 On-campus work programs

The University provides many on-campus part-time jobs, as well as full-time summer employment. Students are encouraged to apply early if working part-time is part of their financial plan. The Ontario Work Study Program may provide on-campus, part-time employment to applicants demonstrating a financial need beyond their resources.

### 7.3 Bursaries

Students who are experiencing financial difficulties face often unexpected and significant challenges which affect not only their academic progress but also their ability to remain in school. A committee assesses all applications for bursary assistance and selects recipients based on financial need. Bursary funding is made available through individuals, service organizations and corporate donations.

A bursary program is available to students in financial need. Throughout the year, individual bursaries are offered to students who are challenged by high cost programs, supplies or equipment. Emergency bursaries will be available to students facing unanticipated financial problems.

### 7.4 Emergency loans

Emergency loans are sometimes available to students awaiting the arrival of their OSAP funding. Appointments are required to determine a student's eligibility. Appointments are not available until the school year has commenced.

## 7.5 Budget counselling

The Financial Aid Office provides individual budgeting advice to students creating a personal budget to assist them in achieving financial success.

## 7.6 Scholarships

The University of Ontario Institute of Technology takes great pride in recognizing the academic achievements of its students. Through generous support from businesses, service organizations and individuals, the University is able to offer a number of scholarships and awards to assist students with meeting the costs of their university education.

Entrance Scholarships will be awarded automatically for outstanding academic achievement to eligible students. Students must register in 80 per cent of a full course load to be eligible for entrance scholarships.

The following is a complete list of scholarships for the 2003-04 academic year:

### 7.6.1 Entrance Scholarships (application required)

These scholarships are based on superior academic achievement, demonstrated leadership qualities, an essay, and a letter of support from the student's secondary school. Applications can be downloaded from **www.uoit.ca**.

**Chancellor's Scholarship:**
One valued at $28,000 ($7,000 per year over four years). Recipients must maintain a minimum 3.7 GPA on a full course load.

**President's Scholarships:**
Three valued at $24,000 each ($6,000 per year over four years). Recipients must maintain a minimum 3.7 GPA on a full course load.

**Founder's Scholarships:**
Three valued at $20,000 each ($5,000 per year over four years). Recipients must maintain a minimum 3.7 GPA on a full course load.

### 7.6.2 Entrance Scholarships (no application required)

Entrance scholarships are awarded to students admitted to the University of Ontario Institute of Technology presenting the highest admission average (not less than 85 per cent). Recipients must be full-time students and must maintain scholarship standing (a minimum 3.7 GPA, and at least 80 per cent of a full course load) to be eligible for renewal.

The number of scholarships available varies by program. The recipients are selected by the Awards Committee. Notification of entrance scholarships will be mailed with the offer of admission.



| Degree program | Total value | 1st year | Subsequent years |
|---|---|---|---|
| Nursing | $10,250 | $5,000 | $1,750 |
| Manufacturing Engineering | $9,750 | $4,500 | $1,750 |
| Nuclear Engineering | $9,750 | $4,500 | $1,750 |
| Commerce | $9,250 | $4,000 | $1,750 |
| Integrated Justice Studies | $9,250 | $4,000 | $1,750 |
| Biological Science | $9,250 | $4,000 | $1,750 |
| Physical Science | $9,250 | $4,000 | $1,750 |
| Radiation Science | $9,250 | $4,000 | $1,750 |
| Bachelor of Education (one year only ) | $4,000 | $4,000 | n/a |
| Mobile Learning Scholarship | $6,000 | $1,500 | $1,500 |

### 7.6.3 Award of Recognition

The University of Ontario Institute of Technology recognizes the accomplishment of all students admitted to the University presenting an admission average of 75 per cent or higher. These awards are given in the year of admission to students entering directly from an Ontario secondary school and are non-renewable.

| Admission average | Value |
|---|---|
| 85.0 per cent or higher | $2,500 |
| 75.0 per cent to 84.99 per cent | $750 |

# Section 8: Student Services

## 8.1 Introduction

The University of Ontario Institute of Technology is committed to ensuring its students experience a rich learning environment, including a high quality of student life. Counselling and support services for personal, academic and career goals contribute to this atmosphere. Qualified, highly skilled and student-focused staff will work directly with individual students and in partnership with faculty and other staff as appropriate, contributing to student success.

## 8.2 Student Life

At the University of Ontario Institute of Technology, emphasis is given to building a learning community that is increasingly supportive of student success in all facets – intellectually, emotionally, socially, and physically. The vibrant student life opportunities at the University are congruent with the institution's educational aspirations providing a seamless learning environment for students.

The Student Life Office welcomes the student voice, connects students to existing campus opportunities and assists students in developing new initiatives. The office liaises with the Student Association, Student Centre, residence, athletics, student clubs, Health and Wellness Centre, alumni, academic departments, and Student Support Services to promote student activities and enhance student satisfaction.

## 8.3 Academic assistance

Advisors will be available to assist students in learning study skills, including listening and note-taking, time management, and exam and test preparation.

## 8.4 Career and employment services

Career and employment counselling services are available to both students and graduates. Counsellors deliver workshops and individual assistance in the following areas: job search techniques, resumé and cover letter writing, interviewing skills and career planning. Special outreach programs that include resumé clinics, student success fairs, and in-class presentations are offered throughout the school term.

Expert labour market information is presented by employer panels that share information about their specific businesses and industries. On-campus employer recruitment events are also featured. Internship opportunities provide practical work experience related to programs of study to increase graduates' marketability. In addition, the annual Job Fair attracts more than 50 employers to campus to recruit for full-time, part-time, summer, and internship opportunities

An exclusive online job posting system will be available to students and graduates through a campus intranet.

## 8.5 Personal financial counselling

The Financial Aid Office helps students prepare budgets for the school year and how to deal with financial crisis. This process encourages students to consider their income and expenses and enables a counsellor to identify potential problems, review them and offer some solutions. Through budget counselling, students can learn the skills required to keep their finances in good order.

## 8.6 Services for students with disabilities

The University of Ontario Institute of Technology is committed to facilitating the integration of students with disabilities into the University community. While all students must satisfy the essential requirements for courses and programs, the administration, faculty, staff and students at the University of Ontario Institute of Technology will be expected to provide reasonable accommodation to students with disabilities.

Reasonable accommodation may require members of the University community to exercise creativity and flexibility in responding to the needs of students with disabilities while maintaining academic standards.

This policy acknowledges that fundamental to the academic and personal success of students is their responsibility both to demonstrate self-reliance and to identify needs requiring accommodation.

The Centre for Students with Disabilities (also known as the REACH Office) will assist students with disabilities who require accommodations in order to be successful as legally required by the Ontario Human Rights Code.

Students are encouraged to contact the REACH Office if they plan to attend the University, so that supports can be put in place. Supports may include alternative testing arrangements, FM hearing systems, note takers, training and access to computers and adaptive software, alternate formats, interpreters, class assistants, counselling, learning strategies instruction and much more, dependent on the needs of the individual student.

## 8.7 Intercollegiate Athletic Academic Success Program

The Intercollegiate Athletic Academic Success Program encourages academic success for all varsity athletes through the establishment of academic standards and a comprehensive program of success strategies and advising.

## 8.8 Athletics

The University of Ontario Institute of Technology has five squash courts, a double gymnasium, indoor golf centre, fitness area with indoor track, six clay indoor/outdoor tennis courts, basketball court, softball diamonds, soccer field and three beach volleyball courts.

## 8.9 Chaplain services

The chaplain's role will be to promote the well-being of the University community by means of her/his presence and concern, through worship and other liturgical activities, and in pastoral and non-credit educational programs. The chaplain's specific role is to provide pastoral care for individuals in need. This care is extended in complete confidence, without prejudice, and apart from the reporting systems of the University administration.

### 8.10 Health services

The Health & Wellness Centre provides a variety of nursing and medical services to the students and staff of the University of Ontario Institute of Technology. A staff of registered nurses and physicians is available five days per week to provide first aid, medical diagnosis and treatment, laboratory services, STD testing, contraceptive counselling, immunizations (including meningitis and hepatitis) and allergy injections. A free flu immunization program is available annually to all students and staff. Health and lifestyle promotional workshops are available through group presentations, guest speakers and one-to-one appointments. The Health & Wellness Centre staff provide consultation; verification of eligibility; and monitoring for infection control legislated purposes to specific University of Ontario Institute of Technology programs.

A mental health nurse is available to provide personal counselling and community referrals. Students will receive referrals through our Student Assistance Program for six one-hour sessions with an appropriate specialist outside of the University. In addition, counselling services are provided by a drug and alcohol counsellor. Health services are paid for on a fee for service basis or covered through the Ontario Health Insurance Plan.

### 8.11 Peer tutoring

Peer tutoring is available to students experiencing difficulties with individual subjects. Students who have successfully completed the subject may take on paid peer tutoring roles through the on-campus employment program.

### 8.12 Residence

Students at the University of Ontario Institute of Technology can choose between a two-bed room and a two-bedroom suite. Close to 1,000 beds will be available to students on campus in September 2003. Suites typically contain two double beds, a kitchenette, a three-piece private bathroom, a TV, Internet access and phone service, as well as common lounges, study rooms, laundry, recreational facilities and biweekly housekeeping service.

### 8.13 Student government

A student government office will be established to enhance the educational experience and quality of life for all students at the University of Ontario Institute of Technology.

# Section 9: School of Business and Information Technology





Dean: Bernadette Schell, BA, MSc, PhD

### 9.1 Degree offered

**Bachelor of Commerce (Honours) - BCom (Hons)**

The School of Business and Information Technology offers an Honours Bachelor of Commerce degree with a difference. By placing a strong emphasis on how technology can enhance business opportunities, students are prepared to be on the leading-edge of innovation in industry and business.

The University's Mobile Learning environment (see section 1.2) provides each student with a current model of the IBM ThinkPad and access to fully networked classrooms and learning spaces. This technically enhanced learning provides rich opportunities to network with the world's best minds and resources. Students have the exceptional advantage of online discussions with leading CEOs and are able to learn first hand the applications of information systems to business.

The School's research focuses on the application of management to engineering technology, information technology, and health sciences technology.

### 9.2 Program information - Bachelor of Commerce (Honours)

#### 9.2.1 General information

The curriculum prepares graduates with strong employability skills in addition to the foundations for excellence in managing business organizations. Organizations are examined from a number of perspectives, including how they are managed and the changing environments in which they operate. National and international contexts of business are explored, along with relevant issues facing managers in business, labour and the public sector. Students receive extensive practice in applying theory to the processes of decision-making and problem-solving through computer-based exercises and simulations, case study analyses, problem-based learning activities and field-based projects.

Year two, the core year, is an introduction to each of the functional areas of business - finance, accounting, operations, human resources, and marketing - and an examination of the ways in which these are integrated within an operation. In years three and four students may choose to specialize in one or more functional areas, such as accounting, supplier management, marketing, e-business and e-commerce, or organizational behaviour and human resources. In year four, students benefit from the UOIT Edge Capstone Study Project and Strategic Management courses. These unique programs provide an opportunity to consolidate learning from earlier years of the program on the site of a partnering organization and under the supervision of both university faculty and the organization's management team.

### 9.2.2 Field placement opportunities

The Internship Program offers students who have successfully completed the requirements for core year (second year) to engage in a contracted learning partnership with businesses in the Durham region and around the globe. The Internship Program not only gives students an opportunity to apply classroom concepts to the challenges of organizational life but helps them to gain valuable, relevant work experience to promote networking and life-long career success. Participating employers are given the opportunity to bring the motivated learners, thinkers, and doers of tomorrow into their workplaces to provide mentoring. The Internship Program placement equates to 560 hours of progressive business and management experience, either on a full-time or a part-time basis. The intern's wages (stipulated in a contract) are paid by the sponsoring business over a contracted period. Successful work placement completion and final report submission will result in the intern's receiving a mark and six credits toward the BCom degree requirements.

### 9.2.3 Careers

Employment opportunities are well above average, with a range of career possibilities or continuation of studies at graduate school. High demand exists for accountants, auditors, financial investment analysts, information technology experts, supply chain management consultants, human resource managers, and e-marketing managers.

## 9.3 Admission requirements

Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent, including:

Six 12U or M credits including English (ENG4U) and one math (MGA4U or MCB4U or MDM4U); or

Six OAC credits including English (ENG OAC) and one math (MAGOAC or MCAOAC or MFNOAC)

Applicants from other provinces or international students should e-mail **admissions@uoit.ca** or visit our Web site at **www.uoit.ca.**

## 9.4 Degree requirements

To be eligible for the BCom (Hons) degree, students must successfully complete 120 credit hours, including all courses outlined below. For course descriptions see section 16.

### YEAR ONE

**SEMESTER ONE (15 credit hours)**
BUSI 1600U Management of the Enterprise
BUSI 1450U Statistics
ECON 2010U Microeconomics
One of: BUSI 1500U Business Communications and Computing Skills or
BUSI 1520U Business Computer Applications
General Elective*

**SEMESTER TWO (15 credit hours)**
BUSI 1650U External Environment of Management
BUSI 1101U Financial Accounting
ECON 2020U Macroeconomics
BUSI 2000U Collaborative Leadership
One of: BUSI 1900U Mathematics Foundations for Business or
BUSI 1830U Introduction to Programming

### YEAR TWO

**SEMESTER ONE (15 credit hours)**
BUSI 2151U Managerial Accounting I
BUSI 2401U Finance I
BUSI 2201U Marketing I
BUSI 2311U Organizational Behaviour and Management of Human Resources I
BUSI 2601U Operations and Project Management I

**SEMESTER TWO (15 credit hours)**
BUSI 2152U Managerial Accounting II
BUSI 2402U Finance II
BUSI 2202U Marketing II
BUSI 2312U Organizational Behaviour and Management of Human Resources II
BUSI 2602U Operations and Project Management II

### YEAR THREE

**SEMESTER ONE (15 credit hours)**
BUSI 3040U Information Systems
Business Specialization Elective*
General Business Elective*
General Elective*
General Elective*

**SEMESTER TWO (15 credit hours)**
Business Specialization Elective*
Business Specialization Elective*
General Business Elective*
General Elective*
General Elective*

### YEAR FOUR

**SEMESTER ONE (15 credit hours)**
BUSI 4991U UOIT Edge I - Capstone Study Project
BUSI 4701U Strategic Management I
Business Specialization Elective*
Business Specialization Elective*
General Elective*

**SEMESTER TWO (15 credit hours)**
BUSI 4992U UOIT Edge II - Capstone Study Project
BUSI 4702U Strategic Management II
General Business Elective* OR Business Specialization Elective* or General Elective*
Business Specialization Elective*
General Elective*

### *ELECTIVES

**General Business Electives**
BUSI 2610U Quality Frameworks
BUSI 2705U Legal Environment of Business
BUSI 2650U Supply Chain and Vendor Management
BUSI 3550U Information Technology Applications
BUSI 2620U Business Ethics

**Business Specialization Electives**

**Accounting:** Intermediate Financial Accounting I (BUSI 2101U); Intermediate Financial Accounting II (BUSI 2102); Advanced Financial Accounting (BUSI 3101U); Contemporary Issues in Accounting I (BUSI 3106U); Managerial Cost Accounting and Analysis (BUSI 3120U); Management Accounting and Control Systems (BUSI 3160U); Auditing Standards and Applications (BUSI 3170U); Introduction to Income Taxation (BUSI 3110U); Advanced Income Taxation (BUSI 4120U); Accounting Theory (BUSI 4140U); Special Topics in Accounting (BUSI 4190U); Directed Independent Studies in Accounting (BUSI 4199U).

**Supplier Management:** Advanced Supply Chain Management (BUSI 4650U); Advanced Vendor and Purchasing Management (BUSI 4600U); Inventory Management (BUSI 3600U); Emergent Technologies in Supplier Management (BUSI 3620U); Supplier Management for Competitive Advantage (BUSI 4652U); Supplier Management Case Competition (BUSI 4659U); Project Learning (BUSI 3650U); Applied Project Management: Tools and Applications (BUSI 4680U); Special Topics in Supplier Management (BUSI 4690U); Directed Independent Studies in Supplier Management (BUSI 4699U).

**Marketing:** Marketing Research (BUSI 3260U); Marketing Communications (BUSI 3200U); Consumer Behaviour (BUSI 3210U); Marketing Analysis (BUSI 4220U); Electronic Commerce and Marketing (BUSI 4203U); Business to Business Marketing (BUSI 4270U); International Marketing (BUSI 4250U); Brand Management (BUSI 3280U); Retail Marketing Strategies (BUSI 4240U); Special Topics in Marketing (BUSI 4290U); Directed Independent Studies in Marketing (BUSI 4299U).

**E-Business and E-Commerce:** E-Business Technologies (BUSI 2501U); E-Commerce (BUSI 2502U); E-Marketing (BUSI 2503U); E-Learning (BUSI 2504U); E-Recruitment and Management of Human Resources (BUSI 2505U); Applied Internet Multimedia (BUSI 3520U); Object Oriented Programming (BUSI 3540U); HTML and Web site Design and Management (BUSI 3530U); Server and Network Administration (BUSI 3570U); WWW Networking (BUSI 3580U); Internet Engineering (BUSI 3510U); Special Project in E-Business and E-Commerce (BUSI 4590U); Directed Independent Studies in E-Business and E-Commerce (BUSI 4599U).

**Organizational Behaviour and Human Resources:** Organizational Issues: Problems and Directions (BUSI 2340U); Training and Development (BUSI 2390U); The Management of Change (BUSI 3330U); Industrial and Labour Relations (BUSI 3312U); Quality of Organizational Life (BUSI 3360U); Human Resources Planning (BUSI 3340U); Negotiation Theory and Behaviour (BUSI 3315U); Conciliation and Dispute Resolution (BUSI 3319U); Developing Management Skills (BUSI 3350U); Special Topics in Organizational Behaviour and Human Resources (BUSI 4390U); Directed Independent Studies in Organizational Behaviour and Human Resources (BUSI 4399U).

**General Electives**

Students may select any course from any School.
(See course descriptions in section 16).

# Section 10: School of Education

Dean: William Hunter, BA, PhD

## 10.1 Degree offered

**Bachelor of Education - BEd**

The School of Education offers a one-year consecutive program in the preparation of science, mathematics and technology teachers. This program is dedicated to developing teacher candidates who are committed to ongoing professional learning, who are skilled in learning independently from research and professional literature, and who are able to lead the integration of appropriate learning technologies into classroom practice.

The laptop is integral to the Bachelor of Education program and students will use information technology in a variety of ways to enhance their learning experience. Students benefit from support through the University's Mobile Learning environment (see section 1.2). An online support network of peers, faculty and resource specialists in the education field is under development and will be especially valuable to graduates in their first years of teaching.

The School's research is primarily focused on improving educational technology such as online learning.

## 10.2 Program information - Bachelor of Education

### 10.2.1 General information

The emphasis on technology in teaching is a defining element of the School's Bachelor of Education program. Teacher candidates use technology in their own learning experiences so that they will understand how to integrate technology into classroom practice. Co-operative learning activities based on realistic problems and scenarios prepare candidates for situations which they will likely encounter in their practica and their own classrooms upon graduation. Courses use inquiry and problem-solving approaches with focus on the importance of subject matter as the catalyst for teacher-learner interaction, as well as individual learning and teaching in shaping learning conditions. There is a specific focus on the new and very rigorous Ontario mathematics and science curriculum. A required course in understanding and applying educational research is a distinctive feature of this program as is an optional course in advanced instructional design.

### 10.2.2 Practicum

Students will be required to complete 60 days of field experience and practicum in local elementary and secondary schools.

### 10.2.3 Careers

Graduates are prepared to teach in the Ontario education system where the demand for teachers of mathematics, science and technology is on the rise. Graduates are also prepared to teach outside the province and some may be able to teach at the college level or undertake roles in business in the areas of training and professional development.

### 10.2.4 Teacher certification

The University's Bachelor of Education consecutive program is designed to meet all Ontario legislated requirements and incorporates the Standards of Practice and Ethical Standards for the Teaching Profession of the Ontario College of Teachers. Graduates will be recommended by the University to the Ontario College of Teachers for certification to practice in the Ontario education system.

## 10.3 Admission requirements

Selection of candidates is based on the following combination of academic criteria, experience and references:

- Undergraduate degree in science from a recognized university; preference will be given to students with Honours degrees in the sciences, mathematics or computer science
- Completion of a minimum of 30 credit hours in university courses (equivalent to five full courses, or 10 one-semester courses) in a first teachable subject and 18 credit hours (equivalent to three full courses, or 6 one-semester courses) in a second teachable subject.
- A minimum B overall average in the last year of full-time study with a minimum B average in courses applicable to each teaching subject.
- Personal profile addressing skills and related work experience.
- Letters of reference, criminal check and TB test (Any costs associated with the criminal records check and medical test are the responsibility of the applicant).

Applicants must ensure that any courses in progress are listed on the OUAC application form, especially when appropriate prerequisites do not appear on the official transcripts being forwarded. Each candidate must have received the required undergraduate degree by July 1, 2003.

Enrolment in the program is competitive. Consequently, possession of the minimum requirements does not guarantee admission. Acceptance is based on the number and calibre of applications received in a given year for the spaces available in the program.

## 10.4 Degree requirements

During orientation week, the week prior to the start of classes, teacher candidates will engage in a variety of university and program orientation activities as well as begin their first required course: Classroom Communications. To be eligible for the BEd degree, students must successfully complete 30 credit hours, including all courses outlined below. For course descriptions, see section 16.

**SEMESTER ONE (15 credit hours)**
EDUC 2000U Classroom Communications - included in orientation week
EDUC 3610U Contemporary Educational Practice
EDUC 4380U Analysis and Management of Classroom Behaviour
EDUC 3750U Learning and Human Development
EDUC 4900U Field Studies and Practicum I (28 days)
Curriculum Studies I *
Curriculum Studies I *

**SEMESTER TWO (15 credit hours)**
EDUC 4590U Assessment & Evaluation
EDUC 3800U Teaching for Individual Needs & Diversity
EDUC 4240U Understanding Educational Research, Theory & Practice
EDUC 4901U Field Studies and Practicum II (32 days)
One of:
  EDUC 3560U Religious Education: Teaching in Ontario Catholic Schools
  EDUC 3470U Issues in Education
  EDUC 4610U Advanced Instructional Design
Curriculum Studies II **
Curriculum Studies II **

* Students will complete two of the following courses in SEMESTER ONE: CURS 4100, 4120, 4130,4140,4160,4180. These courses will be chosen so that a student completes one course in curriculum studies for each teachable area under which he/she was admitted.

** Students will complete two of the following courses in SEMESTER TWO: CURS 4101,4121,4131,4141,4161,4181. These courses will be chosen so that a student completes a second course in curriculum studies for each area under which he/she was admitted.

**Curriculum Studies courses:**
CURS 4180 & 4181 Intermediate/Senior General Science
CURS 4100 & 4101 Intermediate/Senior Biology
CURS 4120 & 4121 Intermediate/Senior Chemistry
CURS 4130 & 4131 Intermediate/Senior Physics
CURS 4140 & 4141 Intermediate/Senior Mathematics
CURS 4150 & 4151 Intermediate/Senior Computer Studies

# Section 11: School of Energy Engineering and Nuclear Science

Dean: George Bereznai, BEng (Hons), MEng, PhD

## 11.1 Degrees offered

Bachelor of Engineering (Honours) in Nuclear Engineering - BEng (Hons)
Bachelor of Science (Honours) in Radiation Science - BSc (Hons)

The School of Energy Engineering and Nuclear Science is the only school of its kind in Canada to offer dedicated programs in nuclear engineering and radiation science.

The four-year honours Bachelor of Engineering in Nuclear Engineering program was designed to meet a worldwide need for graduates in the field of nuclear engineering. Although the primary focus of the program is nuclear power plant engineering, the curriculum is sufficiently broad-based that graduates will be well qualified for careers in many applications of nuclear technology and energy related fields.

The four-year honours Bachelor of Science in Radiation Science provides an advanced science curriculum with a strong emphasis on technologies in the health care field where the expanding use of imaging technologies is creating a demand for graduates. Options for technology applications in the agriculture and industrial sectors are available in third and fourth years.

Students in these programs benefit from the University's Mobile Learning environment (see section 1.2) which provides technically enhanced learning and teaching, including computer simulation of nuclear power plants.

The School's research includes reactor kinetics, reactor design, power plant design and simulation, radiation detection and measurement, radiation protection, radiation biophysics and dosimetry, environmental effects of radiation, production and utilization of radioisotopes, radiation chemistry, and material analysis with radiation techniques. In radiation science the initial focus is on applications in medicine, agriculture and industry.

In subsequent years the School may offer undergraduate options in energy engineering, radiation engineering, reliability and safety engineering, health physics and fusion physics. A master's level engineering program is planned, with possible implementation in 2005.

## 11.2 Program information - Bachelor of Engineering (Honours) in Nuclear Engineering

### 11.2.1 General information

The first two years provide students with a solid foundation in the fundamentals of mathematics and sciences, with years three and four concentrating on engineering sciences and specific nuclear engineering courses. Learning takes place in a variety of settings including lectures, tutorials, field visits, laboratory and computer simulation - the most extensive computer simulation of nuclear power plants of any engineering program in Ontario. Electives may be taken from other programs such as manufacturing engineering, science, radiation physics, and liberal arts, with complementary studies in collaborative leadership, economics, ethics and law, and strategic management. Students develop management, interpersonal, problem-solving, and holistic thinking skills while gaining a comprehensive knowledge of nuclear engineering science and design, as well as the latest developments in this field.

### 11.2.2 Work placements/internships

The University's proximity to a large number of companies engaged in the nuclear power sector or using radiation techniques provides many opportunities for work placements, including a 12 to 16 month internship program for students who have completed third year of their program.

In addition to the internship program, since many of the courses taken by nuclear engineering students will be available in e-learning format that does not necessitate attending classes on campus, it is possible to take work assignments of various lengths (typically 3-12 months) at any time after completing the first two semesters. The type of work terms that will be facilitated with interested companies will be relevant to the student's career. These will be paid work terms but will not appear on the student's academic record.

### 11.2.3 Careers

There is a severe shortage of graduates to replace retiring engineers in the nuclear field. This program prepares graduates who are technically skilled engineers and who can undertake research, development, design, maintenance, operation and decommissioning of nuclear power plants and related facilities. Potential employers include utilities, service companies, government agencies, research and design institutions. Major Canadian utilities and engineering companies that design, operate and service nuclear power plants are looking for a reliable supply of nuclear engineers.

### 11.2.4 Professional designation

This program is designed to meet the requirements of the Canadian Engineering Accreditation Board. Each graduate is eligible to apply for licensing as a Professional Engineer in Ontario and in any province or territory in Canada.

## 11.3 Program information - Bachelor of Science (Honours) in Radiation Science

### 11.3.1 General information

The curriculum is designed to provide students with a comprehensive knowledge of advanced science and applications of radiation technologies to health care, industry and agriculture. The first two years establish the fundamentals in mathematics, physical and biological sciences, and technology. In year three, students can choose to specialize in one of medical, agriculture or industrial radiation. Fourth year furthers the specialization and includes two thesis projects. Learning takes place in a variety of settings including lectures, tutorials, field visits, and laboratory. The program includes mandatory liberal arts electives and business courses designed to develop students' interpersonal, problem-solving, and holistic thinking skills.

### 11.3.2 Work placements

Since many of the courses taken by radiation science students will be available in e-learning format that does not necessitate attending classes on campus, it is possible to take work assignments of various lengths (typically 3-12 months) at any time after completing the first two semesters. The type of work terms that will be facilitated with interested companies will be relevant to the student's career. These will be paid work terms, but will not appear on the student's academic record.

### 11.3.3 Careers

There is a growing global demand for radiation science specialists. Graduates have many career opportunities, particularly in the health care field where an aging population and the use of sophisticated imaging technologies are increasing the demand for such experts. Graduates can find careers in hospitals and clinics as well as at utilities, service companies, government agencies, and research institutions.

## 11.4 Admission requirements

Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent and a minimum of 70 per cent in maths and sciences, including:

Six 12U credits including English (ENG4U) with minimum 60 per cent, Physics (SPH4U), Advanced Functions and Introductory Calculus (MCB4U), Chemistry (SCH4U), Geometry and Discrete Mathematics (MGA4U); or

Six OAC credits including English (ENG OAC) with minimum 60 per cent, Calculus (MCA OAC), Algebra and Geometry (MAG OAC), Chemistry (SCH OAC), and Physics (SPH OAC).

Applicants from other provinces or international students should e-mail **admissions@uoit.ca** or visit our Web site at **www.uoit.ca**.

## 11.5 Degree requirements

### 11.5.1 Bachelor of Engineering (Honours) in Nuclear Engineering - BEng (Hons)

To be eligible for the BEng (Hons) degree in Nuclear Engineering, students must successfully complete 144 credit hours, including all courses outlined below. For course descriptions, see section 16.

#### YEAR 1

**SEMESTER ONE (18 credit hours)**
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I
ENGR 3200U Engineering Graphics and Design
EDUC 1200U History of Science and Technology
EDUC 1050U Technical Communications

**SEMESTER TWO (18 credit hours)**
MATH 1020U Calculus II
PHY 1020U Physics II
CHEM 1800U Chemistry for Engineers
ENGR 1200U Introduction to Programming
EDUC 1470U Impact of Science and Technology on Society
BIOL 1840U Biology for Engineers OR ENVS 1000U Environmental Science

#### YEAR TWO

**SEMESTER ONE (18 credit hours)**
MATH 2860U Differential Equations for Engineers
ENGR 2220U Structure and Properties of Materials
ENGR 2500U Introduction to Nuclear Physics
ENGR 2860U Fluid Mechanics
ENGR 2140U Problem Solving, Modelling and Simulation
Liberal Studies Elective*

**SEMESTER TWO (18 credit hours)**
ENGR 2010U Thermodynamic Cycles
STAT 2800U Statistics and Probability for Engineers
ENGR 2950U Radiation Protection
BUSI 2000U Collaborative Leadership
MATH 2810U Advanced Engineering Mathematics OR
MATH 2070U Numerical Methods
ENGR 2790U Electric Circuits

#### YEAR THREE

**SEMESTER ONE (18 credit hours)**
ENGR 3030U Computer Aided Design
ENGR 3930U Heat Transfer
ENGR 3740U Digital Electronics
ENGR 3570U Environmental Effects of Radiation
ENGR 3380U Strength of Materials
ENGR 3530U Safety and Quality Management

**SEMESTER TWO (18 credit hours)**
ENGR 3610U Corrosion for Engineers
ENGR 3820U Nuclear Reactor Kinetics
ENGR 3780U Nuclear Reactor Design
ENGR 3640U Radioactive Waste Management Design
BUSI 2050U Economics for Professionals
Engineering Design Elective*

#### YEAR FOUR

**SEMESTER ONE (18 credit hours)**
ENGR 4660U Risk Analysis Methods
ENGR 4700U Nuclear Plant Design and Simulation
ENGR 4994U Thesis Design Project I
ENGR 4640U Nuclear Plant Operation
BUSI 3700U Strategic Management for Professionals
Engineering Science Elective*

**SEMESTER TWO (18 credit hours)**
ENGR 4520U Nuclear Plant Safety Design
ENGR 4880U Principles of Fusion Energy
ENGR 4810U Nuclear Fuel Cycle
ENGR 4998U Thesis Design Project II
JSTS 4210U Ethics and Law for Professionals
Engineering Design Elective*

***ELECTIVES**

**Engineering Design Electives**
ENGR 3670U Shielding Design
ENGR 4730U Reactor Instrumentation and Control

**Engineering Science Electives**
ENGR 3920U Nuclear Materials
ENGR 3510U Nuclear Plant Chemistry

**Liberal Studies Electives**

Courses selected for the Liberal Studies Elective must be approved by the dean of the School or his/her designate.

**11.5.2 Bachelor of Science (Honours) in Radiation Science - BSc (Hons)**
To be eligible for the BSc (Hons) in Radiation Science, students must successfully complete 129 credit hours including all courses as outlined below. For course descriptions see section 16.

**YEAR ONE**

**SEMESTER ONE (18 credit hours)**
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I
CHEM 1010U Chemistry I
EDUC 1200U History of Science and Technology
EDUC 1050U Technical Communications

**SEMESTER TWO (18 credit hours)**
MATH 1020U Calculus II
BIOL 1840U Biology for Engineers
PHY 1020U Physics II
CHEM 1020U Chemistry II
ENGR 1200U Introduction to Programming
EDUC 1470U Impact of Science and Technology on Society

**YEAR TWO**

**SEMESTER ONE (15 credit hours)**
MATH 2860U Differential Equations for Engineers
BIOL 2840U Cell and Molecular Biology
ENGR 2500U Introduction to Nuclear Physics
CHEM 2020U Introduction to Organic Chemistry
ENGR 2140U Problem Solving, Modelling and Simulation

**SEMESTER TWO (18 credit hours)**
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers
ENVS 1000U Environmental Science
ENGR 2950U Radiation Protection
BUSI 2000U Collaborative Leadership
Liberal Studies Elective*

**YEAR THREE**

**SEMESTER ONE (15 credit hours)**
RADI 3690U Radiation Chemistry and Processing
ENGR 2220U Structure and Properties of Materials
ENGR 3740U Digital Electronics
CHEM 3020U Organic Chemistry
ENGR 3530U Safety and Quality Management

**SEMESTER TWO (15 credit hours)**
RADI 3550U Radiation Detection and Measurement
RADI 3200U Introduction to Imaging
RADI 3610U Introduction to Radiation Machines
BUSI 2050U Economics for Professionals
Liberal Studies Elective*

**YEAR FOUR**

**SEMESTER ONE (15 credit hours)**
ENGR 4660U Risk Analysis Methods
RADI 4430U Production and Utilization of Radioactive Isotopes
ENGR 3570U Environmental Effects of Radiation
Senior Science OR Engineering Elective
Liberal Studies Elective*

**SEMESTER TWO (15 credit hours)**
RADI 4040U Material Analysis using Nuclear Techniques
RADI 4320U Applications of Radiation Techniques in Medicine
RADI 4995U Thesis Project I
RADI 4999U Thesis Project II
Senior Science OR Engineering Elective

***ELECTIVES**

**Senior Science or Engineering Electives**
ENGR 3510U Nuclear Plant Chemistry
ENGR 3920U Nuclear Materials
ENGR 4640U Nuclear Plant Operation
ENGR 4880U Principles of Fusion Energy
ENGR 4810U Nuclear Fuel Cycle
ENGR 3640U Radioactive Waste Management Design

Selections from the third and forth level science courses, subject to the approval of the dean of the School or his/her designate.

**Liberal Studies Electives**
Courses selected for the liberal studies elective must be approved by the dean of the School or his/her designate.

### 11.6 First-year Engineering Transition Program

The objective of the First-year Engineering Transition Program is to provide first-year engineering students with an opportunity, before the start of second year, to complete first-year courses for which they have not obtained credit, to upgrade their grade point average and academic standing, and to improve their preparation for studies in subsequent years.

The Program involves a second offering of demanding first-year courses, according to the following schedule:

| Winter semester | Summer semester |
|---|---|
| MATH 1010U Calculus I | MATH 1020U Calculus II |
| PHY 1010U Physics I | PHY 1020U Physics II |
| | MATH 1800U Linear Algebra for Engineers |
| | ENGR 1200U Introduction to Programming |
| | CHEM 1800U Chemistry for Engineers |

At the end of the fall semester, engineering students who have failed or are missing Calculus I (MATH 1010U) or Physics I (PHY 1010U), are encouraged to take the course(s) during the winter semester. Students on academic warning will likely be required to take or repeat the courses if they have not already passed them. The follow-up courses, Calculus II (MATH 1020U) and Physics II (PHY 1020U), along with the other above-noted first-year courses, will be offered during the summer semester.

Students who register in and successfully complete the transition program courses will have their academic standing re-evaluated. This re-evaluation will include all the grades received in transition program courses.

# Section 12: School of Health Science





Dean: Carolyn Byrne, RN, MHSc, PhD

### 12.1 Degree offered

**Bachelor of Science in Nursing (Honours) - BScN (Hons)**

The School of Health Science, in collaboration with Durham College, offers a Bachelor of Science in Nursing BScN (Hons). The four-year degree will be required to begin practice as a registered nurse in Ontario beginning in 2005.

The School's mission is to prepare professional nurses who are committed to excellence and innovation in assessing and meeting the nursing needs of society; and, to develop and transmit knowledge regarding nursing practice and the human experience of health, illness and healing. The University's Mobile Learning environment (see section 1.2) enhances the learning experience.

The School provides state-of-the-art technically enhanced laboratories and facilities, including a new clinical skills laboratory that simulates hospital and home care settings. The research focus on community health issues is enhanced through partnerships with local hospitals, public health organizations and social service agencies.

### 12.2 Program information - Bachelor of Science in Nursing (Honours)

#### 12.2.1 General information

The concept of caring is central to the School's nursing program. It is coupled with the foundations for excellence in clinical practice, grounding in the natural sciences, and development of communication, critical thinking and problem solving skills. Collaborative learning activities, in which students take an active role in their own learning, combine with traditional methods, to prepare students for life-long learning, research, teamwork, and leadership skills essential for nursing practice.

#### 12.2.2 Practicum

Forty-five employers from the health sector provide practicum experience and supervision.

#### 12.2.3 Careers

There is no better time to choose a rewarding career in nursing. Projections show that by the year 2004 the province of Ontario will face a shortfall of over 12,000 registered nurses in the hospital sector alone. There are abundant and varied employment opportunities for nursing graduates in hospitals, nursing homes, community service organizations, health centres and others.

#### 12.2.4 Professional qualifications

Graduates are prepared to write the licensure examinations for the College of Nurses of Ontario (CNO). To become a registered nurse you must comply with the

licensing requirements of the College of Nurses. The legislation for all individuals requesting registration should be reviewed by students applying to this program. For more information on how this new legislation may impact you, call the College of Nurses of Ontario (CNO) at 1.800.387.5526 for clarification.

### 12.3 Admission requirements

Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent in six courses, including:

Six 12U or M credits including English (ENG4U), one of (MGA4U or MCB4U or MDM4U); and Biology (SBI4U), and Chemistry (SCH4U) or Physics (SPH4U); or

Six OAC credits including English (ENG OAC) and one Math (MAG OAC or MCA OAC or MFN OAC) Biology (SBI OAC), and Chemistry (SCH OAC) or Physics (SPH OAC)

Applicants from other provinces or international students should e-mail **admissions@uoit.ca** or visit our Web site at **www.uoit.ca**.

For graduates of nursing programs at colleges other than Durham please note that year three will not be offered until 2005-06.

### 12.4 Degree requirements

To be eligible for the BScN (Hons) degree, students must successfully complete 120 credit hours, including all courses outlined below. For course descriptions see section 16.

#### YEAR 1

**SEMESTER ONE (15 credit hours)**
BIOL 1810U Biochemistry for Health Science
NURS 1200U Anatomy and Physiology
NURS 1100U Health and Healing I
NURS 1420U Development of Self as a Nurse I
NURS 1005U Professional Practice I

**SEMESTER TWO (18 credit hours)**
BIOL 1820U Microbiology for Health Science
NURS 1201U Anatomy and Physiology II
NURS 1150U Health and Healing II
NURS 1505U Professional Practice II
PSYC 1000U Introductory Psychology
SOCI 1000U Introductory Sociology

#### YEAR TWO

**SEMESTER ONE (18 credit hours)**
NURS 2005U Nursing Professional Practice III
NURS 2100U Health and Healing III
NURS 2460U Pathophysiology I
NURS 2320U Health Assessment
BIOL 2810U Pharmacology for Health Science
PSYC 2010U Developmental Psychology

**SEMESTER TWO (18 credit hours)**
NURS 2505U Nursing Professional Practice IV
NURS 2150U Health and Healing IV
NURS 2710U Ethics
NURS 2461U Pathophysiology II
BIOL 2820U Nutrition for Health Science
BUSI 2000U Collaborative Leadership

#### YEAR THREE

**SEMESTER ONE (15 credit hours)**
NURS 3005U Nursing Professional Practice V
NURS 3100U Health and Healing V
NURS 3420U Development of Self as a Nurse II
STAT 3800U Statistics for Health Science
Level II Sociology elective

**SEMESTER TWO (12 credit hours)**
NURS 3505U Nursing Professional Practice VI
NURS 3150U Health and Healing VI
NURS 3910U Research
Nursing Elective

#### YEAR FOUR

**SEMESTER ONE (15 credit hours)**
NURS 4005U Nursing Professional Practice VII
NURS 4100U Health and Healing VII
NURS 4420U Development of Self as a Nurse III
NURS 4840U Health Policy
Nursing Elective

**SEMESTER TWO (9 credit hours)**
NURS 4505U Nursing Professional Practice VIII

# Section 13: School of Integrated Justice Studies

Dean: Ronald Hinch, BA, MA, PhD

## 13.1 Degree offered

Bachelor of Arts (Honours) in Integrated Justice Studies - BA (Hons)

The School of Justice Studies offers a four-year program designed to educate the professional with a broad range of skills required in fields ranging from criminal justice to law and human rights. Students learn to build an integrated approach to justice services through examination of each of the justice system's components, including the victim. Graduates will be skilled in taking leadership roles and more collaborative approaches within their own field and within the related infrastructures of society.

The University campus is home to the new Centre for Integrated Justice Studies which houses a moot court, classrooms, special training facilities, a computer lab, a conference room and faculty offices.

Teaching and learning is enhanced through the University's Mobile Learning environment (see section 1.2).

The School's research focus is on the criminal justice system, policing and corrections/penology. The School publishes the Online Journal of Justice Studies, an interdisciplinary journal on a broad range of justice issues from around the world.

## 13.2 Program information - Bachelor of Arts (Honours) in Integrated Justice Studies

### 13.2.1 General information

The program begins with the study of the theories, processes and concepts that are applied in the justice system. The theoretical perspectives that impact justice, such as critical thinking skills, diversity, the rights of the victim, and social justice, are examined and will lead to more advanced studies such as social justice and conflict, and issues related to policing, corrections, and justice policy. While the focus is the criminal justice system, the integrated justice program gives students options from other program such as business, science and liberal arts.

### 13.2.2 Field work practicum

The course of study includes two required full semester practica, one in third year and one in fourth year. These practica enhance the integrated approach to the study of justice by giving students an opportunity to gain experience in several organizations within the justice field. Placements are made in consultation with faculty and in keeping with students' learning goals. Each course includes two seminars, one hundred hours of practical experience and journals of the field experience.

### 13.2.3 Careers

Public demand for increased protective services is growing and this, together with current retirements, is creating opportunities in justice-related professions. Employers—including police services, corrections, customs, immigration, private business, victims' agencies, private security, and government services—have confirmed their need for graduates of this program.

## 13.3 Admission requirements

Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent, including:

Six 12U or M credits including English (ENG4U) and one math (MGA4U or MCB4U or MDM4U); or

Six OAC credits including English (ENG OAC) and one math (MAG OAC or MCA OAC or MFN OAC)

Applicants from other provinces or international students should e-mail **admissions@uoit.ca** or visit our Web site at **www.uoit.ca**.

## 13.4 Degree requirements

To be eligible for the BA (Hons) degree in Integrated Justice Studies, students must successfully complete 120 credit hours, including all courses outlined below. For course descriptions see section 16.

### YEAR ONE

**SEMESTER ONE (15 credit hours)**
JSTS 1000U Introduction to Criminal Justice
PHIL 1040U Philosophy: Social and Political Issues
JSTS 1260U Introduction to Canadian Legal System
POSC 1010U Political Science
Elective

**SEMESTER TWO (15 credit hours)**
JSTS 1420U Ethical Reasoning and Critical Thinking
SOCI 1000U Introductory Sociology
PSYC 1000U Introductory Psychology
Law Elective:
JSTS 1600U Criminal Law OR
JSTS 1610U Customs and Immigration Law
Elective

### YEAR TWO

**SEMESTER ONE (15 credit hours)**
JSTS 2040U Justice Theory and Policy
JSTS 2190U Issues in Diversity OR
JSTS 2490U Issues in the Family
JSTS 2900U Research Methods
JSTS 2550U Psychological Explanations of Criminal Behaviour
BUSI 2000U Collaborative Leadership

**SEMESTER TWO (15 credit hours)**
JSTS 2640U Rights and Freedoms in the Justice System
JSTS 2710U Sociological Theories of Crime
JSTS 2820U Statistics
JSTS 2370U Theory and Practice of Mediation
Elective

**YEAR THREE**

**SEMESTER ONE (15 credit hours)**
JSTS 3020U Policing 1
JSTS 3210U The Prosecution Process
JSTS 3460U Victimology
JSTS 3670U Youth Crime
Elective

**SEMESTER TWO (15 credit hours)**
JSTS 3710U Corrections I
JSTS 3780U Public Administration
JSTS 3650U Issues in Organized Crime
JSTS 3520U Social Justice and Conflict
JSTS 3900U Field Work Practicum I

**YEAR FOUR**

**SEMESTER ONE (15 credit hours)**
JSTS 4020U Policing II
JSTS 4000U Advanced Justice Studies
JSTS 4250U Alternative Methods in Justice
JSTS 4900U Field Work Practicum II
Elective

**SEMESTER TWO (15 credit hours)**
JSTS 4710U Corrections II
JSTS 4340U Policy Analysis
JSTS 4580U Leadership and Administration
JSTS 4999U Integrating Project
Elective

# Section 14: School of Manufacturing Engineering





Dean: Marc Rosen, BASc, MASc, PhD, PEng, FCSME, FEIC

## 14.1 Degree offered

Bachelor of Engineering (Honours) in Manufacturing Engineering - BEng (Hons)

The School of Manufacturing Engineering is the only school of its kind in Canada offering a dedicated program in manufacturing engineering [check - only second in Ontario?]. The program provides graduates with the knowledge and skills required for work in all areas of manufacturing, including product design, automation and control, and production. Developed in consultation with industry, this program is based on the principles that a graduate engineer needs a well-rounded education that includes strong fundamentals in mathematics, computing and sciences, analytical and application skills, and creative and innovative approaches to design.

Each student benefits from the University's Mobile Learning environment (see section 1.2) on a campus equipped with state-of-the-art laboratories and fully networked classrooms. Our campus is home to the Integrated Manufacturing Centre, an extensive 10,000-square-foot fully functional, industrial grade, flexible manufacturing facility with advanced manufacturing and automation technologies that is capable of manufacturing a variety of products.

The School's research focuses on flexible manufacturing systems, high-performance manufacturing, efficient and environmentally conscious manufacturing, robotics, mechatronics, computer-integrated manufacturing, and micro-electromechanical systems.

In subsequent years, the School may offer undergraduate programs or options in mechanical engineering, mechatronics engineering, electrical engineering, computer engineering, and software engineering. In addition, the School may offer programs based on one of the above-noted disciplines, but which add a management component. Master's and doctoral programs are in planning and it is hoped that a master's level program will be offered within two to three years.

## 14.2 Program information - Bachelor of Engineering (Honours) in Manufacturing Engineering

### 14.2.1 General information

The manufacturing engineering curriculum provides a solid grounding in the fundamentals of mathematics, computing and science, with significant content in engineering sciences and engineering design. In addition to classroom lectures, students participate in tutorials, laboratories, computer simulations, field visits, independent research and design tasks, individual and group projects, as well as presentations to both technical and non-technical audiences. Many facets of the program are interdependent, with fundamental courses followed by advanced topics. Complementary studies including liberal studies electives, collaborative leadership,

economics, and ethics and law for professionals, promote a broader understanding of the needs of society and technology's impact on it. Students gain technical expertise along with the understanding of business and humanities required for an integrated approach to manufacturing.

#### 14.2.2 Work placement/internship opportunities

The University's proximity to a large number of diverse manufacturing companies provides many opportunities for work placements. In addition, an optional 12 to 16 month engineering internship program is available for students completing third year of the program. This program allows students to gain valuable and meaningful work experience and exposure to an engineering workplace.

#### 14.2.3 Careers

Manufacturing is a $290 billion business in Ontario, employing over one million people directly and another one million people indirectly. It plays a vital role in the Ontario economy, accounting for about 19 per cent of all jobs in the province and 26 per cent of Ontario's gross domestic product. Manufacturing engineering provides job opportunities in sectors ranging from aerospace and biotechnology to telecommunications, automotive, chemical, industrial and commercial product manufacturing. The types of functions that program graduates may perform in organizations are numerous and include design and development of products and processes, production planning and control, system and facility design and analysis, operations management and plant maintenance, engineering marketing and sales, economic analysis and accounting, and research and development. Growing industrial development in Ontario coupled with current retirement rates is increasing the need for manufacturing engineers over the next decade.

#### 14.2.4 Professional designation

This program is designed to meet the requirements of the Canadian Engineering Accreditation Board. Each graduate is eligible to apply for licensing as a Professional Engineer in Ontario and in any province or territory in Canada.

### 14.3 Admission requirements

The Ontario Secondary School Diploma (OSSD) with minimum 70 per cent overall average and minimum 70 per cent in math and sciences, including:

Six 12U or M credits including English (ENG4U) with 60 per cent minimum, Advanced Functions and Introductory Calculus (MCB4U), Geometry and Discrete Math (MGA4U) , Chemistry (SCH4U), and Physics (SPH4U); or

Six OAC credits including English (ENGOAC) with 60 per cent minimum, Calculus (MCAOAC), Algebra and Geometry (MAGOAC), Chemistry (SCHOAC), and Physics (SPHOAC).

Applicants from other provinces or international students should e-mail **admissions@uoit.ca** or visit our Web site at **www.uoit.ca.**

### 14.4 Degree requirements

To be eligible for the BEng (Hons) degree in Manufacturing Engineering, students must successfully complete 123 credit hours, including all courses outlined below. For course descriptions see section 16.

All courses in year 1, except EDUC 1470U, are prerequisites to all year 3 non-elective courses.

All courses in years 1 and 2, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year 4.

#### YEAR 1

**SEMESTER ONE (15 credit hours)**
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I
ENGR 3200U Engineering Graphics and Design
EDUC 1050U Technical Communications

**SEMESTER TWO (18 credit hours)**
MATH 1020U Calculus II
ENVS 1000U Environmental Science
PHY 1020U Physics II
CHEM 1800U Chemistry for Engineers
ENGR 1200U Introduction to Programming
EDUC 1470U Impact of Science and Technology on Society

#### YEAR TWO

**SEMESTER ONE (15 credit hours)**
MATH 2860U Differential Equations for Engineers
ENGR 2220U Structure and Properties of Materials
ENGR 2860U Fluid Mechanics
ENGR 2140U Problem Solving, Modelling and Simulation
BUSI 2000U Collaborative Leadership

**SEMESTER TWO (15 credit hours)**
MATH 2070U Numerical Methods
ENGR 2420U Solid Mechanics
STAT 2800U Statistics and Probability for Engineers
ENGR 2640U Thermodynamics and Heat Transfer
ENGR 2790U Electric Circuits

#### YEAR THREE

**SEMESTER ONE (15 credit hours)**
ENGR 3270U Kinematics and Dynamics of Machines
ENGR 3190U Manufacturing and Production Processes
ENGR 3030U Computer-Aided Design
ENGR 3350U Control Systems
Liberal Studies Elective*

**SEMESTER TWO (15 credit hours)**
ENGR 3300U Integrated Manufacturing Systems I
ENGR 3460U Industrial Ergonomics
ENGR 3390U Mechatronics
BUSI 2050U Economics for Professionals
Liberal Studies Elective*

#### YEAR FOUR

**SEMESTER ONE (15 credit hours)**
ENGR 4045U Quality Control
ENGR 4280U Robotics
ENGR 4390U Modelling Manufacturing Systems
ENGR 3395U Manufacturing Systems Design
Liberal Studies Elective (Advanced)*

**SEMESTER TWO (15 credit hours)**
ENGR 4160U Artificial Intelligence in Manufacturing
ENGR 4015U Reliability and Maintenance
ENGR 4300U Integrated Manufacturing Systems II
JSTS 4210U Ethics and Law for Professionals
ENGR 4999U Design Thesis

*ELECTIVES

**Liberal Studies Electives**

Courses selected for the liberal studies elective must be approved by the School.
The following are approved as general liberal studies electives:
EDUC 1200U History of Science and Technology
JSTS 1000U Introduction to Criminal Justice
PHIL 1040U Philosophy: Social and Political Issues
POSC 1010U Political Science
PSYC 1000U Introductory Psychology
SOCI 1000U Introductory Sociology

**The following are approved as advanced liberal studies electives:**
JSTS 2040U Justice Theory and Policy
JSTS 2190U Issues in Diversity
JSTS 2550U Psychological Explanations of Criminal Behaviour
JSTS 2710U Sociological Theories of Crime
JSTS 3520U Social Justice and Conflict
Other liberal studies electives will be identified in the future.

### 14.5 First-year Engineering Transition Program

The objective of the First-year Engineering Transition Program is to provide first-year engineering students with an opportunity, before the start of second year, to complete first-year courses for which they have not obtained credit, to upgrade their grade point average and academic standing, and to improve their preparation for studies in subsequent years.

The program involves a second offering of demanding first-year courses, according to the following schedule. Note that transition program courses may be cancelled if there is insufficient demand.

| Winter semester | Summer semester |
|---|---|
| MATH 1010U Calculus I | MATH 1020U Calculus II |
| PHY 1010U Physics I | PHY 1020U Physics II |
| | MATH 1800U Linear Algebra for Engineers |
| | ENGR 1200U Introduction to Programming |
| | CHEM 1800U Chemistry for Engineers |

At the end of the fall semester, engineering students who have failed or are missing Calculus I (MATH 1010U) or Physics I (PHY 1010U), are encouraged to take the course(s) during the winter semester. Students on academic warning will likely be required to take or repeat the courses if they have not already passed them. The follow-up courses, Calculus II (MATH 1020U) and Physics II (PHY 1020U), along with the other above-noted first-year courses, will be offered during the summer semester.

Students who register in and successfully complete the transition program courses will have their academic standing re-evaluated. This re-evaluation will include all the grades received in transition program courses.

# Section 15: School of Science

Dean: William Smith, BASc, MASc, MSc, PhD, PEng



### 15.1 Degrees offered

Bachelor of Science (Honours) in Biological Science - BSc (Hons)
Bachelor of Science in (Honours) in Physical Science - BSc (Hons)

The School of Science offers two four-year programs, one in the biological science and one in the physical science. These programs are highly focused in subjects relevant to emerging areas of science knowledge and practice. The biological science program provides two innovative concentrations, in pharmaceutical biotechnology and environmental toxicology. In physical science, students can choose to specialize in chemistry, mathematics or physics. In both programs, secondary concentrations are also available in a number of areas. In addition, both programs permit a complementary studies stream, to match their interests and career plans (see below).

In keeping with the University's mission to prepare students for careers, science programs also include development in leadership, business and management. Learning and teaching takes place in the University's Mobile Learning environment (see section 1.2).

The School maintains strong links with other Schools in the University, in particular Education, Health Sciences and Engineering, in order to further opportunities for students and for research.

### 15.2 Program information - Bachelor of Science (Honours) in Biological Science

**15.2.1 General information**

The curriculum provides a solid grounding in the fundamentals of biology, chemistry and physics in years one and two. A compulsory course in bioethics is a unique feature of this School's science program. Learning takes place in classroom lectures, tutorials, laboratories, computer simulations, and through independent research.

The BSc (Hons) in Biological Science program allows students to select a primary area-of-emphasis stream in Pharmaceutical Biotechnology or in Environmental Toxicology. Alternatively, using the guidelines provided below, students will be able to work with an Academic Advisor to customize their program to match their interests and career plans by selecting a Complementary Studies stream. Students may also select a secondary area-of-emphasis stream. The first two years of the program are common for all streams, allowing students time to explore the possibilities before committing themselves to a final choice.

### 15.2.2 Work placements

The two areas of specialization give students good opportunities to undertake research outside the University and to participate in cooperative programs and work placements.

### 15.2.3 Careers

Pharmaceutical biotechnology is a growth industry and leading companies in this field have expressed a critical need for science graduates with the skills provided by this program. Likewise, graduates in environmental toxicology can expect to fill the growing need for experts to deal with such issues as toxins in the food chain and water pollution. Opportunities exist in government regulatory and industries involved in environmental assessments.

### 15.2.4 Program overview and degree requirements

Students interested in the two primary area-of-emphasis streams (Pharmaceutical Biotechnology or Environmental Toxicology) will follow specified program maps, which prescribe the sequence of courses. A graduate of the UOIT Biological Science program must successfully complete 120 credit hours according to the requirements indicated below. These requirements apply to all streams.

**First-year required science core - 27 credit hours**

- BIOL 1010U and 1020U
- CHEM 1010U and 1020U
- PHY 1010U and 1020U
- MATH 1010U and 1020U
- CSCI 1000U

**Biological science additional core courses - 18 credit hours**

In addition to the two first-year courses in Biology (BIOL 1010U and 1020U), the BSc (Hons) in Biological Science program includes required courses in:

- BIOL 2010U Introductory Physiology
- BIOL 2020U Genetics and Molecular Biology
- BIOL 2030U Cell Biology
- BIOL 2040U Biochemistry
- BIOL 3030U Microbiology and Immunology
- BIOL 3050U Developmental Biology

**Upper-year specialization - 24 credit hours in biological science**

All students in the BSc (Hons) in Biological Science program must successfully complete at least 24 credit hours in additional courses in Biological Science at the 3rd or 4th year level, with a minimum of 6 of these credit hours at the 4th year level. Students specializing in Pharmaceutical Biotechnology or in Environmental Toxicology will be required to take a set of prescribed upper year offerings (which includes 24 credit hours in Biological Science courses) as specified in the following program maps, to satisfy this requirement.

**Additional science courses - total of 27 credit hours**

These additional courses must include:

- STAT 2020U Statistics and Probability for Biological Science
- CHEM 2020U Introduction to Organic Chemistry

The remaining science courses must be selected from lists of courses approved by the Dean of Science. Approved science electives will be identified each semester on the list of course offerings, in the subject areas of:

- biology
- chemistry
- computing Science
- mathematics
- physics
- energy and environmental science
- manufacturing

Particular sets of science electives are designated as secondary areas of specialization. Students should consult with an academic advisor for further information.

**Liberal studies courses - 24 credit hours**

These include 9 credit hours in required courses outside or linked to the discipline:

- BUSI 2000U Collaborative Leadership
- BUSI 1600U Management of the Enterprise
- BIOL 4080U Bioethics

**NOTE:**

- The program must include a total of 36 credit hours in science courses at the 3rd and 4th year level. Of these, at least 12 credit hours must be at the 4th year level.
- No more than 42 credit hours may be taken at the 1st year level.

### 15.2.5 Program details - Pharmaceutical Biotechnology

**YEAR ONE**

**SEMESTER ONE (15 credit hours)**
BIOL 1010U Biology I
CHEM 1010U Chemistry I
PHY 1010U Physics I
MATH 1010U Calculus I
CSCI 1000U Scientific Computing Tools

**SEMESTER TWO (15 credit hours)**
BIOL 1020U Biology II
CHEM 1020U Chemistry II
PHY 1020U Physics II
MATH 1020U Calculus II
Elective*

**YEAR TWO**

**SEMESTER ONE (15 credit hours)**
BIOL 2010U Introductory Physiology
BIOL 2030U Cell Biology
CHEM 2020U Introduction to Organic Chemistry
STAT 2020U Statistics and Probability for Biological Science
Elective*

**SEMESTER TWO (15 credit hours)**
BIOL 2040U Biochemistry
BIOL 2020U Genetics and Molecular Biology
BUSI 2000U Collaborative Leadership
Elective*
Elective*

YEAR THREE

**SEMESTER ONE (15 credit hours)**
BIOL 3050U Developmental Biology
CHEM 2030U Analytical Chemistry
BIOL 3010U Laboratory Methods in Molecular Biology
BIOL 3020U Principles of Pharmacology and Toxicology
Elective*

**SEMESTER TWO (15 credit hours)**
BIOL 3030U Microbiology and Immunology
CHEM 3830U Instrumental Analytical Chemistry
BIOL 3040U Physiology of Regulatory Systems
BUSI 1600U Management of the Enterprise
Elective*

YEAR FOUR

**SEMESTER ONE (15 credit hours)**
BIOL 4510U Independent Research Project I
BIOL 4070U Advanced Biochemistry
BIOL 4040U Applied Molecular Biology
Elective*
Elective*

**SEMESTER TWO (15 credit hours)**
BIOL 4520U Independent Research Project II
BIOL 4050U Advanced Topics in Pharmaceutical Biotechnology
BIOL 4060U Functional Genomics and Proteomics
BIOL 4080U Bioethics
Elective*

* Note: students are required to take 12 credit hours in science electives and 15 credit hours in liberal studies electives. Science electives may be Biological Science subjects.

### 15.2.6 Program details - Environmental Toxicology

YEAR ONE

**SEMESTER ONE (15 credit hours)**
BIOL 1010U Biology I
CHEM 1010U Chemistry I
PHY 1010U Physics I
MATH 1010U Calculus I
CSCI 1000U Scientific Computing Tools

**SEMESTER TWO (15 credit hours)**
BIOL 1020U Biology II
CHEM 1020U Chemistry II
PHY 1020U Physics II
MATH 1020U Calculus II
Elective*

YEAR TWO

**SEMESTER ONE (15 credit hours)**
BIOL 2010U Introductory Physiology
BIOL 2030U Cell Biology
CHEM 2020U Introduction to Organic Chemistry
STAT 2020U Statistics and Probability for Biological Science
Elective*

**SEMESTER TWO (15 credit hours)**
BIOL 2040U Biochemistry
BIOL 2020U Genetics and Molecular Biology
BUSI 2000U Collaborative Leadership
ENVS 1000U Environmental Science
Elective*

YEAR THREE

**SEMESTER ONE (15 credit hours)**
BIOL 3050U Developmental Biology
CHEM 2030U Analytical Chemistry
BIOL 3020U Principles of Pharmacology and Toxicology
Elective*
Elective*

**SEMESTER TWO (15 credit hours)**
BIOL 3030U Microbiology and Immunology
CHEM 3830U Instrumental Analytical Chemistry
STAT 3010U Biostatistics in Life Sciences
BUSI 1600U Management of the Business Enterprise
Elective*

YEAR FOUR

**SEMESTER ONE (15 credit hours)**
BIOL 4510U Independent Research Project I
BIOL 4010U Introduction to Environmental Research Methods
CHEM 4050U Environmental Chemistry
BIOL 4020U Environmental Risk Characterization
Elective*

**SEMESTER TWO (15 credit hours)**
BIOL 4520U Independent Research Project II
BIOL 4030U Advanced Topics in Environmental Toxicology
BIOL 4080U Bioethics
Biological Science Elective
Elective*

* Note: students are required to take 12 credit hours in science electives and 15 credit hours in liberal studies electives. Science electives may be biological science subjects.

## 15.3 Admission requirements

Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent, including:

Six 12U or M credits including English (ENG4U) and Calculus (MCB4U); and two of Biology (SBI4U), Chemistry (SCH4U), Physics (SPH4U) or Geometry and Algebra (MGA4U); or

Six OAC credits including English (ENG OAC) and Calculus (MCA OAC), two of Chemistry (SCH OAC), Physics (SPH OAC), Algebra and Geometry (MAG OAC), Biology (SBI OAC)

Applicants from other provinces or international students should e-mail **admissions@uoit.ca** or visit our Web site at **www.uoit.ca**.

## 15.4 Program information - Bachelor of Science (Honours) in Physical Science

### 15.4.1 General information

The curriculum provides a foundation in chemistry, physics, mathematics and computer science. Learning takes place in classroom lectures, tutorials, laboratories, computer simulations, and through independent and group research as well as multidimensional projects.

The BSc (Hons) in Physical Science program allows students to select a primary area-of-emphasis stream in Chemistry, Mathematics, or Physics. Alternatively, using the guidelines provided below, students will be able to work with an academic advisor to customize their program to match their interests and career plans by selecting a complementary studies stream. Students may also select a secondary area-of-emphasis stream, in any of the primary areas, and in biological science, computing science, energy and environment science, or manufacturing. The first year of the program is common for all streams, allowing students time to explore the possibilities before committing themselves to a final choice.

### 15.4.2 Work placements

The primary and secondary areas of specialization give students good opportunities to undertake research outside the University and to participate in cooperative programs and work placements.

### 15.4.3 Careers

There is a wealth of opportunities for graduates in the physical sciences in pharmaceutical, biotechnology, and chemical industries, government, and in fields of applied science. Graduates may wish to pursue the University's Bachelor of Education program to help meet the need for science teachers in Ontario's secondary schools.

### 15.4.4 Program overview and degree requirements

Students interested in the three primary area-of-emphasis streams (chemistry, mathematics, or physics) will follow specified program maps, which prescribe the sequence of courses, as described below. A graduate of the University of Ontario Institute of Technology's physical science program must successfully complete 120 credit hours according to the requirements indicated below. These requirements apply to all streams.

**First-year required science core - 27 credit hours**

- BIOL 1010U and 1020U
- CHEM 1010U and 1020U
- PHY 1010U and 1020U
- MATH 1010U and 1020U
- CSCI 1000U

**Upper-year specialization - 51 credit hours in physical science**

These must include:

STAT 2010U Statistics and Probability for Physical Science

All students in the BSc (Hons) in Physical Science program must successfully complete at least 48 credit hours in additional courses in physical science in the areas of chemistry, computing science, mathematics, and physics.

Program maps for each primary specialization are given below.

**Additional science courses - total of 18 credit hours**

A total of 18 credit hours from the list of science electives for BSc (Hons) students.

The remaining science courses must be selected from lists of courses approved by the dean of science. Approved science electives will be identified each semester on the list of course offerings, in the subject areas of:

- biology
- chemistry
- computing science
- mathematics
- physics
- energy and environment science
- manufacturing

Particular sets of science electives are designated as secondary areas of specialization. Examples of primary/secondary combinations include chemistry/mathematics, mathematics/computing science, mathematics/physics, and physics/chemistry. Students should consult with an academic advisor for further information.

**Non-science electives - 24 credit hours**

These include six credit hours in required courses outside or linked to the discipline:

- BUSI 2000U Collaborative Leadership
- BUSI 1600U Management of the Enterprise

**NOTE:**

- The program must include a total of 36 credit hours in science courses at the third- and fourth-year levels. Of these, at least 12 credit hours must be at the fourth-year level.
- No more than 42 credit hours may be taken at the first-year level.

### 15.4.5 Program details - Chemistry

**YEAR ONE**

**SEMESTER ONE (15 credit hours)**
BIOL 1010U Biology I
CHEM 1010U Chemistry I
PHY 1010U Physics I
MATH 1010U Calculus I
CSCI 1000U Scientific Computing Tools

**SEMESTER TWO (15 credit hours)**
BIOL 1020U Biology II
CHEM 1020U Chemistry II
PHY 1020U Physics II
MATH 1020U Calculus II
Elective*

## YEAR TWO

**SEMESTER ONE (15 credit hours)**
CHEM 2010U Structure and Bonding
CHEM 2020U Introduction to Organic Chemistry
CHEM 2030U Analytical Chemistry
STAT 2010U Statistics and Probability for Physical Science
Elective*

**SEMESTER TWO (15 credit hours)**
CHEM 2040U Thermodynamics and Kinetics
BIOL 2040U Biochemistry
BUSI 2000U Collaborative Leadership
Elective*
Elective*

## YEAR THREE

**SEMESTER ONE (15 credit hours)**
CHEM 3020U Organic Chemistry
CHEM 3510U Inorganic Chemistry I
CHEM 3530U Instrumental Analytical Chemistry I
Elective*
Elective*

**SEMESTER TWO (15 credit hours)**
CHEM 3040U Fundamentals of Physical Chemistry
CHEM 3520U Inorganic Chemistry II
CHEM 3540U Instrumental Analytical Chemistry II
BIOL 1600U Management of the Enterprise
Elective*

## YEAR FOUR

**SEMESTER ONE (15 credit hours)**
CHEM 4050U Environmental Chemistry
CHEM 4020U Advanced Organic Chemistry
CHEM 4040U Physical Chemistry
Elective*
Elective*

**SEMESTER TWO (15 credit hours)**
CHEM 4060U Chemical and Molecular Spectroscopy
CHEM 4010U Industrial Chemistry
Elective*
Elective*
Elective*

* Note: students are required to take 18 credit hours in science electives and 18 credit hours in liberal studies electives.

### 15.4.6 Program details - Mathematics

## YEAR ONE

**SEMESTER ONE (15 credit hours)**
BIOL 1010U Biology I
CHEM 1010U Chemistry I
PHY 1010U Physics I
MATH 1010U Calculus I
CSCI 1000U Scientific Computing Tools

**SEMESTER TWO (15 credit hours)**
BIOL 1020U Biology II
CHEM 1020U Chemistry II
PHY 1020U Physics II
MATH 1020U Calculus II
Elective*

## YEAR TWO

**SEMESTER ONE (15 credit hours)**
MATH 2030U Set Theory
MATH 2010U Advanced Calculus I
MATH 2050U Linear Algebra
STAT 2010U Statistics and Probability for Physical Science
Elective*

**SEMESTER TWO (15 credit hours)**
MATH 2070U Numerical Methods
MATH 2020U Advanced Calculus II
MATH 2060U Differential Equations
BUSI 2000U Collaborative Leadership
Elective*

## YEAR THREE

**SEMESTER ONE (15 credit hours)**
MATH 3050U Partial Differential Equations
MATH 3020U Real Analysis
MATH 3030U Linear Algebra II
MATH 3040U Operations Research I
Elective*

**SEMESTER TWO (15 credit hours)**
MATH 3060U Complex Analysis
MATH 3070U Algebraic Structures
BUSI 1600U Management of the Enterprise
Elective*
Elective*

## YEAR FOUR

**SEMESTER ONE (15 credit hours)**
MATH 4010U Advanced Differential Equations
MATH 4020U Numerical Analysis
MATH 4030U Biomathematics
Elective*
Elective*

**SEMESTER TWO (15 credit hours)**
MATH 4050U Advanced Partial Differential Equations
Elective*
Elective*
Elective*
Elective*

* Note: students are required to take 15 credit hours in science electives and 18 credit hours in liberal studies electives.

### 15.4.7 Program details - Physics

#### YEAR 1

**SEMESTER ONE (15 credit hours)**
BIOL 1010U Biology I
CHEM 1010U Chemistry I
PHY 1010U Physics I
MATH 1010U Calculus I
CSCI 1000U Scientific Computing Tools

**SEMESTER TWO (15 credit hours)**
BIOL 1020U Biology II
CHEM 1020U Chemistry II
PHY 1020U Physics II
MATH 1020U Calculus II
Elective*

#### YEAR TWO

**SEMESTER ONE (15 credit hours)**
PHY 2030U Mechanics I
PHY 2010U Electricity and Magnetism I
PHY 2050U Thermodynamics
STAT 2010U Statistics and Probability for Physical Science
Elective*

**SEMESTER TWO (15 credit hours)**
PHY 2040U Mechanics II
PHY 2020U Electricity and Magnetism II
MATH 2060U Differential Equations
BUSI 2000U Collaborative Leadership
Elective*

#### YEAR THREE

**SEMESTER ONE (15 credit hours)**
PHY 3010U Statistical Physics I
PHY 3020U Quantum Physics I
PHY 3030U Electronics
Elective*
Elective*

**SEMESTER TWO (15 credit hours)**
PHY 3040U Mathematical Physics
PHY 3050U Waves and Optics
PHY 3060U Fluid Mechanics
BUSI 1600U Management of the Enterprise
Elective*



#### YEAR FOUR

**SEMESTER ONE (15 credit hours)**
PHY 4010U Quantum Physics II
PHY 4020U Statistical Physics II
PHY 4600U Thesis Project
Elective*
Elective*

**SEMESTER TWO (15 credit hours)**
PHY 4030U Atomic and Molecular Physics
PHY 4610U Biophysics of Excitable Cells
Elective*
Elective*
Elective*

* Note: students are required to take 15 credit hours in science electives and 18 credit hours in liberal studies electives.

# Section 16: Course Descriptions

**All courses are 3 credit hours unless otherwise noted.**

**Cross listed courses:** A course which is listed under two or more Schools and which can be taken for credit from one School only.

**Credit restrictions:** Where two or more courses are closely related, credit may be limited to one of the courses.

**BIOL 1010U Biology I.** This course examines the evolutionary basis of life and the structure and function of living organisms. The major tissues, organs, and organ systems and their development from simple structures to more complicated systems will be examined. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: OAC or 12U Biology (recommended). Credit may be obtained for only one of BIOL 1010U and BIOL 1840U. Note: Students without the Biology prerequisite may be admitted by permission of the course instructor, and will be responsible for making up background material.

**BIOL 1020U Biology II.** Biology explores some of the basic challenges that organisms face in order to develop, survive and reproduce. The second half of the course will address the fundamental principles of ecology and give a basic understanding of individual populations and communities. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: BIOL 1010U. Credit may be obtained for only one of BIOL 1020U and BIOL 1840U.

**BIOL 1810U Biochemistry for Health Science.** This course focuses on enzyme mechanisms and stereochemistry, and includes discussions of carbohydrate metabolism, glycolysis, glycogen breakdown and synthesis, transport across membranes, the citric acid cycle, electron transport and oxidative phosphorylation, the pentose phosphate pathway and the glycoxylate pathway, lipid metabolism, including fatty acid degradation and biosynthesis, and the synthesis and role of ketone bodies, amino acid metabolism, and an overview of the urea cycle. Lect: 2hrs, Other: 2hrs. Credit may be obtained for only one of BIOL 1810U and BIOL 2040U.

**BIOL 1820U Microbiology for Health Science.** Introductory microbiology is a survey study of the comparative biology of microorganisms, directed toward students in health and biological science programs. Common infectious diseases will be examined using a body systems approach. Laboratory activities will focus on correct aseptic principles, identification of organisms and diagnostic microbiology. Core concepts will be presented and studied in ways that prepare students to apply their understanding in practice in their specific discipline. Lect: 3hrs. Note: There will be an online tutorial.

**BIOL 1840U Biology for Engineers.** This course examines the evolutionary basis of life and the structure and function of living organisms. The major tissues, organs, and organ systems and their development from simple structures to more complicated systems will be examined. Lect: 3hrs, Other: 2hrs. Credit may not be obtained for both BIOL 1840U and either BIOL 1010U or BIOL 1020U.

**BIOL 2010U Introductory Physiology.** Overview of the major physiological processes involved in plant and animal growth and development including the mechanism of action of growth regulators and hormones. Emphasis is placed on the use of genetic, biochemical, and physiological approaches to understand the regulation of different systems in plants and animals. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: BIOL 1020U.

**BIOL 2020U Genetics and Molecular Biology.** An introduction to the fields of genetics and molecular biology. Topics include the science of inheritance, DNA structure and replication, meiosis, regulation of gene expression, sex-linked inheritance, analyzing inheritance and heredity, human genetic disorders, and the molecular biology technology on which DNA cloning, and construction of recombinant DNA and of transgenic organisms is based on. Lect: 3hrs, Lab: 3hrs, biweekly, Other: 2hrs biweekly. Prerequisites: BIOL 1020U. Credit may be obtained for only one of BIOL 2020U and BIOL 2840U.

**BIOL 2030U Cell Biology.** Provides a basic knowledge of the structural and functional properties of cells. Emphasizes the mechanisms by which signalling molecules and the process of signal transduction integrate and coordinate the functions of many individual cells in a multi-cellular organism. Explores factors regulating the cell cycle and growth. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: BIOL 1020U. Credit may be obtained for only one of BIOL 2030U and BIOL 2840U.

**BIOL 2040U Biochemistry.** Focuses on enzyme mechanisms and stereochemistry, carbohydrate metabolism, glycolysis, glycogen breakdown and synthesis, transport across membranes, the citric acid cycle, electron transport and oxidative phosphorylation, the pentose phosphate pathway and the glycoxylate pathway, lipid metabolism, synthesis and role of ketone bodies, amino acid metabolism, and an overview of the urea cycle. Lect: 3hrs, Other: 1hr. Prerequisites: BIOL 1020U, CHEM 2020U. Credit may be obtained for only one of BIOL 2040U and BIOL1810U.

**BIOL 2810U Pharmacology for Health Sciences.** This course introduces the student to the concepts of pharmacology and medication administration. The student will learn about common drug classifications, and the psychological and cultural aspects of drug therapy. As well, the student will learn about the legal aspects, nursing responsibilities and decision-making processes required for the safe and accurate administration of medication to a variety of client populations. Lect: 3hrs. Credit may be obtained for only one of BIOL 2810U and BIOL 3020U.

**BIOL 2820U Nutrition for Health Science.** This course will focus on nutrition as a determinant of health. Learners will examine basic nutrients, nutrient metabolism, and nutritional requirements across the lifespan. Students will be introduced to health promotion challenges related to nutrition such as vegetarianism, needs in pregnancy, eating disorders, and cultural considerations. Lect: 3hrs. Prerequisites: BIOL 1810U. Credit may be obtained for only one of BIOL 2820U and BIOL 3650U.

**BIOL 2840U Cell and Molecular Biology.** This course covers basic properties of cells, cell organelles, differentiated cells systems and tissues. Students will be introduced to scientific literature on the subject of cell biology in order to become familiar with the experimental evidence that supports current knowledge of the cell. They will also learn how to critically examine data and interpretations presented by researchers. Lect: 3hrs, Lab: 2hrs biweekly, Other: 2hrs biweekly. Prerequisites: BIOL 1840U. Credit may not be obtained for both BIOL 2840U and either of BIOL 2020U or BIOL 2030U.

**BIOL 3010U Laboratory Methods in Molecular Biology.** Laboratory-based instruction in the basic methodologies used in the construction of recombinant DNA molecules and construction of transgenic organisms. Students will develop technical skills commonly used in the field of molecular biology, practical knowledge sufficient to perform basic procedures independently, and to analyze experimental results obtained with these techniques. Lab: 6hrs. Prerequisites: BIOL 2020U, BIOL 2040U.

**BIOL 3020U Principles of Pharmacology and Toxicology.** An overview of the action and toxicity of drugs that affect the autonomic nervous system, the central nervous system, and cardiovascular function in both normal and pathological conditions. Toxicological effects of food, food additives, household and industrial products and wastes will also be examined. Lect: 3hrs, Other: 1hr. Prerequisites: BIOL 2010U, BIOL 2040U. Credit may be obtained for only one of BIOL 3020U and BIOL 2810U.

**BIOL 3030U Microbiology and Immunology.** An introduction to the field of microbiology, with emphasis on the interactions of microbes with host organisms in symbiosis and pathogenesis. The immune response obtained during a host-pathogen interaction will be used to provide an overview of the cells and organs of the immune system, antigen-antibody interactions, immune effector molecules, vaccines and immunodeficiency diseases. Lect: 3hrs, Lab 3hrs biweekly. Prerequisites: BIOL 2020U, BIOL 2030U.

**BIOL 3040U Physiology of Regulatory Systems.** Examines the close relationship between structure and function from the molecular to cellular to organismal level and the processes by which regulation of physiological functions occur. Emphasis is placed on the sensing and signalling systems (nervous and endocrine) and then on the effector systems (muscles and glands). Lect: 3hrs, Lab: 3hrs biweekly. Prerequisites: BIOL 2010U, BIOL 2030U.

**BIOL 3050U Developmental Biology.** Emphasizes principles and key concepts that govern the process of development in vertebrates, with some examples from invertebrate models. Examines how a single fertilized cell gives rise to hundreds of differentiated cells, how differentiated cells are organized into tissues and organs, how the growth of cells is regulated, and how an adult transmits the instructions for making an organism from one generation to the next. Lect: 2hrs, Lab: 3hrs biweekly. Prerequisites: BIOL 2020U, BIOL 2030U.

**BIOL 3610U Comparative Zoology.** Provides a general knowledge of the biology of both invertebrates and vertebrates. Various concepts related to form, function, ecology and evolution will be emphasized and compared in the lecture material. Diversity within each phylum will be examined and adaptive explanations will be sought for how these organisms have adapted to the environment. Lect: 3hrs. Prerequisites: BIOL 2010U.

**BIOL 3620U Conservation Biology.** Designed to help students of biodiversity develop practical skills and knowledge that they can use in their professional and personal lives. Integrates local (Ontario), regional (Canada) and global scales of diversity, both of life and of our human responses to these issues. The first unit explores the diversity of species and the genetic basis for their evolution and adaptation. The tools used to measure biodiversity are introduced and the moral and management issues involved in the protection of biodiversity are addressed. Lect: 3hrs, Other: 1hr. Prerequisites: BIOL 2020U.

**BIOL 3630U Soil-Plant Relationships.** Explores the interrelationships among soil characteristics, root growth, water and nutrient absorption and the mineral nutrition of plants. Topics to be covered include: shoot-root relations, root growth, soil-plant atmosphere, water relations, soil aeration and plant growth, nutrient transport in the soil-plant system, the root-soil interface, the function of nutrients in plants, nutrient management for sustainable plant production. Lect: 3hrs. Prerequisites: BIOL 2010U.

**BIOL 3640 Plant Biology.** Provides a working knowledge of the structure of vascular plants. The primary topic areas are the plant cell and its components, apical meristems and development of primary tissue systems, primary tissue organization, secondary growth, and floral structure. Structural fitness of tissues and organs for functions they perform are also examined. Lect: 3hrs. Prerequisites: BIOL 2030U.

**BIOL 3650U Fundamentals of Nutrition.** This course provides the basic concepts for the study of human and animal nutrition. Topics will include those related to macronutrient nutrition, fibre and energy metabolism. The structure and function of macronutrients and fibre, their digestion, absorption and metabolism in the body, and their implications for health will be discussed. Lect: 3hrs. Prerequisites: BIOL 2040U. Credit may be obtained for only one of BIOL 3650U and BIOL 2820U.

**BIOL 4010U Introduction to Environmental Research Methods.** Introduction to methods of developing, evaluating and using evidence in Environmental Studies. Methods for summarizing and critical appreciation of data describing environmental systems. Skill development in applying statistical techniques and in using microcomputers as a research tool. Lect: 3hrs, Other: 3hrs. Prerequisites: STAT 3010U.

**BIOL 4020U Environmental Risk Characterization.** A biologically-based course that surveys current risk assessment issues in ecotoxicology. Topics include problem definition, effect and exposure characterization, risk assessment and risk management decision making. Lect: 3hrs. Prerequisites: BIOL 3020U.

**BIOL 4030U Advanced Topics in Environmental Toxicology.** Highlights advanced concepts, techniques, research, and industrial applications in the area of environmental toxicology. Selected topics include nutritional toxicology and food safety, toxicology of drugs, contamination of water resources, toxicity and biological fate of pesticides, herbicides, and other environmental contaminants, molecular toxicology, P-450, genetic toxicology, biomedical toxicology, plant pathology, and toxicological epidemiology. Lect: 3hrs. Prerequisites: BIOL 3020U. Note: An independent term project will be part of this course.

**BIOL 4040U Applied Molecular Biology.** A comprehensive study of the molecular biology-based techniques used in biotechnology, basic research, treatment of disease, food production, and forensic science. Applications of these techniques will be illustrated using recently published original research journal articles. Lect: 3hrs. Prerequisites: BIOL 3010U.

**BIOL 4050U Advanced Topics in Pharmaceutical Biotechnology.** Highlights the fundamental research and industrial applications of pharmaceutical biotechnology in selected areas including psychopharmacology, cardiovascular pharmacology, neuropharmacology, endocrine pharmacology, quantitative pharmaceutical analysis, drug discovery and design, safety and quality assurance, and protein engineering. Lect: 3hrs. Prerequisites: BIOL 3020U. Notes: An independent term project will be part of this course.

**BIOL 4060U Functional Genomic and Proteomics.** An overview of genomics (the study of the structure and function of complete sets of genes of a genome) and proteomics (the study of the structure and function of the complete set of proteins that the genome expresses). The complexity of genes, genome organization, protein structure and methods used for analysis will be discussed from both an historical and current perspective. The practical use of software tools for analysis of genomic and proteomic data will be introduced. Lect: 3hrs. Prerequisites: BIOL 3010U, BIOL 4070U.

**BIOL 4070U Advanced Biochemistry.** A systems-oriented course in which biochemical structure, function and metabolism are presented in an integrated fashion. Topics will include protein structure, enzyme regulation, regulation and integration of metabolism, and mechanisms by which a cell's metabolism responds to the environment. Lect: 3hrs. Prerequisites: BIOL 2040U.

**BIOL 4080U Bioethics.** Introduction to bioethical methods and theory to guide discussion of bioethical issues related to the various disciplines in biology including the environment and moral relationships between humans and the rest of the world. Students will discuss bioethical issues from an historical, sociological, and philosophical perspective, with a consideration of how religious beliefs, political ideology, and the law influence positions. Lect: 3hrs. Prerequisites: Registration in year four of a Biological Science program.

**BIOL 4510U Independent Research Project I.** Provides students with the opportunity to integrate and synthesize knowledge gained throughout their program of study. In consultation with a faculty advisor, students will select a research topic and design, implement and report on a project in an area of interest related to the area of specialization. The project will be completed in the following semester. Other: 9hrs. Prerequisites: Registration in year four of a Biological Science program. Notes: Students are expected to take BIOL 4520U in the following semester.

**BIOL 4520U Independent Research Project II.** A continuation of the project started in BIOL 4510U. Students will make oral presentations based on their research and provide a

written report at the end of the semester. Other: 9hrs. Prerequisites: BIOL 4510U. Notes: students are expected to take this course immediately after BIOL 4510U.

**BIOL 4610U Field Biology.** Each year the Ontario Universities Program in Field Biology offers a diversity of field courses in habitats ranging from the Arctic to the Tropics, microbes to mammals, and covering marine, freshwater and terrestrial habitats. A complete list of the field courses offered is available at http://bioserv2.mcmaster.ca/oupfb/index.htm. The Web site includes the course list, the faculty coordinator and the host university. Only courses equivalent in weight to 3 credits (one half-course) at UOIT may be applied to the requirements of the BSc degree. Prerequisites: As specified by host university.

**BIOL 4620U Animal Behaviour.** This course is designed to provide students with the theoretical background necessary for an understanding of animal behaviour. Students will learn to observe and characterize the behaviours. Key factors such as genetics, developmental and environmental effects will be studied. Lect: 3hrs. Prerequisites: BIOL 3610U.

**BIOL 4630U Plant Physiology.** Provides a greater understanding of the mechanisms and experimental data introduced in the introductory physiology course. Topics include the processes involved in plant growth and development. Emphasizes basic mechanisms of plant development and function, current research in the field, and the use of genetic, biochemical, and physiological approaches to understand the regulation of plant growth. Lect: 3hrs. Prerequisites: BIOL 2010U, BIOL 3640U.

**BUSI 1101U Financial Accounting.** This introductory course examines financial accounting theories, principles, techniques and practices in a Canadian context. Students are introduced to the role of accounting in the business environment, measuring income, valuing assets and liabilities, generally accepted accounting principles, partnership and corporate accounting. Lect: 3hrs.

**BUSI 1450U Statistics.** This course introduces the fundamental concepts and applications of descriptive and inferential statistics and probability theory. It also introduces statistical model building. Emphasis is balanced among theoretical concepts, calculations (including computer-based calculations), and data interpretation. Credit Restriction: STAT 2010U, STAT 2020U, STAT 2800U, STAT 3800U, JSTS 2820U.

**BUSI 1500U Business Communications and Computing Skills.** This experiential course develops students' proficiency at communicating via interpersonal (one-on-one and small group), electronic and written means and develops computing application skills. Topics include: components of effective business communication (audience, content and delivery); interpersonal skills and the art of effective persuasion; computer literacy and electronic forms of communication; computing application; the toolbox of effective business writing vocabulary, spelling, grammar, style, punctuation, organization; business writing planning, researching, reading/thinking, outlining, organizing, writing, rewriting, citing sources, editing, presenting; memos and reports; and special situations job search and interviews.

**BUSI 1520U Business Computer Applications.** This course helps students use computer applications to aid a variety of business communication and managerial tasks. Tasks include: communication with stakeholders (stockholders, consumers, employees, directors and officers, etc.), government, and the media; preparation of advertising; communication for project management; decision-making tools; and user-oriented security. This course is not available to computer science students for credit. Lect: 3hrs.

**BUSI 1600U Management of the Enterprise.** This introductory management course is divided into four parts. Students will be introduced to the core concepts and context of management, enhancing their understanding of how the business environment affects the practice of management. The functions of management will be reviewed, including key topics, issues and problems within the basic management activities of marketing, organizational behaviour/human resources, operations management and information technology, accounting, and finance. The latter components will synthesize the ideas presented in earlier classes by introducing fundamental elements of business strategy, followed by advanced topics in management, including small business, entrepreneurship and E-business.

**BUSI 1650U External Environment of Business.** This course provides an introduction to the national and international context of Canadian political, economic, legal and business activity. It presents a sampling of the most relevant issues facing managers in business, labour and public sector organizations. Emphasis is placed on developing an understanding of Canada's competitive position today and of the historical background and current influences on this position. Topics covered include: an overview of the historical and contemporary socio-economic events that shape the Canadian and global economies today, the changing world scene, the attractiveness of various world markets, the relative position of Canada vs. the world with respect to labour, capital, and technology, different measures of competitiveness, as well as policy recommendations. Lect: 3hrs. Prerequisites: BUSI 1600U.

**BUSI 1830U Introduction to Programming.** This course introduces students to general computer programming principles. Topics include basic computer hardware and software concepts, problem analysis, design of algorithms and programs, the selection of data types, basic I/O, repetition and flow control, decision-making, and optionally, principles of object-oriented languages. The course uses a programming language such as Java or C. Applications to business, science and engineering are illustrated. Lect: 3hrs. Cross Listed: ENGR 1200U.

**BUSI 1900U Mathematical Foundations for Business.** This course provides a core mathematical background for students who are undertaking their BCom. Two main areas of coverage are calculus and linear programming. Theoretical concepts are balanced with hands-on calculations and an emphasis on problem solving. Students will also use graphing software and other computer tools to explore graphs of functions, to analyze the basic characteristics and properties of functions, and to become more successful in mathematical problem solving with the use of technology. Lect: 3hrs.

2000-level Business specialization electives (course descriptions under development)

**BUSI 2101U Intermediate Financial Accounting I**

**BUSI 2102U Intermediate Financial Accounting II**

**BUSI 2340U Organizational Issues: Problems and Directions.**

**BUSI 2390U Training and Development.**

**BUSI 2501U E-Business Technologies.**

**BUSI 2502U E-Commerce.**

**BUSI 2503U E-Marketing.**

**BUSI 2504U E-Learning.**

**BUSI 2505U E-Recruitment and Management of Human Resources.**

**BUSI 2000U Collaborative Leadership.** This course intends to develop critical employability skills such as teamwork, leadership, project management, communication skills and intercultural understanding, and will focus students' learning on topics related to interactions with others in personal, educational and professional contexts. Students will engage in collaborative and dynamic learning activities involving direct and practical application of the content/skills critical to professional success. They will explore the practice and impact of leadership, negotiations and teamwork in organizations and communities. These practices will be examined in a variety of settings as described in both popular and academic writings. Learning activities will be directed toward: developing leadership for exceptional performance, obtaining commitment to goals and standards, negotiating and resolving conflict, inter-cultural communications, ethical practice, and relating with others in team environments. Lect: 3hrs.

**BUSI 2050U Economics for Professionals.** Aspects of theoretical and applied economics relevant to professionals. Fundamental principles in both micro- and macroeconomics are introduced. Microeconomics topics include scarcity, opportunity cost, diminishing returns, elasticity, industrial organization, economies of scale and concentration. Macroeconomics topics include unemployment, inflation, economic growth, the multiplier, equilibrium, fiscal policy and monetary policy. The principle of money and banking are introduced along with the role of the Bank of Canada. Applied economics topics covered include cost concepts, time value

of money, comparison of alternatives, depreciation, tax considerations, economic analysis of projects, break-even, sensitivity and risk, and decision models. Lect: 3hrs.

**BUSI 2151U Managerial Accounting I.** This course introduces the student to managerial accounting concepts with a focus on accounting information and analysis used in management decisions. Current trends in the application of management accounting from a Canadian perspective are emphasized. Lect: 3hrs. Prerequisites: BUSI 1101U.

**BUSI 2152U Managerial Accounting II.** This is a continuation of Managerial Accounting I, addressing managerial accounting concepts with a focus on accounting information and analysis used in management decisions. Current trends in the application of management accounting from a Canadian perspective are emphasized. Lect: 3hrs. BUSI 2151U.

**BUSI 2201U Marketing I.** This introductory course addresses the basic concepts and practices of modern marketing. It will provide a firm understanding of how to define and segment a market; how to develop products and services for chosen target markets; how to price offerings to make them attractive and affordable; how to choose intermediaries to make products available to customers and how to develop a promotional mix in order that customers will know about and want a firm's products. It provides a broad range of marketing skills in order to determine, serve and to satisfy the needs and wants of a customer. Lect: 3hrs.

**BUSI 2202U Marketing II.** This course builds upon the basic concepts and practices of modern marketing introduced in Marketing I. It will provide a firm understanding of how to define and segment a market; how to develop products and services for chosen target markets; how to price offerings to make them attractive and affordable; how to choose intermediaries to make products available to customers and how to develop a promotional mix in order that customers will know about and want a firm's products. For students, it provides a broad range of marketing skills in order to determine, serve and to satisfy the needs and wants of a customer. Lect: 3hrs. Prerequisites: BUSI 2201U.

**BUSI 2311U Organizational Behaviour and Human Resources Management I.** This course provides students with an introduction to the fundamentals of human resources management and organizational behaviour. The focus in this course is on the management aspects of human resources in order to create an environment that is conducive to maximum productivity. Students will be introduced to effective strategies for attracting, retaining, and motivating staff; demographic challenges; human resources planning; performance management; establishing and maintaining high performance work teams; and managing diversity. Using interactive techniques, students will have opportunities to apply human resources management and organizational behaviour theories, concepts, and practices. Lect: 3hrs.

**BUSI 2312U Organizational Behaviour and Human Resource Management II.** This second level course builds upon the introduction to the fundamentals of human resources management and organizational behaviour provided in Human Resource Management I. The focus in this course is on the management aspects of human resources in order to create an environment that is conducive to maximum productivity. Students will be introduced to effective strategies for attracting, retaining, and motivating staff; demographic challenges; human resources planning; performance management; establishing and maintaining high performance work teams; and managing diversity. Using interactive techniques, students will have opportunities to apply human resources management and organizational behaviour theories, concepts, and practices. Lect: 3hrs. Prerequisites: BUSI 2311U.

**BUSI 2401U Finance I.** This introductory course focuses on the major decisions made by the financial executive. Topics include analysis of the financial environment and its components; security valuation; determinants of interest rates; capital budgeting; the cost of capital; working capital management and financial planning. Lect: 3hrs.

**BUSI 2402U Finance II.** This course builds upon the content of Finance I, continuing to focus on the major decisions made by the financial executive. Topics include analysis of the financial environment and its components; security valuation; determinants of interest rates; capital budgeting; the cost of capital; working capital management and financial planning.

**BUSI 2601U Operations and Project Management I.** This course introduces students to the functional area of production and operations management as practiced in manufacturing industries and the services sector. It includes decision-making, project management, facility layout in both manufacturing and services industries, waiting lines, quality control, just-in-time systems, forecasting, aggregate planning, inventory management, materials requirements planning and operations scheduling. Lect: 3hrs.

**BUSI 2602U Operations and Project Management II.** This second level course continues to study the functional area of production and operations management as practiced in manufacturing industries and the services sector. It includes decision-making, project management, facility layout in both manufacturing and services industries, waiting lines, quality control, just-in-time systems, forecasting, aggregate planning, inventory management, materials requirements planning and operations scheduling. Lect: 3hrs. Prerequisites: BUSI 2601U.

**BUSI 2610U Quality Frameworks.** In this theory and lab-based course, students examine the planning tools and techniques used to establish a quality focused system. As well, students look at the effective monitoring and continual improvement in the quality of an organization's products and services. Other topics include quality planning, process capability, gauge capability, Pareto analysis, quality costs, cause and effect, regression-correlation, ANOVA, ISO 9000 and acceptance sampling. Lect: 3hrs.

**BUSI 2620U Business Ethics.** This course seeks to answer some fundamental questions, including: Why do organizations need to address ethical issues? What ethical issues arise in the course of business activity? How can individuals and organizations address questions of morality in business? What are the ethical obligations of business people and organizations in society? How do organizations manage for ethical practice and social responsibility? What can individuals do to encourage ethical business practice? The following topics are examined in the course: business ethics and strategic management; stakeholder impact analysis and ethical decision-making; employees as stakeholders; customers and suppliers as stakeholders; the environment and local communities as stakeholders, the legal environment of corporations and the professions; compliance programs; crisis management and global business ethics. Lect: 3hrs.

**BUSI 2650U Supply Chain & Vendor Management.** This introductory course in Supply Chain Management covers the following topics: supply chain activities and functions, the role of purchasing in the supply chain, the purchasing process, purchasing and information technology, sourcing strategies, electronic marketplaces and e-procurement, negotiating techniques, quality considerations in purchasing, outsourcing and supplier price determination. Lect: 3hrs.

**BUSI 2705U Legal Environment of Business.** This introductory business law course covers the following subjects: the Canadian legal system, the US legal system (including class actions, contingency fees, jury trials, punitive damages, cost structures etc.), the legal profession, constitutional law, legal research, contract law (including offer, acceptance, consideration, legality, capacity, misrepresentation, breach, remedy etc.), business associations (sole proprietorships, partnerships and corporations), corporation law, officer and director liability, commercial transactions, civil litigation, alternative dispute resolution, employment law, negligence, professional liability, tort law, real estate law, consumer protection, competition law, marketing law, environmental law, intellectual property law, internet law, comparative laws and damages and remedies. Lect: 3hrs.

**BUSI 2930U Leadership, Negotiation and Teamwork.** This course examines the practice and impact of leadership, negotiations and teamwork in organizations and communities. These practices will be examined in a variety of settings as described in both popular and academic writings on the subjects. It is organized around sets of activities critical to managerial success, each involving face-to-face interaction and a high degree of interpersonal skill: developing leadership for

exceptional performance; obtaining commitment to goals and standards; negotiating and resolving conflict; cultural awareness; and relating well with one another in team environments. Implications for personal and career development will also be incorporated. Other topics covered include current thinking and research on negotiating, international negotiations and the effect of culture on negotiating styles. Lect: 3hrs.

3000-level Business specialization electives (course descriptions under development)

**BUSI 3101U Advanced Financial Accounting.**

**BUSI 3106U Contemporary Issues in Accounting.**

**BUSI 3110U Introduction to Income Taxation.**

**BUSI 3120U Managerial Cost Accounting and Analysis.**

**BUSI 3160U Management Accounting and Control Systems.**

**BUSI 3170U Auditing Standards and Applications.**

**BUSI 3200U Marketing Communications.**

**BUSI 3210U Consumer Behaviour.**

**BUSI 3260U Marketing Research.**

**BUSI 3280U Brand Management.**

**BUSI 3312U Industrial and Labour Relations.**

**BUSI 3315U Negotiation Theory and Behaviour.**

**BUSI 3319U Conciliation and Dispute Resolution.**

**BUSI 3330U The Management of Change.**

**BUSI 3340U Human Resources Planning.**

**BUSI 3350U Developing Management Skills.**

**BUSI 3360U Quality of Organizational Life.**

**BUSI 3510U Internet Engineering.**

**BUSI 3520U Applied Internet Multimedia.**

**BUSI 3530U HTML and Web site Design Management.**

**BUSI 3540U Object Oriented Programming.**

**BUSI 3570U Server and Network Administration.**

**BUSI 3580U WWW Networking.**

**BUSI 3600U Inventory Management.**

**BUSI 3620U Emergent Technologies in Supplier Management.**

**BUSI 3650U Project Learning.**

**BUSI 3040U Information Systems.** This course introduces students to the management issues, concepts and terminology associated with information technology systems. This course is of interest to students with either a technical or a non-technical background. Issues discussed include: the role of computers in modern organizations; data models and their relation to organization models; systems development processes; and systems theory. Students will learn to recognize opportunities for use of computer-based technology at strategic, tactical and operational levels; the technical and organizational problems generated by introducing new technology; and the long-term organizational implications of these decisions. Lect: 3hrs.

**BUSI 3550U Information Technology Applications.** This course is designed to enable students to use the many tools and techniques used in systems analysis and design, and examines alternative approaches to systems development. These approaches include structured analysis and design concepts, the prototyping of user interfaces, entity-relationship diagrams, data flow diagrams and structure charts. Students will be expected to attain sufficient mastery of these concepts to apply them to a case study. Students will also use a variety of automated computer assisted software engineering (CASE) tools. Lect: 3hrs.

**BUSI 3700U Strategic Management for Professionals.** This course examines strategy and related concepts. The focus is on strategic management: choosing and defining purposes and objectives, formulating and implementing a viable strategy, and monitoring strategic performance. The thrust of the course is to view the organization in its totality: the external environment in which it operates, its strategy, and its internal administrative activities. The emphasis is on assessing the kinds of problems and issues that affect the success of the entire organization. Lect: 3hrs.

4000-level Business specialization electives (course descriptions under development)

**BUSI 4120U Advanced Income Taxation.**

**BUSI 4140U Accounting Theory.**

**BUSI 4190U Special Topics in Accounting.**

**BUSI 4199U Directed Independent Studies in Accounting.**

**BUSI 4203U Electronic Commerce & Marketing.**

**BUSI 4220U Marketing Analysis.**

**BUSI 4240U Retail Marketing Strategies.**

**BUSI 4250U International Marketing.**

**BUSI 4270U Business to Business Marketing.**

**BUSI 4290U Special Topics in Marketing.**

**BUSI 4299U Directed Independent Studies in Marketing.**

**BUSI 4390U Special Topics in Organizational Behaviour and HR.**

**BUSI 4399U Directed Independent Studies in Organizational Behaviour and HR.**

**BUSI 4590U Special Project in E-Business and E-Commerce.**

**BUSI 4599U Directed Independent Studies in E-Business and E-Commerce.**

**BUSI 4600U Advanced Vendor and Purchasing Management.**

**BUSI 4650U Advanced Supply Chain Management.**

**BUSI 4652U Supplier Management for Competitive Advantage.**

**BUSI 4659U Supplier Management Case Competition.**

**BUSI 4680U Applied Project Management: Tools and Applications.**

**BUSI 4690U Special Topics in Supplier Management.**

**BUSI 4699U Directed Independent Studies in Supplier Management.**

**BUSI 4701U Strategic Management I.** This course examines strategy and related concepts. The focus throughout is on strategic management: choosing and defining purposes and objectives, formulating and implementing a viable strategy, and monitoring strategic performance. The thrust of the course is to view the organization in its totality: the external environment in which it operates, its strategy, and its internal administrative activities. The emphasis is on assessing the kinds of problems and issues that affect the success of the entire organization. Topics include the strategic process, the role of the general manager, the external environment, internal analysis, competitive advantage, strategy and structure, diversification, integrations and alliances, organizational structure, strategy and control and an introduction to corporate strategy. Lect: 3hrs.

**BUSI 4702U Strategic Management II.** This second level course continues to examine strategy and related concepts. The focus throughout is on strategic management: choosing and defining purposes and objectives, formulating and implementing a viable strategy, and monitoring strategic performance. The thrust of the course is to view the organization in its totality: the external environment in which it operates, its strategy, and its internal administrative activities. The emphasis is on assessing the kinds of problems and issues that affect the success of the entire organization. Topics include the strategic process, the role of the general manager, the external environment, internal analysis, competitive advantage, strategy and structure, diversification, integrations and alliances, organizational structure, strategy and control and an introduction to corporate strategy. Lect: 3hrs. Prerequisites: BUSI 4701U.

**BUSI 4991U The UOIT Edge I.** Directed by three faculty advisors (of whom one is the chair for a group's project), and with input from the employer, this is a six-month study of an actual organization by groups of six to eight BCom students. The two courses require the comprehensive description and evaluation of an organization and appropriate recommendations for improved performance with the solution of a particular problem or group of problems. The main purpose of this capstone study is to provide students with opportunities to develop a thorough under-

standing of the technology, environment, markets, and operations of a real organization by applying the theory and knowledge that they have learned. Lect: 3hrs.

**BUSI 4992U The UOIT Edge II.** This is a continuation of the UOIT Edge I, begun in the previous semester. Student teams continue to study actual organization. Students will complete a comprehensive analysis and evaluation of an organization and develop appropriate recommendations for improved performance with the solution of a particular problem or group of problems. They will make a formal presentation of their findings and recommendations to faculty advisors and to the management team of the organization. Lect: 3hrs. Prerequisites: BUSI 4991U.

**CHEM 1010U Chemistry I.** The concepts of chemistry including simple reactions and stoichiometry; atomic and molecular structure and chemical bonding; chemical equilibria involving gases; acids, bases, salts, buffers and ionic equilibria; titration; introduction to organic chemistry and the reactions of organic compounds; polymer chemistry. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: OAC or 12U Chemistry (recommended). Note: Students without the Chemistry prerequisite require the permission of the instructor in charge of the course, and will be responsible for making up background material. Credit may be obtained for only one of CHEM 1010U and CHEM 1800U.

**CHEM 1020U Chemistry II.** Introduction to the fundamental principles governing chemical transformations. Thermochemistry and thermodynamics (energy, heat, enthalpy, entropy and free energy); the rates of reaction, the law of radioactive decay and reaction mechanisms; redox reactions and electrochemistry. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: CHEM 1010U. Credit may be obtained for only one of CHEM 1020U and CHEM 1800U.

**CHEM 1800U Chemistry for Engineers.** Introduction to the four sub-disciplines of modern chemistry: analytical, inorganic, organic and physical. Atoms, molecules, stoichiometry and gas laws; reactions, chemical kinetics, thermochemistry, entropy and free energy; electronic structure of atoms, bonding and molecular structure with emphasis on organic molecules; intermolecular forces, liquids and solids; electrochemistry, fuel cells and electrolytic cells. Lect: 3hrs, Lab: 2hrs biweekly, Other: 2hrs biweekly. Prerequisites: OAC or 12U Chemistry. Credit may not be obtained for both CHEM 1800U and either CHEM 1010U or CHEM 1020U.

**CHEM 2010U Structure and Bonding.** An introduction to modern inorganic chemistry which provides a systematic overview of bonding theories designed to explain molecular arrangements, with emphasis on structure and reactivity. An introduction to transition group elements, as well as the use of modern structural methods to determine composition, structure and bonding. Lect: 3hrs, Other: 1hr. Prerequisites: CHEM 1020U.

**CHEM 2020U Introduction to Organic Chemistry.** An introduction to the principles and techniques of organic chemistry, including a study of the correlation of reactions and physical properties of organic compounds with structure and energetic concepts; structure, bonding, properties, reactions and synthesis of mono-functional aliphatic and aromatic compounds; stereochemistry and reaction mechanism theory; study of infrared, nuclear magnetic resonance and mass spectroscopy. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs, biweekly. Prerequisites: CHEM 1020U.

**CHEM 2030U Analytical Chemistry.** A study of the principles of analytical chemistry through demonstrations of applications in chemistry, biology, medicine and the study of the environment. Includes: standard analytical chemistry techniques based on chemical equilibrium, volumetric analysis, analytical electrochemistry; use of buffers for pH-control; statistical treatment of analytical data. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: CHEM 1020U.

**CHEM 2040U Thermodynamics and Kinetics.** Classical thermodynamics: first and second laws, Gibbs and Helmholtz functions, chemical potential; phase diagrams, applications to phase equilibrium in one, two, and many component systems, Gibbs phase rule; phase diagrams for steels and other alloys; behaviour of real gases; steam tables. Chemical kinetics: gas phase kinetics; Arrhenius rates; enzyme kinetics. Lect: 3hrs, Lab: 3hrs biweekly. Prerequisites: CHEM 1020U, MATH 1020U. Credit may be obtained for only one of CHEM 2040U and PHY 2050U.

**CHEM 3020U Organic Chemistry.** Mechanistic analysis of chemical reactivity of common functional groups with a focus on nucleophilic substitutions at carbonyl centers, functional group transformations in organic synthesis; aromatic chemistry, alkanes, alkyl halides, alkynes, alkenes, and alcohols; carbohydrates, amino acids, proteins, heterocycles; applications of spectroscopic techniques. Lect: 3 hrs, Lab: 3hrs biweekly. Prerequisites: CHEM 2020U.

**CHEM 3040U Fundamentals of Physical Chemistry.** Thermodynamics concepts including solution thermodynamics, phase equilibria, and electrochemistry; transport phenomena, the random walk problem and diffusion; introduction to statistical mechanics including probability distributions and entropy, fluctuations, the Boltzmann distribution, and partition functions and their relation to thermodynamic functions. Lect: 3hrs, Lab: 3hrs biweekly. Prerequisites: CHEM 2040U.

**CHEM 3510U Inorganic Chemistry I.** Detailed treatments of inorganic and organometallic coordination chemistry of the transition and main group elements; the emphasis is on structure, bonding, and reactivity; solid state chemistry; acid-base chemistry; inorganic chemistry in non-aqueous media. The lab portion of this course will emphasize the use of modern structural methods to determine composition, structure and bonding. Lect: 3hrs, Lab 3hrs biweekly. Prerequisite: CHEM 2010U. Students are expected to take CHEM 3520U in the following semester.

**CHEM 3520U Inorganic Chemistry II.** A continuation of the lecture and laboratory topics of Inorganic Chemistry I. Spectroscopy of metal complexes, reaction mechanisms of d-block complexes, d-block organometallic complexes, catalysis; introduction to bioinorganic chemistry. Lect: 3hrs, Lab 3hrs biweekly. Prerequisite: CHEM 3510U. Students are expected to take this course immediately after CHEM 3510U.

**CHEM 3530U Instrumental Analytical Chemistry I.** Instrumental methods of trace chemical analysis. This course deals with the scope and use of instruments in chemical analysis, and the theory and applications of ultraviolet/visible, infrared and atomic absorption spectroscopy. A range of other analytical techniques is examined. Lect: 3hrs, Other: 1hr. Prerequisite: CHEM 2030U. Credit may be obtained for only one of CHEM 3530U and CHEM 3830U. Students are expected to take CHEM 3540U in the following semester.

**CHEM 3540U Instrumental Analytical Chemistry II.** A continuation of the topics of Instrumental Analytical Chemistry I. Arc, spark and inductively-coupled plasma, emission spectroscopy and ICP mass spectroscopy; X-ray fluorescence; gas chromatography; surface characterization, vacuum ultraviolet and X-ray photoelectron spectroscopy; auger and SIMS; neutron activation analysis; electrochemical techniques; HPLC. Lect: 3hrs, Other: 1hr. Prerequisite: CHEM 3530U. Credit may be obtained for only one of CHEM 3540U and CHEM 3830U. Students are expected to take this course immediately after CHEM 3530U.

**CHEM 3830U Instrumental Analytical Chemistry.** A one-semester course dealing with instrumental methods of trace chemical analysis. The theory and applications of ultraviolet/visible, infrared and atomic absorption spectroscopy are described. Other common techniques are examined, including X-ray fluorescence, mass spectrometry, gas chromatography, nuclear activation analysis and high performance liquid chromatography. Lect: 3hrs, Other: 1hr. Prerequisite: CHEM 2030U. Credit may not be obtained for both CHEM 3830U and either CHEM 3530U or CHEM 3540U.

**CHEM 4010U Industrial Chemistry.** An introduction to the principles and practices of industrial chemistry with a survey of the chemical industry, pollution control, plant design, corrosion and similar topics. Selected industrial processes will be discussed, such as production of primary petrochemicals; plastics and synthetic fibres; pharmaceutical agents; insecticides, herbicides and insect pheromones, dyes, detergents, perfumes and flavours. Lect: 3hrs. Prerequisites: CHEM 3520U. This course will include tours of industrial plants.

**CHEM 4020U Advanced Organic Chemistry.** Application of advanced synthetic methodologies used in modern organic synthesis. Emphasis will be placed on the use of ret-

rosynthetic analysis, stereochemical control, and protection/deprotection schemes. The application of mass spectrometry, NMR, and ultraviolet/visible and infrared spectroscopy will be central to the analysis of organic chemical problems. Lect: 3hrs. Prerequisites: CHEM 3020U.

**CHEM 4040U Physical Chemistry.** An introduction to phenomena at surfaces and interfaces: colloids, adsorption, thermodynamic treatments and examples of technological applications. The course describes modern methods to characterize surfaces in materials science and chemical dynamics at electrode interfaces. Lect: 3hrs, Lab: 3hrs biweekly. Prerequisite: CHEM 3040U.

**CHEM 4050U Environmental Chemistry.** Major chemical pollutants: their sources, the environmental reactions they undergo, and how they become distributed throughout the environment. Topics will be chosen from the major environmental toxicants: pesticides, natural products, inorganics, and industrial chemicals. The course explores the principal means of chemical and biological degradation of toxicants, and the processes by which chemicals move, concentrate, and dissipate. The details of the chemistry occurring in the earth's atmosphere are examined. Lect: 3hrs. Prerequisite: CHEM 2020U, CHEM 2030U. Field trips will be included as part of this course.

**CHEM 4060U Chemical and Molecular Spectroscopy.** Interaction of light with matter including transition moments and selection rules; matrix methods; electron and nuclear magnetic resonance (Bloch equation and the rotating frame approximation); detailed study of rotation, vibration and electronic spectroscopy, including line broadening, hyperfine and quadrupole coupling; introduction to group theory in chemistry. Lect: 3hrs. Prerequisite: CHEM 3040U.

**CSCI 1000U Scientific Computing Tools.** A course covering the use of various software tools for use in the UOIT web-centric and laptop environment in Science. Modules will be included on: web tools, spreadsheets, file management, meta-computing tools (Maple, Matlab), basic graphics tools, scientific text processing, presentation tools (Powerpoint, Visio). Lect: 3hrs, Other: 2hrs.

**CSCI 1600U Fundamentals of Programming.** Introduction to basic computer programming principles and the use of computer programming tools to solve problems arising in science, engineering, and business. Topics include: basic computer hardware and software concepts, problem analysis, design of algorithms and programs, the principles of object-oriented languages. Lect: 3hrs, Other: 2hrs. Prerequisite: CSCI 1000U.

**CURS 4100U Curriculum Studies I: Biology.** A study of the general principles of curriculum design and development. Students will learn the forces that shape the curriculum and ways in which designers seek to address the needs of learners and society while being guided by the discipline of the subject. Particular attention will be given to the curriculum and the teaching of biology in the Intermediate and Senior Divisions. Topics will include: content in science and biology courses taught in these divisions, relevant Ontario Ministry of Education guidelines, policies and resource documents, teaching philosophies, instructional and assessment techniques (for both classroom and laboratory contexts) appropriate to the subject and level. Lect: 1.5hrs, Lab 1.5hrs, 1.0hrs online.

**CURS 4101U Curriculum Studies II: Biology.** This course will expand upon the foundation provided in the Biology Curriculum Studies I course by extending the examination of teaching methods and materials that are appropriate for the teaching of biology in Grades 11 and 12. Students will explore the development of lessons and units of instruction for particular topics in the Ontario science - biology curriculum and will learn a variety of assessment techniques for use in evaluating student progress and for curriculum development. Lab safety, lab-based teaching and the use of technology in teaching lab skills will be foci of the course. Lect: 1.5hrs, Lab: 1.5hrs, 1.0 online. Prerequisites: CURS 4100U.

**CURS 4120U Curriculum Studies I: Chemistry.** A study of the general principles of curriculum design and development. Students will learn the forces that shape the curriculum and ways in which designers seek to address the needs of learners and society while being guided by the discipline of the subject. Particular attention will be given to the curriculum and teaching of chemistry in the Intermediate and Senior Divisions. Topics include: content in science and chemistry courses taught in these divisions, relevant Ontario Ministry of Education guidelines, policies and resource documents, teaching philosophies, instructional and assessment techniques (for both classroom and laboratory contexts) appropriate to the subject. Lect: 1.5hrs, Lab 1.5hrs, 1.0hrs online.

**CURS 4121U Curriculum Studies II: Chemistry.** This course will expand upon the foundation provided in the Chemistry Curriculum Studies I course by extending the examination of teaching methods and materials that are appropriate for the teaching of chemistry in Grades 11 and 12. Students will explore the development of lessons and units of instruction for particular topics in the Ontario science - chemistry curriculum and will learn a variety of assessment techniques for use in evaluating student progress and for curriculum development. Lab safety, lab-based teaching and the use of technology in teaching lab skills will be foci of the course. Lect: 1.5hrs, Lab: 1.5hrs, 1.0 online. Prerequisites: CURS 4120U.

**CURS 4130U Curriculum Studies I: Physics.** A study of the general principles of curriculum design and development. Students will learn the forces that shape the curriculum and ways in which designers seek to address the needs of learners and society while being guided by the discipline of the subject. Particular attention will be given to the curriculum and teaching of physics in the Intermediate and Senior Divisions. Topics include: content in science and physics courses taught in these divisions, relevant Ontario Ministry of Education guidelines, policies and resource documents, teaching philosophies, instructional and assessment techniques (for both classroom and laboratory contexts) appropriate to the subject and level. Lect: 1.5hrs, Lab 1.5hrs, 1.0 online.

**CURS 4131U Curriculum Studies II: Physics.** This course will expand upon the foundation provided in the Physics Curriculum Studies I course by extending the examination of teaching methods and materials that are appropriate for the teaching of physics in Grades 11 and 12. Students will explore the development of lessons and units of instruction for particular topics in the Ontario science-physics curriculum and will learn a variety of assessment techniques for use in evaluating student progress and for curriculum development. Lab safety, lab-based teaching and the use of technology in teaching lab skills will be foci of the course. Lect: 1.5hrs, Lab: 1.5hrs, 1.0 online. Prerequisites: CURS 4130U.

**CURS 4140U Curriculum Studies I: Mathematics.** A study of the general principles of curriculum design and development. Students will learn the forces that shape the curriculum and ways in which designers seek to address the needs of learners and society while being guided by the discipline of the subject matter. Particular attention will be given to the curriculum and the teaching of mathematics in the Intermediate and Senior Divisions. Topics will include: mathematics content in courses taught in these divisions, relevant Ontario Ministry of Education guidelines, policies and resource documents, teaching philosophies, instructional and assessment techniques appropriate to mathematics. Lect: 1.5hrs, Lab: 1.5 in-class, 1.0 online.

**CURS 4141U Curriculum Studies II: Mathematics.** This course will expand upon the foundation provided in the Mathematics Curriculum Studies I course by extending the examination of teaching methods and materials that are appropriate for the teaching of mathematics in the intermediate and senior grades. Students will explore the development of lessons and units of instruction for particular topics in the Ontario mathematics curriculum and will learn a variety of assessment techniques for use in evaluating student progress and for curriculum development. Special attention will be given to the integration of mathematics with other areas of instruction. Lect: 1.5hrs, Lab: 1.5hrs, 1.0 online. Prerequisites: CURS 4140U.

**CURS 4160U Curriculum Studies I: Computer Studies.** A study of the general principles of curriculum design and development. Students will learn the forces that shape the curriculum and ways in which designers seek to address the needs of learners and society while being guided by the discipline of the subject. Topics will include: the key concepts of courses in computer and information science and computer engineering technology in Grades 11 and 12, relevant Ontario Ministry of Education guidelines,

policies and resource documents, teaching philosophies, instructional and assessment techniques (for classroom and laboratory contexts) appropriate to the subject. Lect: 1.5hrs, Lab: 1.5, 1.0 online.

**CURS 4161U Curriculum Studies II: Computer Studies.** This course will expand upon the foundation provided in the Computer Science Curriculum Studies I course by extending the examination of teaching methods and materials that are appropriate for the teaching of computer science in Grades 11 and 12. Students will explore the development of lessons and units of instruction for particular topics in the Ontario curriculum and will learn a variety of assessment techniques for use in evaluating student progress and for curriculum development. Lect: 1.5hrs, Lab: 1.5hrs, 1.0 online. Prerequisites: CURS 4160U.

**CURS 4180U Curriculum Studies I: General Science.** A study of the general principles of curriculum design and development. Students will learn the forces that shape the curriculum and ways in which designers seek to address the needs of learners and society while being guided by the discipline of the subject. Particular attention will be given to the curriculum and the teaching of general science subjects in the Intermediate and Senior Divisions. Topics will include: content of the science courses taught in these divisions, relevant Ontario Ministry of Education guidelines, policies and resource documents, teaching philosophies, instructional and assessment techniques (for both classroom and laboratory contexts) appropriate to the subject. Lect: 1.5hrs, Lab 1.5hrs, 1hr online.

**CURS 4181U Curriculum Studies II: General Science.** This course will expand upon the foundation provided in the General Science Curriculum Studies I course by extending the examination of teaching methods and materials that are appropriate for the teaching of general science in the intermediate and senior grades. Students will explore the development of lessons and units of instruction for particular topics in the Ontario science curriculum and will learn a variety of assessment techniques for use in evaluating student progress and for curriculum development. Special attention will be given to the integration of science with other areas of instruction. Lab safety, lab-based teaching and the use of technology in teaching lab skills will be foci of the course. Lect: 1.5hrs, Lab: 1.5hrs, 1.0 online. Prerequisites: CURS 4180U.

**ECON 2010U Microeconomics.** As a first course in economics, microeconomics introduces the student to principles such as scarcity, opportunity cost, diminishing returns, elasticity, industrial organization, economies of scale, and concentration. The course begins with an introduction to the market and price determination. The course reviews the cost structure of the firm in both the long and short run. Price and quantity decisions for firms in various competitive situations are discussed. Canada's Competition Act is examined. The course also analyses the markets for factors of production.

**ECON 2020U Macroeconomics.** As an introductory course in economics, macroeconomics introduces the student to principles such as unemployment, inflation, economic growth, the multiplier, equilibrium, fiscal policy, and monetary policy. The student builds on the knowledge of the market from microeconomics and proceeds to an understanding of aggregate demand and supply. The principles of money and banking are introduced along with the role of the Bank of Canada. The course also introduces the student to the principles of international trade theory. Lect: 3hrs. Prerequisites: ECON 2010U.

**EDUC 1050U Technical Communications.** This course will assist students in developing professional writing and presentation skills required for university assignments and for their professional work in the future. It will start with basic writing and speaking skills and will emphasize their application in the preparation of reports and other technical writing. Topics for the course include using correct grammar and punctuation, organizing ideas, formulating persuasive arguments, and preparing narrative and written technical reports. Part of the process will involve students in the critical analysis of the writing and speaking of others as a means of developing one's own skills. Lect: 3hrs, Other: 1hr.

**EDUC 1200U History of Science and Technology.** This course will focus on the history and philosophy of science and engineering with special emphasis on scientific technology and the cultural significance of technology to civilization. The course will include critical analyses and will pay significant attention on the nature and problems of industrial technology, benefits and risks of technological progress, and issues around intellectual property. Throughout, students will examine the history and philosophy within the context of science and engineering as learned professions. Lect: 3hrs.

**EDUC 1470U Impact of Science and Technology on Society.** In this course, students will engage in analyses of scientific and technological developments from the perspective of broad social impacts. Special attention will be paid to controversial issues currently receiving media attention, but the major emphasis will be on ways of thinking critically about both the remediation of already existing problems (e.g., toxic substance cleanup) and the prevention of future problems (e.g., environmental impact analyses and or economic impact analyses). Canadian examples will be of primary concern, but students will also learn to think about impact globally since large-scale problems do not respect political boundaries. Lect: 3hrs.

**EDUC 2000U Classroom Communications.** This 18-hour course is designed to strengthen students' abilities to communicate effectively through speaking, writing and listening. The course uses a variety of activities that are appropriate to the range of communication skills being taught and that reflect the most common communication activities involved in teaching. Some attention will be given to computer-supported presentations. 1.5 credit hours.

**EDUC 3470U Issues in Education.** This elective will examine current issues in educational practice and policy as a means of demonstrating the relevance of other BEd courses and as a beginning step in the process of lifelong professional development. While the course will stress Ontario issues, one purpose will be to help the students to understand these issues in the context of related questions. Lect: 3hrs, Other: 1hr online.

**EDUC 3560U Religious Education: Teaching in Ontario Catholic Schools.** This course, which is compulsory for teacher candidates who want to teach in Ontario Catholic schools, is designed to introduce teacher candidates to the history and philosophical foundations of Catholic education in Ontario. They will study ways in which curriculum can be designed to reflect the philosophy and values of the Catholic system and examine the support systems available for Catholic teachers in Ontario schools. Lect: 3hrs, Other: 1hr online.

**EDUC 3610U Contemporary Educational Practice.** The course is designed to introduce teacher candidates to the basic legal issues related to functioning as a teacher in the publicly funded school system in Ontario. Teachers must be aware of their rights and obligations as defined in legislation. They must also understand how education is delivered to pupils in the publicly funded school systems in Ontario and the basic structure supporting that delivery. These rights and obligations, combined with the legal structure and processes, have a direct impact on the relationships between teachers and pupils, teachers and their colleagues in education and teachers and the community. The course addresses Ontario education law, related legislation and policy including the Education Act and regulations made under the Act, The Ontario College of Teachers Act and regulations made under that Act relating to teacher qualifications and professional misconduct, the Teaching Professional Act and Labour Relations Act, the Safe Schools Act, the Trespass to Property Act, the Freedom of Information and Protection of Privacy Act, the Education Quality Improvement Act, the regulation governing the identification and placement of exceptional pupils and the legislation regarding workplace health and safety. Lect: 3hrs, Other: 1hr.

**EDUC 3750U Learning and Human Development.** There are two parts to this course. The first module will focus on traditional learning theories and contemporary learning research with special emphasis on classroom applications. Teacher Candidates will be introduced to some of the historically important theories of learning and will critique contemporary views of learning from an understanding of the older views. In the second module students will examine the physical, cognitive, social and emotional development of children in the context of family, peers, school, work and culture. The course content includes contemporary adolescent issues and concerns, such as drug and alcohol abuse, sexuality, vandalism,

ethnic and cultural issues, and problems of handicapped youths. The course will include literary as well as socio-psychological portrayals of adolescence. Topics include: theories of adolescence, physiological and cognitive development; social, emotional and personality development; the contexts of adolescent development; adolescent problems/challenges and methods of coping. Lect: 3hrs, Other: 1hr online.

**EDUC 3800U Teaching for Individual Needs and Diversity.** This 18-hour course focuses on strategies to address special needs of students within the regular classroom. It introduces different types of special needs encountered in the elementary and secondary schools and examines the instructional and assessment strategies most likely to succeed with these learners. The course includes review of legislation and required procedures such as Individual Education Plans (IEPs) and Identification, Placement and Review Committees (IPRC). Techniques for modifying testing situations and course materials are also addressed. Students are encouraged to see effective partnerships with parents and other professionals as essential to effective learning and integration. Another focus in the course is the increasing diversity of the regular classroom-gender and racial differences, ESL, patterns of family life, religious beliefs, socioeconomic status, etc. Students will explore ways to address such differences so that they are accepted and respected. Lect: 2hrs, Other: 1hr online. 1.5 credit hours.

**EDUC 4240U Understanding Education Research, Theory & Practice.** This course is designed to introduce teacher candidates to the diverse approaches to knowledge production that make up educational research. The course highlights a variety of forms of disciplined inquiry used in a wide range of research disciplines. The emphasis in this course is on reading and understanding research with a focus on examining the potential implications for teaching practice. The course provides teacher candidates with the opportunity to understand the various approaches to educational research in terms of underlying principles such as generalizability, reproducibility and logical coherence. The course assists teacher candidates to begin the process of using educational research and reflective practice to construct, document and inform their own professional practice. Lect: 3hrs, Other: 1hr online.

**EDUC 4380U Analysis and Management of Classroom Behaviour.** Strategies for dealing with student behaviour will be learned in this half-credit course (36 hours) in the context of case analyses and role-playing. A wide range of behavioural, emotional, and academic problems will be presented in cases that systematically vary on potentially important dimensions such as teacher age and experience, other teacher characteristics, age of students, subject matter and type of class (e.g. regular classroom vs. lab). The tasks for students are to identify the variables that are germane in each situation and to develop action plans for dealing with the problem. Lect: 2hrs, Other: 1hr.

**EDUC 4590U Assessment and Evaluation.** This 18-hour course will focus on issues in testing, measurement and evaluation. The course will introduce traditional testing concepts including reliability, validity and item analysis. Particular emphasis will be placed on test planning and development using tables of specifications. Students will learn how to interpret test data and to exhibit a critical attitude toward the misuse and misinterpretation of test results. Performance and portfolio assessment will be stressed as contemporary approaches to authentic assessment and will form a significant part of the evaluation of students in the course. Lect: 2hrs, Other: 1hr. 1.5 credit hours.

**EDUC 4610U Advanced Instructional Design.** This elective course presents systematic approaches to answering questions about how instruction should be designed. Students will learn processes for the analysis of learning needs, contexts and tasks as well as techniques for choosing and developing instructional materials and media. Throughout, students will be encouraged to think of learning in the context of a wide range of human performance environments. Students will be encouraged to select and adapt a model for instructional design that they believe will fit their needs and their individual working style. Lect: 3hrs, Other: 1hr online.

**ENGR 1200U Introduction to Programming.** Personal computer hardware: CPU, memory, machine cycle; input and output devices; data representation; operating systems: DOS and Windows; application software: programs and files, text and document processing; spreadsheets; databases; networks and computer-computer communications; programming languages; structured programming; flowcharting; algorithm design; use of procedures, loops and arrays; programming in 'C': data declaration, arithmetic and logic operations, input and output. Lect: 3hrs, Other: 2hrs. Cross Listed with BUSI1830U.

**ENGR 2010U Thermodynamic Cycles.** A study of the basic concepts involved in thermodynamics, including: Nature of thermodynamics; First Law of Thermodynamics; Second Law of Thermodynamics; properties and behaviour of pure substances; ideal gases and mixtures; equation of state for a perfect gas; Carnot and Rankine Cycles; Thermodynamic Efficiency; Steam Tables and Charts; Superheating and Reheating; Regenerative Feedwater Heating; Conventional and Nuclear Steam Cycles; Heat Exchanger Thermal Balance; Steam Turbine Expansion Lines; Steam Generator Thermal Characteristics. Lect: 3hrs, Lab: 2hrs biweekly, Other: 1hr.

**ENGR 2140U Problem Solving, Modelling and Simulation.** Students will explore processes and skills needed to define, evaluate and develop a range of solutions to design problems while working alone or as members of a group. Topics include: methods for estimating and verifying the results and levels of accuracy of alternate designs; mathematical modelling of simple processes and equipment; computer programs for solving systems of equations; use of simulation in the design and visualization of continuous and discrete process. Lect: 2hrs, Other: 2hrs. Prerequisites: MATH 1020U, PHY 1020U, ENGR 1200U. Co-Requisites: MATH 2860U.

**ENGR 2220U Structure and Properties of Materials.** Atomic structure and atomic bonding in solids, structure of crystalline solids, solidification and defects, alloys and phase diagrams, mechanical properties of metals and alloys, semiconductors, organics, polymers, crystalline ceramics, glass and fibre optics, composites, biomaterials, magnetic materials. Lect: 3hrs. Prerequisites: CHEM 1800U.

**ENGR 2420U Solid Mechanics.** Design of mechanical joints; elasto-plastic torsion of circular sections; elasto-plastic bending of beams; residual stresses, shearing stresses in beams, analysis of plane stress and plain strain problems; pressure vessels, design of members of strength criteria, deflection of beams; statistically indeterminate structures. Lect: 3hrs, Lab: 3hrs biweekly. Prerequisites: ENGR 2220U, MATH 2820U.

**ENGR 2500U Introduction to Nuclear Physics.** An introduction to atomic and nuclear physics. Topics include: radioactivity; alpha, beta and gamma decay; binding energy interaction of radiation with matter; neutron cross-sections, neutron scattering and absorption; fission; fusion; neutron density and flux, neutron diffusion, diffusion equation; neutron multiplication factor and reactivity, reactor equation, four and six factor formulae, neutron flux distribution, flux flattening; application of nuclear energy and radioisotopes in various fields. Lect: 3hrs. Prerequisites: PHYS 1020U, MATH 1020U.

**ENGR 2640U Thermodynamics and Heat Transfer.** Nature of thermodynamics; First Law of Thermodynamics; Second Law of Thermodynamics. Control mass and control volume analyses. Properties and behaviour of pure substances. Ideal gases and mixtures; equation of state for a perfect gas. Maxwell's relations. Introduction to conduction, convection and radiation. Solutions to steady-state and transient conduction problems. Solutions to convection problems for laminar and for turbulent flows. Thermal radiation between black bodies. Lect: 3hrs, Lab: 2hrs biweekly, Other: 1hr. Prerequisites: PHY 1010U, ENGR 2860U, MATH 2860U.

**ENGR 2790U Electric Circuits.** Basic concepts of electricity, magnetism and electric circuits; DC and AC driven circuits; series and parallel circuits; Ohm's Law, Kirchhoff's Laws, Thevenin's Theorem, Norton's Theorem, operation of electrical equipment such as instruments, motors, generators, solid-state transistors and microcircuits; electrical measuring equipment and circuit measurements; response to step functions; response to sinusoids, steady-state AC, resonance, parallel resonance, AC power, power factor, power factor correction; graphical and analytical analysis of single-stage amplifier; magnetic circuits and devices: coils, solenoids, transformers; mutual inductance; fundamentals of electromechanical energy conversion; elementary rotating machines; single and three phase circuits. Lect: 3hrs, Lab: 2hrs. Prerequisites: PHY 1020U, MATH 2860U.

**ENGR 2860U Fluid Mechanics.** Properties of fluids and their units; fluid statics. Kinematics of fluids, conservation of mass and the continuity equation. Dynamics of fluids; Euler's equation; Bernoulli's equation. The energy equation; energy grade lines. Flow of viscous fluids; laminar and turbulent flows; flow in pipes and fittings; the Moody diagram. Flows around immersed bodies; lift and drag on bodies. Boundary layers; flow separation. Flow measurement techniques. Lect: 3hrs, Lab: 2hrs biweekly, Other: 1hr. Prerequisites: PHY 1010U, MATH 1020U.

**ENGR 2950U Radiation Protection.** Defines and introduces basic concepts in radiation safety; dose limits and risk; protection from external radiation: time, decay and distance, shielding, access control; external radiation hazards; radiation surveys; internal radiation hazards; behaviour of internal sources, annual limit on intake, derived air concentration for tritium, radioiodines, particulates; bioassay; contamination control; basic principles of radiation dosimetry; calculation of internal and external body radiation exposures; regulations concerning radioactive materials; safety working with radiation. Lect: 2hrs, Lab: 2hrs. Prerequisites: ENGR 2500U.

**ENGR 3030U Computer-Aided Design.** Geometric/solid modeling, computer graphics and feature modeling. Finite element analysis, discretization and modeling, selection of elements, treatment of boundary conditions, checking for accuracy. Design optimization, optimization models, algorithms for optimization. State-of-the-art software packages will be introduced and case studies will be employed. Lect: 4hrs, Lab: 2hrs. Prerequisites: ENGR 2420U, 2640U, 3200U.

**ENGR 3190U Manufacturing and Production Processes.** The role and characterization of manufacturing technology within the manufacturing enterprise is studied. Topics include an overview of the deformation process, joining processes, consolidation processes, material removal processes, and material alteration processes; process selection and planning; just-in-time production; computer control of manufacturing systems. Lect: 3hrs, Lab: 3hrs biweekly. Prerequisites: ENGR 2220U, 2420U.

**ENGR 3200U Engineering Graphics and Design.** Engineering drawing techniques, dimensions and geometric tolerances, standard viewpoints and section planes, orthographic projections, use of AutoCAD, and other design, drawing and graphics software; a case-based introduction to engineering design; use of graphics and illustrations in engineering design; design projects by individuals and groups; basics of project management, such as organizing, planning, scheduling and controlling; application of such computer tools as spreadsheets, project management software, computer-aided drafting and design tools. Lect: 3hrs, Lab: 1.5hrs, Other: 1.5hrs.

**ENGR 3270U Kinematics and Dynamics of Machines.** Classification of mechanisms; velocity, acceleration and force analyses; graphical and computer-oriented methods of analyses; balancing, flywheels, gears, gear trains, and cams. Introduction to Lagrangian dynamics; Lagrange's equations of motion; Hamilton's equations, and Hamilton's principle. Lect: 3hrs, Lab: 3hrs biweekly. Prerequisites: PHY 1010U, MATH 2820U.

**ENGR 3300U Integrated Manufacturing Systems I.** Facility layout; cellular manufacturing; fundamentals of automation; automatically-guided vehicles; flexible manufacturing; group technology; computer-aided process planning; forecasting; inventory management and control; production planning and control; production activity control systems. Lect: 3hrs, Other: 1hr. Prerequisites: ENGR 3030U, 3190U, 3270U.

**ENGR 3350U Control Systems.** Analysis and synthesis of linear feedback systems by classical state space techniques. Nonlinear and optimal control systems. Modelling of dynamic systems; analysis of stability, transient and steady state characteristics of dynamic systems; characteristics of feedback systems; design of PID control laws using frequent response methods and the root locus technique. Lect: 3hrs, Lab: 2hrs biweekly, Other, 1hr. Prerequisites: MATH 2820U, ENGR 2790U.

**ENGR 3380U Strength of Materials.** Principles of statics as applied to deformable solid bodies; stress and strain; Hooke's law, elastic behaviour of simple members under axial force, tension, compression, shear, torsion; bending and deflection of beams; design of beams, trusses, frames and shafts; column loads and buckling; impact loading; stability of structures. Lect: 3hrs, Lab: 2hrs biweekly, Other: 1hr. Prerequisites: ENGR 2220U, PHY 1010U.

**ENGR 3390U Mechatronics.** This course provides students with the tools required to design, model, analyze and control mechatronic systems; i.e. smart systems comprising electronic, mechanical, fluid and thermal components. The techniques for modeling various system components will be studied in a unified approach developing tools for the simulation of the performance of these systems. Analysis will also be made of the various components needed to design and control mechatronic systems including sensing, actuating, and I/O interfacing components. Lect: 3hrs, Lab: 2hrs biweekly, Other: 1hr. Prerequisites: ENGR 3030U, 3270U, 3350U.

**ENGR 3395U Manufacturing Systems Design.** Concepts for successful product design relating to manufacturing processes. Principles of concurrent engineering, design for assembly, environmentally conscious design and manufacturing and the competitive aspects of manufacturing. Methods of assessment for engineering life cycles, manufacturing systems, assembly/disassembly processes in relation to rapid product manufacturing. Numerous case studies will be covered. Tutorial work will entail individual and group design for three to four projects. Lect: 3hrs, Other: 2hrs. Prerequisites: successful completion of all third year non-elective courses.

**ENGR 3460U Industrial Ergonomics.** The biology of work; anatomical and physiological factors underlying the design of equipment and work places; biomechanical factors governing physical workload and motor performance; Circadian rhythms and shift work; measurement and specification of heat, light and sound levels with respect to the design of workplaces. Detailed analyses will be made of several cases in which human factors methods have been applied to improve the efficiency with which human/machine systems operate. Lect: 3hrs, Other: 1hr.

**ENGR 3510U Nuclear Plant Chemistry.** Corrosion and crud formation; heavy water chemistry; heavy water production and upkeep; moderator and heat transport system chemistry; purification systems to remove particulates, contaminants and chemicals added to control reactivity; decontamination; steam generator, condenser and feedwater chemistry; pH and pD control in power plants; online and off-line control of process chemistry; metallurgical problems in nuclear power plants; metallurgical techniques for irradiated materials. Lect: 3hrs. Prerequisite: Professor's Permission. Note: Elective for Nuclear Engineering programs.

**ENGR 3530U Safety and Quality Management.** Nuclear safety management: legal framework, regulatory environment, licensing process; safety culture; defence in depth; reliability concepts; investigating and reporting incidents; emergency procedures; quality assurance; total quality management: organizational structure, policies and procedures, interfaces, grading of QA processes, deficiencies and corrective actions, verification, competence of personnel, document control and records, ISO qualification process. Lect: 3hrs.

**ENGR 3570U Environmental Effects of Radiation.** Topics include: natural and artificial environmental radiation; units and measurements; biological effects of radiation; maximum permissible public dose, magnitude and frequency; release of radioisotopes to the environment; dispersion in the atmosphere; dispersion in aquatic environment; food chain; calculation of total dose consequence; site demographic, meteorological, geologic, hydrologic and seismic characteristics; derived emission limits; radiation dose due to the nuclear fuel cycle; ALARA principle; emergency preparedness; on-site and off-site emergency procedures. Lect: 3hrs, Lab: 2hrs. Prerequisites: ENGR 2500U.

**ENGR 3610U Corrosion for Engineers.** A study of types, causes, costs, measurement and prevention of corrosion. Topics include: effects of material choices and the environment; types of corrosion discussed: general or uniform, galvanic, crevice, pitting, intergranular, selective leaching, stress-corrosion, erosion-corrosion, hydrogen effects; corrosion testing; selection of materials; aqueous corrosion; high temperature corrosion; corrosion in nuclear and fossil plants and other industrial environments; electrochemical principles; thermodynamics; electrode kinet-

ics; aqueous corrosion kinetics; practical applications. Lect: 3hrs. Prerequisites: CHEM 1020U or CHEM 1800U.

**ENGR 3640U Radioactive Waste Management Design.** Students will study: nature of radioactive waste; origin of low, intermediate and high activity waste; characteristics, forms and quantity of radioactive waste; production of radioactive waste at each stage of the nuclear cycle: mining, fuel fabrication, reactor operation and maintenance, spent fuel, reactor structural components; medical and industrial waste; handling, transporting, storing and disposing technologies for each type of waste; on-site and off-site storage; spent fuel reprocessing and disposal methods; radioactive waste management plans and practices in various countries; public concerns and perception of radioactive waste management.
Two field trips will be arranged. Lect: 3hrs, Other: 1hr. Prerequisites: ENGR 3570U, ENGR 3930. Co-Requisites: ENGR 3610U.

**ENGR 3670U Shielding Design.** Radiation sources; characteristics and utilization of various radiation detectors; statistics of radiation counting; radiation spectroscopy with scintillation detector; semi-conductor detectors; identification and measurement of source strength, spectrum and geometry; shielding requirements for various types of radiation; shielding materials for equipment and processes employing radiation; radiation heating; radiation damage; measuring the effectiveness of various shielding materials; shielding for the transportation of radioactive materials; calculation and design of shielding for industrial and power plant applications; shielding requirements for spent fuel storage. Lect: 3hrs, Lab: 2hrs. Prerequisites: ENGR 2950U. Notes: Elective for Nuclear Engineering or Radiation Science.

**ENGR 3740U Digital Electronics.** Principles of semiconductors and devices; Boolean algebra, number systems and codes; logic circuits, registers, memories, counters and arithmetic circuits; combinational circuits; synchronous and asynchronous sequential circuits; analogue to digital and digital to analogue converters. Lect: 2hrs, Lab: 2hrs.

**ENGR 3780U Nuclear Reactor Design.** An introduction to thermal and fast reactors and reactor cooling systems. Topics include: natural and enriched fuels; pressure vessels and pressure tubes; reactor structures; moderator materials and systems; reactor coolant materials and systems; shutdown and safety systems, heat generation and removal in the fuel; modes of heat transfer from fuel to coolant; boiling heat transfer; cooling by natural circulation; measurement of thermalhydraulic parameters; momentum, mass and energy transfer processes; requirements for main heat transport, shutdown cooling and emergency core cooling systems. Nuclear power plant simulators will be used to demonstrate key aspects of reactor design. Lect: 3hrs, Other: 1hr. Prerequisites: ENGR 2500U, ENGR 2860U, ENGR 3930U. Co-Requisites: ENGR 3820U.

**ENGR 3820U Nuclear Reactor Kinetics.** An introduction to the basic principles of nuclear reactor kinetics and nuclear reactor control. Topics include: neutron cycle; reactor period; prompt and delayed neutrons; source neutron effects; sub-critical, critical and supercritical reactor; point reactor model; thermal power and neutron power; fission product poisoning; Xenon override capability; fresh and equilibrium fuel characteristics; reactivity effects of temperature changes and coolant voiding; reactivity control; approach to critical; reactor stability; spatial flux and power distribution.
Reactor simulators will be used to illustrate the key principles being taught. Lect: 3hrs. Prerequisites: ENGR 2500U, MATH 2820U.

**ENGR 3920U Nuclear Materials.** Irradiation effects on material properties, including neutrons, charged particles and gamma radiation; activation products; selection of materials for nuclear applications; radiation induced damage in materials; neutronic, thermal and structural considerations; material properties of nuclear fuels and fuel cladding; pressure vessel and pressure tube material behaviour; moderator, coolant and steam generator material properties; materials suitable for reactivity control device and shielding; materials used for long term storage of radioactive waste and spent fuel; activation analysis of materials using a neutron source. Lect: 3hrs. Prerequisites: ENGR 2950U, ENGR 2220U. Note: Elective for Nuclear Engineering or Radiations Science programs.

**ENGR 3930U Heat Transfer.** Introduction to conduction, convection and radiation. Solutions to steady-state and transient conduction problems. Solutions to convection problems for laminar and for turbulent flows. Heat conduction across contact surfaces and cylindrical walls. Heat generation in conduction. Boiling and condensing heat transfer. Two phase flow in a channel. Critical heat flux. Heat exchanger effectiveness and operational characteristics. Lect: 3hrs, Lab: 2hrs biweekly, Other: 1hr. Prerequisites: ENGR 2860U, MATH 2820U.

**ENGR 4015U Reliability and Maintenance.** Introduction to life-cycle costing for equipment acquisition, operation, and replacement decision making; designing for reliability and determination of optimal maintenance and replacement policies for both capital equipment and components. Topics include: identification of an item's failure distribution and reliability function; reliability of series, parallel and redundant systems design configurations; time-to-repair and maintainability function; age and block replacement policies for components; the economic life model for capital equipment; provisioning of spare parts. Lect: 3hrs, Other: 1hr. Prerequisites: ENGR 4045U.

**ENGR 4045U Quality Control.** Quality improvement and productivity; quality costs, total quality management; statistical process control; control of incoming material, control charts for attribute and variable data, process capability. Process optimization and design of experiments; screening methods, fractional factorial experiments, Taguchi methods, empirical regression models; acceptance sampling. Lect: 3hrs, Other: 1hr. Prerequisites: STAT 2800U.

**ENGR 4160U Artificial Intelligence in Manufacturing.** Introduction to artificial intelligence; knowledge-based systems, state space representation, search strategies, knowledge representation, reasoning with uncertainty; fuzzy sets, membership functions and operations, fuzzy relations, fuzzy reasoning; neural networks, basic neuron modeling, multi-layer perceptron, self-organization networks and adaptive theory; genetic algorithms for optimization and search; applications of artificial intelligence in design and manufacturing. Lect: 3hrs, Other: 1hr. Prerequisites: ENGR 4280U, 4390U.

**ENGR 4280U Robotics.** Industrial robots; robot kinematics, differential kinematics; statics, dynamics and control of robot arms; non-contact and contact sensors; actuators; real-time joint control; task planning and programming of industrial robots; applications of robots. Lect: 3hrs, Lab: 2hrs biweekly, Other: 1hr. Prerequisites: ENGR 3300U, 3390U.

**ENGR 4300U Integrated Manufacturing Systems II.** Production activity control (PAC); PAC and automated material handling and storage; PAC and fabrication/assembly; PAC and computer-aided process planning; PAC and computer-aided testing; materials requirements planning; manufacturing resource planning; optimized production technology. Lect: 4hrs, Lab: 2hrs biweekly, Other: 1hr. Prerequisites: ENGR 3300U, 4390U.

**ENGR 4390U Modelling Manufacturing Systems.** Queuing theory; production scheduling; modeling of production systems; discrete event simulation languages and programming; discrete event simulation software for manufacturing; production process scheduling; capacity planning; analytic rapid modeling; facility simulation. Lect: 4hrs, Lab: 2hrs. Prerequisites: ENGR 3300U.

**ENGR 4520U Nuclear Plant Safety Design.** This course describes the regulatory requirements and the principles guiding the protection of workers and the general public from being harmed as a result of nuclear plant operations. Topics include: Worker and public safety requirements; codes and standards; sources of radioactive release; defense in depth; principle of control, cool, contain; accident prevention, mitigation and accommodation; separation and independence; redundancy; common mode events; inherent safety features; plant safety systems; safety culture, management of plant safety; design basis accident; accident analysis; quantitative and probabilistic risk assessment; examples of nuclear accidents; online and off-line computer codes for the design and safety analysis of nuclear plants. Lect: 2hrs, Other: 1hr. Prerequisites: ENGR 4640U, ENGR 4660U, ENGR 4700U.

**ENGR 4640U Nuclear Plant Operation.** A combination of lectures and self-paced interactive CD-ROM study will introduce students to the principles of energy conversion, to the operating features of the main nuclear reactor types, the use of pressure vessels and pressure tubes, natural versus enriched fuel, moderators, reactor coolant

systems, steam turbines and associated water systems, generators, transformers, electrical output and plant electrical systems, grid frequency and voltage control, reactor-following-turbine and turbine following reactor unit control systems, turbine-generator governing, power maneuvering capability, trips, steam dumping to the condenser, normal and abnormal operating events. Lect: 3hrs, Other: 2hrs. Prerequisites: ENGR 3820U, ENGR 3780U. Co-Requisites: ENGR 4700U.

**ENGR 4660U Risk Analysis Methods.** Students will apply probability theory to discrete and continuous events. Topics include: random variables; decision theory, including Bayes' Theorem, the likelihood principle, prior posterior and predictive distributions, survival models. Students will also study chemical, physical, biological hazards; recognition, evaluation, prevention and control of hazards; industrial hygiene and occupational health; analysis, assessment, characterization and communication of risks. Lect: 3hrs, Other: 1hr. Prerequisite: STAT 2800U.

**ENGR 4700U Nuclear Plant Design and Simulation.** Introduces the main design and operating features of nuclear power plants using pressurized and boiling light water, pressurized heavy water and gas cooled reactors; small, medium and large reactors; unit control schemes; shutdown and safety systems; reactor cooling, shutdown and emergency core cooling systems; steam generator design features, level and pressure control; turbine and generator design; feedheating systems; unit electrical, service water and air systems. Where appropriate, nuclear power plant simulators will be used to demonstrate key aspects of power plant design. Lect: 3hrs, Other: 1hr. Prerequisites: ENGR 3780U, ENGR 2010U. Co-Requisites: ENGR 4640U.

**ENGR 4730U Reactor Instrumentation and Control.** Control theory and application to nuclear power plants; use of indicators and alarms; role of the operator, man-machine interface; use of computers in reactor control; in-core and out-of-core measurement of neutron flux, spatial flux control, start-up instrumentation, failed fuel detection and location; reactivity control methods, mechanisms and algorithms; reactor shutdown methods, mechanisms and systems; loss of reactor control; temperature, pressure and flow measurements; heat transport system pressure and inventory control. Lect: 3hrs. Prerequisites: Professor's Permission. Note: Elective for the Nuclear Engineering Program.

**ENGR 4810U Nuclear Fuel Cycle.** Students study the production of fissile and fertile nuclear fuel; isotope separation; enrichment of uranium; characteristics of fuel-element materials; metal and ceramic uranium fuel; design and fabrication of fuel-elements; fueling strategies; fuel failure mechanisms and detection of failed fuel; properties of irradiated fuel; the role of plutonium; principles of spent fuel reprocessing; dissolution of spent fuel from nuclear reactors; plutonium separation; meeting safe-guards requirements; natural versus slightly enriched fuel cycles; recycling of PWR fuel in CANDU; use of plutonium from the weapons program; thermal breeders; fast breeders. Lect: 3hrs. Prerequisites: ENGR 3610U, ENGR 3780U.

**ENGR 4880U Principles of Fusion Energy.** Explores the nature and energy generating potential of fusion reactions. Topics include: Matter-energy transformations; fusion reaction analysis; Coulomb repulsion; deuterium-tritium reactions; production, extraction and storage of tritium; energy efficiency; fusion fuels and wastes; fusion reactor blankets; burn cycles; characteristics and diagnostics of plasmas; magnetic and inertial confinement schemes for fusion; tokomak techniques; laser fusion techniques; damage to walls and other materials; fission-fusion reactions; ITER Project; global fusion research projects. Lect: 3hrs. Prerequisites: ENGR 2500U, ENGR 3930.

**ENGR 4994U Thesis Design Project I.** The thesis design project provides students with the opportunity, under the supervision of a faculty member, to integrate and synthesize knowledge gained throughout their program of study, to satisfy specific objectives and requirements. The project topic will be selected to include some aspects of the student's specialization, and will require the organization and conduct of a design project with a significant analytical component, including consideration of technical, economic, environmental and other societal impacts. Thesis Design Project I will typically be a group design project, but with each student having clearly defined roles, objectives and outcomes. The requirements include a written paper and a group presentation of the project outcomes. Lect: 1hr, Lab: 4hrs, Other: 1hr. Prerequisites: Professor's Permission.

**ENGR 4998U Thesis Design Project II.** The thesis design project provides students with the opportunity, under the supervision of a faculty member, to integrate and synthesize knowledge gained throughout their program of study, to satisfy specific objectives and requirements. The project topic will be selected to include some aspects of the student's specialization, and will require the organization and conduct of a design project with a significant analytical component, including consideration of technical, economic, environmental and other societal impacts. Thesis Design Project II will typically be an individual design project, although with the approval of the professor, a significant and clearly delineated individual contribution to a group design project is acceptable. The requirements include a written paper and an individual presentation of the project outcomes. Lect: 3hrs, Lab: 4hrs, Other: 1hr. Prerequisites: Professor's permission.

**ENGR 4999U Design Thesis.** An engineering thesis project relating to design will be carried out under the supervision of a faculty advisor. The course stresses independent work skills and the synthesis of knowledge acquired from previously studied courses. A wide range of topics may be covered, including research and development, testing and/or evaluation of a system, process or device. Each student will prepare a formal technical report and will make an oral presentation. Lab: 6hrs. Prerequisites: successful completion of all third year non-elective courses.

**ENVS 1000U Environmental Science.** This course will introduce the conceptual, interdisciplinary framework of environmental science by examining its physical, biological, economic and social components. Topics will include environmental problems and scientific principles; ecological principles (ecosystems, nutrient cycles, geographic ecology, climate and biodiversity); resources and sustainability (food, water, energy and minerals); climate change; pollution (indoor and outdoor air, water, effects on health and ecosystems); energy (renewable, non-renewable, management); agriculture and food production (pesticides and pest control, energy and chemical inputs, land, soil water resources, population and economic issues); waste management and remediation and prevention of environmental degradation. Canadian examples will be used wherever possible but the underlying theme will include a more global approach. Lect: 3hrs, Other: 2hrs.

**JSTS 1000U Introduction to Criminal Justice.** This course provides an analysis of historical and contemporary theory and practices of the criminal justice system. Beginning with the analysis of crime data, the course will also examine the role and function of each component of the criminal justice system: the police, the court system, corrections, prisons and alternatives to prisons. The course will also include a section on victimology, as well as sections on criminal law, and theories of crime causation. Lect: 3hrs.

**JSTS 1260U Introduction to Canadian Legal System.** This course investigates the nature, purpose, scope, sources and basic principles of law within its historical and contemporary contexts. The historical and constitutional foundations of legal concepts and due process of law are studied. Current policy and legislation such as the legislative policy inherent in The Charter of Rights and Freedoms, federal and provincial human rights codes, family law, criminal law and civil law will be examined. Students will be guided to understand the complex interrelationship between the law and the various components of Canadian society. The roles of lawyers, judges and others involved in the integrated legal system will be presented. Lect: 3 hrs.

**JSTS 1420U Ethical Reasoning and Critical Thinking.** This course focuses on ethical dilemmas faced by individuals as citizens and professionals. It helps students to clarify their values and establish a framework for ethical decision-making. It includes the concept of critical thinking or the ability to interpret complex ideas and appraise the evidence offered in support of an argument to better resolve problems or issues. Ethical issues, which relate to a wide variety of concerns, are examined. Students will examine a variety of professional ethical codes and apply ethical decision-making models to dilemmas in their personal and professional lives. Lect: 3hrs.

**JSTS 1600U Criminal Law.** This course investigates the nature, purpose, scope,

sources and basic principles of law within its historical and contemporary contexts. The historical and constitutional foundations of legal concepts and due process of law are studied. Current policy and legislation such as the legislative policy inherent in the Criminal Code, the specific offences and categories in the Criminal Code, the Young Offenders Act, Narcotic Control Act will be examined. The roles of lawyers, judges and others involved in the integrated legal system will be presented. Lect: 3hrs.

**JSTS 1610U Customs and Immigration Law.** This course covers the role of Customs and Excise as a part of the Canada Customs and Revenue Agency mandate. Relevant legislation such as the Customs Act and the Narcotic Control Act are examined. Current issues surrounding Customs policies as well as internal regulatory procedures (e.g., search and seizure, appeal procedures and citizens rights). Other issues covered are those that relate to the Customs and Immigration authority, such as primary duties and relevant sections of the Criminal Code. Lect: 3hrs.

**JSTS 2040U Justice Theory and Policy.** This course considers social and political theories, law and justice and their implications for policy development in the justice system. It explores the diverse nature of the theory within the field of crime and deviance by focusing on modern and post-modern theories. The selected paradigms are studied with regard to their explanatory domain, role in examining social and criminological problems and the development of policies. Lect: 3hrs. Prerequisites: JSTS 1000U, JSTS 1260U, PHIL 1040U.

**JSTS 2190U Issues in Diversity.** Students will identify and critically analyse issues of diversity. The course will incorporate an inclusive approach to diversity. Learners will focus on topics pertaining to the achievement of equity in various social settings, including but not limited to race, gender, ethnicity, class and social orientation. This course will deal with social and legal definitions of diversity and students will identify possible strategies for community empowerment. Lect: 3hrs.

**JSTS 2370U Theory and Practice of Mediation.** This course will examine the theory and practice of mediation in the justice field. It will consider the history and influences in the development of mediation practices. Mediation will be contrasted with formal litigation and other dispute resolution processes. Issues of social and legal control will be considered and critiques of the process from a feminist, Marxist and critical race theory perspective. Mediation practices and skills will be applied to contemporary issues and disputes. Lect: 3hrs. Prerequisites: JSTS 1420, PSYC 100U, SOCI 200U.

**JSTS 2490U Issues in Family.** The purpose of this course is to introduce the student to problems in the family and their relation to the justice system. In addition to gaining knowledge of the theoretical perspectives used to study the family, the student will also lean about such issues as the relation between family and work, parenting, family interactions, and legal issues within the family. The legal issues to be discussed include family violence, divorce and remarriage, and the creation of social policies as they impact on the family. Lect: 3hrs.

**JSTS 2550U Psychological Explanations of Criminal Behaviour.** This course examines the causes of criminal and deviant behaviour in terms of psychological theories and suppositions, including psychophysiological, psychoanalytic, behavioural, cognitive, and biological theories. The focus of the course is on similarities and differences across theories and research findings, and on the relationship between theories discussed and criminal justice policy. Lect: 2hrs.; Lab: 1hr. Prerequisites: PSYC 1000U.

**JSTS 2640U Rights and Freedoms in the Justice System.** This course considers social and political theories, law and justice and their implications for policy development in the justice system (broadly defined). It explores the diverse nature of justice theory by focusing on modern and post-modern theories. The selected paradigms are studied with regard to their explanatory domain, role in examining social and legal problems and the development of justice policies. Lect: 3hrs. Prerequisites: JSTS 1000U, JSTS 1260U, JSTS 1600, SOCI 2000U.

**JSTS 2710U Sociological Theories of Crime.** This course reviews the various sociological theories beginning in the early 1800s to contemporary times. It will review the classical theories of crime, the early positivist theories, the notions of "the born criminal" and "the criminal mind," structural functionalist theories of crime, conflict and radical theories of crime, Marxist theories of crime and feminist theories of crime. Lect: 2hrs.; Lab: 1hr. Prerequisites: SOCI 2000U.

**JSTS 2820U Statistics.** This course offers an introduction to descriptive and inferential statistics. Topics to be included are: frequency distributions, measures of central tendency and variability, correlation and regression, elementary sampling theory and tests of significance. The application of statistical methods to the study of justice questions will be examined in depth with examples from the literature. Lect: 2hrs; Lab: 1hr. Prerequisites: PSYC 1000U, SOCI 2000U. Credit may be obtained for only one of the following: JSTS2820U, BUSI 1450U, STAT 2010U, STAT 2020U, STAT 2800U, STAT 3800U.

**JSTS 2900U Research Methods.** This course is designed to introduce criminology and applied social research. The students will develop practical experience in a variety of research methods and techniques. Quantitative and qualitative research methods will be examined. They will gain experience in questionnaire design and analysis, interviewing skills, and focus group research. Statistical analysis will be introduced using computer software. Students may choose a research question from their practicum experience, or from an area of professional interest. Lect: 2hrs.; Lab: 1hr. Prerequisites: PSYC 1000U, SOCI 2000U.

**JSTS 3020U Policing 1.** The goal of this course is to introduce students to the study of law enforcement in modern Canadian society. The course will address key issues and concerns that surround policing. Attention is given to the history of policing and to its public and private forms. Emphasis in the course will be placed on strategies, powers, and authority of contemporary policing; including decision-making, wrongdoing, accountability and the decentralization of policing. Special care is taken to assess the implications of the Charter of Rights and Freedoms on policing and police recruitment practices. Lect: 3hrs. Prerequisites: JSTS 2040U, JSTS 2550U, JSTS 2710U, JSTS 2900U, STATISTICS.

**JSTS 3210U The Prosecution Process.** This course will cover the historical evolution of the modern prosecution process. Analysis and cross-national comparisons of how criminal cases are processed through the court system will focus on the accountability of prosecution decision-making, alternatives to the process including diversion and restorative justice. System rules and the standards by which admissibility of evidence is determined will be covered. Lab and simulations for evidence processes, prosecution and trial processes are included. Lect: 3hrs. Prerequisites: JSTS 2040U, JSTS 2550U, JSTS 2710U JSTS 2900U, JSTS 2820U.

**JSTS 3460U Victimology.** This course will examine the scope and impact of crime on victims as well as the experience of victimization as a whole. An historical review of the Victim's Rights Movement and the evolution of victims rights in Canada will be studied. This course will take an integrated approach involving all components of the justice system (federal and provincial). Lect: 3hrs. Prerequisites: JSTS 2190 or JSTS 2490, JSTS 2550, JSTS 2710U, JSTS 2900U, JSTS 2820U.

**JSTS 3520U Social Justice and Conflict.** This course will examine justice from a social perspective by considering various cultural and ethnic groups' experience with the law and the justice system (broadly defined). The multi-cultural make-up of Canadian society is considered in the domains of social and criminal justice. This stratification is analyzed in relation to conflict in Canadian society. Lect: 3hrs. Prerequisites: JSTS 2190U or JSTS 2490, JSTS 2550U, JSTS 2710U, JSTS 2900U, JSTS 2820U.

**JSTS 3650U Issues in Organized Crime.** This course is designed to identify the nature and issues of organized crime in all societies. It will conduct a critical analysis of the types of organized crime including terrorism. This analysis will be grounded in theory and an applied research approach, which will emphasize a multi-disciplinary approach to identifying and recommending solutions to the problem. It will examine jurisdictional issues and begin to consider a multi-disciplinary approach to the issue. Lect: 3hrs. Prerequisites: JSTS 2040U, JSTS 2550U, JSTS 2710U, JSTS 2900U, JSTS 2820U.

**JSTS 3670U Youth Crime.** This course examines the nature, prevalence, characteristics, and consequences of youth crime in Canada. It considers the social, political, legal, and criminological issues associated with youth crime. Canada's juvenile justice and child protection systems are examined from an historical perspective. The Youth Criminal Justice Act is reviewed in detail in relation to the Convention of the Rights of the Child and various other international human rights standards. The objectives pursued by the youth criminal justice system are examined in relation to prevailing scientific and popular explanations of juvenile crime. The effectiveness of the youth justice system is evaluated for its effectiveness and efficiency. Lect: 3hrs. Prerequisites: JSTS 2040U, JSTS 2550U, JSTS 2710U, JSTS 2900U, JSTS 2820U.

**JSTS 3710U Corrections I.** This course will present an historical view of the correction system and examine the current theories and practices used by Canadian corrections. The course will cover the following topics: sentencing, the incarceration process, probation, parole, institutional programs, social rehabilitation, offender case management, community-based offender programs, correctional workers, and community-based involvement in corrections. Lect: 3hrs. Prerequisites: JSTS 2040U, JSTS 2550U, JSTS 2710U, JSTS 2900U, JSTS 2820U.

**JSTS 3780U Public Administration.** This course provides an analysis of organizational theories and relates them to public administration in Canada. The administrative workings and the interaction of federal, provincial and municipal agencies will be explored. Study of the underlying issues that relate to the justice system will be looked at in the areas of budgets, funding, proposals, planning, and organizational skills. Students will also examine the issue of policy creation and analyze the problems of decision-making and implementation of government initiatives. Lect: 3hrs. Prerequisites: JSTS 2040U, JSTS 2550U, JSTS 2710U, JSTS 2900U, JSTS 2820U, POSC 1010U.

**JSTS 3900U Field Work Practicum I.** The purpose of this work practicum is to allow the student to work in situations where they may be later employed. They will have the opportunity to practice skills gained in prerequisite courses and receive feedback on their abilities. The fieldwork practicum will enhance the integrated approach, as students will have the opportunity to have experience in several organizations within the justice field. Lect: 3hrs. Prerequisites: JSTS 2040U, JSTS 2190U, JSTS 2370U, JSTS 2640U, JSTS 2040U, JSTS 2550U, JSTS 2710U, JSTS 2900U, JSTS 2820U.

**JSTS 4000U Advanced Justice Studies.** This capstone course in justice studies will provide a critical examination of the theory and method of an integrated justice system in comparison with other countries' justice systems. Students will be expected to demonstrate an advanced level of understanding based on their previous course work of concept justice as it is found in common law systems, civic law systems, and socialist systems. The development, structure, and operation of other justice systems will be considered. The content will focus on the impact of historical, political, social, religious and cultural factors on the justice system. The specific components of each system will be evaluated for their structure and operation. Lect: 3hrs. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3670U, JSTS 3710U, JSTS 3780U.

**JSTS 4020U Policing II.** This capstone course examines policing from an historical and philosophical perspective looking at social and legal issues and how they shape policing. Students will be expected to demonstrate an advanced level of understanding based on their previous course work on policing. The course will examine how these factors change the organization, structure and control of the police. It will look at the implications of different forms of policing for crime control, maintenance of order, and social control. Trends such as globalization and privatization will also be considered. Lect: 3hrs. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3650U, JSTS 3670U, 3780U.

**JSTS 4210U Ethics and Law for Professionals.** Ethical and legal aspects of the engineering profession; business organizations and corporations; intellectual and industrial property; conflict resolution; contract law; employment and labour law; occupational health and safety; Canadian and international engineering standards and commercial practices; international trade; environmental laws and regulations. Lect: 3hrs.

**JSTS 4250U Alternative Methods in Justice.** This course will introduce students to methods of intervention applied in the justice field. It will use methods of problem solving to identify the appropriate intervention to solve the problem. Methods of intervention covered will include negotiation, mediation, arbitration, de-briefing, crisis/conflict management and group process facilitation. Simulation labs and activities are included. Students will be expected to demonstrate an advanced level of understanding based on their previous course work of concept justice as it is found in common law systems, civic law systems, and socialist systems. Lect: 3hrs. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3650U, JSTS 3670U, 3780U.

**JSTS 4340U Policy Analysis.** This capstone course in the justice administration area explores various aspects of policy, planning and analysis as they relate to social policy and criminal justice policy. It will compare and contrast theories of policy implementation and analyze and evaluate social policies. Students will consider how economical, political, legal, and cultural forces shape the construction of social policy. Students will be expected to demonstrate an advanced level of understanding based on their previous course as it applies to the subject matter of this course. Lect: 3hrs. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3650U, JSTS 3670U, 3780U.

**JSTS 4580U Leadership and Administration.** This course introduces students to the nature of organizations and the behaviour of individuals and groups within organizations. Students will assess and develop key knowledge and skills areas, which enable them to facilitate development of individuals, groups, and organizations. Students will be expected to demonstrate an advanced level of understanding based on their previous course work in leadership and administration. The knowledge and skills of this course will be applicable to a wide range of settings in the justice system. Lect: 3hrs. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3650U, JSTS 3670U, 3780U.

**JSTS 4710U Corrections II.** This course will examine the methods and means that criminal justice personnel use to change criminal behaviour. The focus of these intervention techniques is to reduce recidivism. Techniques such as supervision and psychotherapy both inside and outside of prison will be examined. This course will assist the student in thinking critically and analyze the theoretical and treatment effectiveness. Lect: 3hrs. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3650U, JSTS 3670U, 3780U.

**JSTS 4900U Field Work Practicum II.** The purpose of this work practicum is to allow the student to work in situations where they may be later employed. They will have the opportunity to practice skills gained in prerequisite courses and receive feedback on their abilities. The fieldwork practicum will enhance the integrated approach, as students will have the opportunity to be employed by many organizations within the justice field. Students choose a second placement, in consultation with faculty, or may continue in the same agency as in Practicum I if this addresses their learning experience goals. Lect: 3hrs. Prerequisites: JSTS 3900U.

**JSTS 4999U Integrating Project.** This course is designed to allow students to participate in an upper level research seminar in criminology and justice. Emphasis will be placed on student participation in all aspects of the course. Student participation will include class presentations, class discussions, scheduled and routine meetings with the instructor and several written assignments that will contribute to the development of the research project. Students will be expected to demonstrate an advanced level of understanding based on their previous course work in this program. Lect: 3hrs.

**MATH 1010U Calculus I.** Study of limits and continuity, the derivative, Rolle's theorem, the Mean-Value Theorem for Derivatives, Fermat's Theorem, the differential and anti-differentiation, the definite integral, area, the Mean-Value Theorem for Integrals, the Fundamental Theorem of Calculus, and other topics as time permits. Applications to science and engineering will be incorporated. Lect: 3hrs, Other: 2hrs. Prerequisites: OAC Calculus or 12U Advanced Functions and Introductory Calculus.

**MATH 1020U Calculus II.** A continuation of Calculus I that addresses techniques of integration, applications of integration to volumes, arc length and surface area, parametric equations, polar coordinates, functions of

two or more variables, partial derivatives, differentials, Taylor and MacLauren series, double and triple integrals, and other topics as time permits. Applications to science and engineering will be incorporated. Lect: 3hrs, Other: 2hrs. Prerequisites: MATH 1010U.

**MATH 1850U Linear Algebra for Engineers.** Develops the fundamental ideas of linear algebra and demonstrates their applications to other areas. Topics include the algebra of matrices; systems of linear equations; determinants and matrix inverses; real and complex vector spaces, linear independence, bases, dimension and coordinates; inner product spaces and the Gram-Schmidt process; least squares and regression; linear maps and matrices, change of basis and similar matrices; eigenvalues, eigenvectors and matrix diagonalization; quadratic forms. Lect: 3hrs, Other: 2hrs. Credit may be obtained for only one of MATH 1850U and MATH 2050U.

**MATH 2010U Advanced Calculus I.** Examines the concepts, techniques and uses of differential and integral calculus of functions of more than one variable. Topics include: infinite series of real numbers and power series; planes and quadratic surfaces; partial differentiation, directional derivatives and gradients, maxima and minima problems; multiple integrals and coordinate transformations; applications. Lect: 3hrs, Other: 1hr. Prerequisites: MATH 1020U. Credit may be obtained for only one of MATH 2010U and MATH 2810U.

**MATH 2020U Advanced Calculus II.** Examines the concepts, techniques and uses of vector calculus. Topics include: uniform convergence of series of functions; spherical and cylindrical polar coordinate transformations; multiple integrals; line integrals; vector and scalar fields including the gradient, divergence, curl and directional derivative, and their physical interpretation; theorems of Green and Stokes; uniform convergence. Lect: 3hrs, Other: 1hr. Prerequisites: MATH 2010U. Credit may be obtained for only one of MATH 2020U and MATH 2810U.

**MATH 2030U Set Theory.** Topics include the algebra of sets and logic; mathematical induction; a review of the number systems, and the real line; countable and uncountable sets; the arithmetic of complex numbers, and the Fundamental Theorem of Algebra; mappings and inverse mappings; equivalence relations; partial and total order relations; an introduction to axiomatic set theory. Lect: 3hrs, Other: 1hr. Prerequisites: MATH 1020U.

**MATH 2050U Linear Algebra I.** Develops the fundamental ideas of linear algebra and demonstrates their applications to other areas. Topics include the algebra of matrices; systems of linear equations; determinants and matrix inverses; real and complex vector spaces, linear independence, bases, dimension and coordinates; inner product spaces and the Gram-Schmidt process; least squares and regression; linear maps and matrices, change of basis and similar matrices; eigenvalues, eigenvectors and matrix diagonalization; quadratic forms. Lect: 3hrs, Other: 1hr. Prerequisite: MATH 1010U. Credit may be obtained for only one of MATH 2050U and MATH 1850U.

**MATH 2060U Differential Equations.** A study of differential and difference equations that arise as models of phenomena in many branches of physical and biological sciences, in engineering, and in social science. Examples include Newtonian mechanics, chemical kinetics, and ecological system models. Students learn the basic properties of differential and difference equations, techniques for solving them, and a range of applications. Lect: 3hrs, Other: 1hr. Prerequisites: MATH 1020U. Credit may be obtained for only one of MATH 2060U and MATH 2860U.

**MATH 2070U Numerical Methods.** Provides an overview of and practical experience in utilizing algorithms for solving numerical problems arising in applied sciences. Topics include: computer arithmetic, solution of a single nonlinear equation, interpolation, numerical differentiation and integration, solution of differential equations, and solution of systems of linear equations. Students will use computer programs in the solution of problems. Lect: 3hrs, Other 1hr. Prerequisites: MATH 1020U, and either MATH 2060U (which may be taken concurrently) or MATH 2860U.

**MATH 2810U Advanced Engineering Mathematics.** Extends the study of calculus and differential equations, including multiple integration: integral theorems, polar coordinates and changes of variables; differential and integral calculus of vector-valued functions of a vector variable: vector algebra, line and surface integrals, Green's, Gauss' and Stokes' theorems; introduction to partial differential equations: Heat equation, Laplace's equation, wave equation. Lect: 3hrs, Other: 1hr. Prerequisites: MATH 1020U. Credit may not be obtained for both MATH 2810U and either MATH 2010U or MATH 2020U.

**MATH 2860U Differential Equations for Engineers.** A study of differential equations that arise as models of phenomena in engineering. Topics include: first-order equations; linear equations; second-order equations and their applications; systems of linear equations; series solutions; Laplace transforms; introduction to partial differential equations. Lect: 3hrs, Other: 1hr. Prerequisites: MATH 1020U. Credit may be obtained for only one of MATH 2860U and MATH 2060U.

**MATH 3020U Real Analysis.** Provides the foundation for real analysis, and prepares students for other branches of mathematics, mathematical statistics and quantum mechanics. Students study real and complex number systems; numerical sequences and series; absolute and conditional convergence; basic topological notions in a metric space; continuous functions; continuity and compactness; continuity and connectedness; uniform continuity; sequences and series of functions; uniform convergence; the Riemann-Stieltjes integral; rectifiable curves; fixed points and the contraction principle; introduction to one-dimensional discrete dynamical systems. Lect: 3hrs. Prerequisites: MATH 2020U, MATH 2030U, MATH 2050U.

**MATH 3030U Linear Algebra II.** Develops the basic theory of finite dimensional vector spaces and the study of linear operators on such spaces. Topics include vector spaces over the complex numbers, the algebras of linear operators and matrices, polynomial theory, elementary canonical forms, inner product spaces, normal operators and the spectral theorem. Lect: 3hrs. Prerequisites: MATH 2010U, MATH 2050U, MATH 3040U.

**MATH 3040U Operations Research I.** Introduction to linear and nonlinear optimization problems and the concepts and techniques required for their solution. Students study: linear programming problems; network optimization; dynamic programming problems: nonlinear programming problems. Lect: 3hrs. Prerequisites: MATH 2050U, MATH 2010U, STAT 2010U or STAT 2020U.

**MATH 3050U Partial Differential Equations.** This course examines theory, solution and physical interpretation of the heat and wave equations in one, two, and three dimensions, with Dirichlet, Neumann, or mixed boundary conditions. The method of separation of variables is employed in Cartesian and polar coordinates; Fourier transform methods are also used. Lect: 3hrs. Prerequisites: MATH 2050U, MATH 2060U.

**MATH 3060U Complex Analysis.** Introduces some classical theorems and applications of complex analysis. Students study basic properties of complex number; the Cauchy-Riemann equations; analytic and harmonic functions; complex exponential and logarithmic functions; branches of multi-valued functions; contour integrals; the Cauchy-Goursat Theorem and the Cauchy Integral Formula; the maximum moduli of functions; Taylor and Laurent series; analytic continuation; the residue theorem with applications; conformal mappings with applications. Lect: 3hrs. Prerequisites: MATH 2030U, MATH 2010U.

**MATH 3070U Algebraic Structures.** An introductory study of groups: symmetric groups, subgroups, normal subgroups, factor groups, the Fundamental Homomorphism Theorem; rings: subrings, ideals, quotient rings, polynomial rings, the Euclidean algorithm, the Fundamental Ring Homomorphism Theorem; finite fields. Includes applications of groups, rings, and fields. Lect: 3hrs. Prerequisites: MATH 2030U, MATH 2050U.

**MATH 4010U Advanced Differential Equations.** A rigorous treatment of the qualitative theory of ordinary differential equations and an introduction to the modern theory of dynamical systems. Existence, uniqueness, and continuity theorems. Definition and properties of dynamical systems. Linearization and local behaviour of nonlinear systems. Stable Manifold Theorem. Liapunov stability. Limit cycles and Poincaré-Bendixson Theorem. Introduction to bifurcations and chaotic dynamics. Lect: 3hrs. Prerequisites: MATH 2050U, MATH 2060U, MATH 3020U.

**MATH 4020U Numerical Analysis.** This course provides a variety of results and

algorithms from a theoretical point of view. Students study numerical differentiation and integration; interpolation and approximation of functions; quadrature methods; numerical solution of ordinary differential equations; the algebraic eigenvalue problem. Computer software will be used in assignments. Lect: 3hrs. Prerequisites: MATH 2010U, MATH 2050U, MATH 2070U.

**MATH 4030U Biomathematics.** An introduction to mathematical modeling focusing on the development, analysis, and interpretation of mathematical models of biological phenomena. Emphasis is on deterministic, discrete, and continuous models. Uses computer software for solving problems and exploring and expanding concepts. Lect: 3hrs. Prerequisites: MATH 2050U, MATH 2060U, STAT 2010U or STAT 2020U.

**MATH 4050U Advanced Partial Differential Equations.** Considers advanced aspects of the theory, solution and physical interpretation of first- and second-order partial differential equations in up to four independent variables. This includes the classification of types of equations, and the theory and examples of associated boundary-value problems; the concepts of maximum principles and Green's functions; an introduction to nonlinear equations. A broad range of applications are considered. Lect: 3hrs. Prerequisites: MATH 3020U, MATH 3050U, MATH 3060U.

**MATH 4640U Operations Research II.** Continues the study of linear and nonlinear optimization problems and the concepts and techniques required for their solution. Students study: the theory of the simplex method; duality theory and sensitivity analysis; other algorithms for linear programming; topics in nonlinear programming; an unsolved problem from industry: modeling and algorithms. Lect: 3hrs. Prerequisites: MATH 3040U.

**NURS 1005U Professional Practice** I. This course gives the student the opportunity to apply theoretical concepts that relate to the maintenance and promotion of wellness. Students will observe, practice, research, review and critique fundamental nursing skills in a simulated practice environment. They will also explore the lived experience of individuals within families and in the community, using health and wellness as a focus. Growth and development, and resources to meet health needs will be examined. Students will plan and implement a health fair for the college, university community.

**NURS 1100U Health & Healing I.** This course introduces concepts that are the basis for nursing knowledge. Students will explore aspects of health and healing in the context of social and cultural diversity values, beliefs, lifestyle choices, environment, growth and development. The focus will be on maintenance and promotion of personal, individual, and family health and healing.

**NURS 1150U Health & Healing II.** This course will provide the student with the opportunity to explore various health challenges in populations experiencing life transitions. The aging process and the health and healing requirements of the older adult are the focus of the theory concepts. The student learns key assessments and interventions to promote health and healing for individuals and families connected to this population. This course is an introduction to caring concepts, which are the basis for nursing care for the elderly population.

**NURS 1200U Anatomy & Physiology I.** This course introduces normal anatomy and physiology as scientific disciplines. Focusing on homeostasis and the interrelationships of structure and function as the underpinnings for the maintenance of life, the human organization from the molecular to the system levels will be studied, with specific attention to the organization of the human body, principles of support and movement, and the nervous system. Students will also develop a working scientific vocabulary to communicate effectively within the scientific community. In collaboration with the students, learning activities may come to include teacher-directed discussion, self-directed learning, computer-assisted instruction using WebCT, multimedia supports, and labs as applicable. This is the introductory component of a two-semester investigation of human biology.

**NURS 1201U Anatomy & Physiology II.** This course is a continuation of Anatomy & Physiology: Introductory Concepts. With continued focus on homeostasis and the interrelationships of structure and function, focus will be on the systems level of human physiology. The scientific investigation of the circulatory systems including both the cardiovascular and lymphatic systems are further areas of study, along with the respiratory, digestive, urinary, and reproductive systems. The concept of homeostasis will be investigated in depth as it relates to fluid, electrolyte and acid-base balances. To refine the students' communication skills in the scientific community, the development of scientific vocabulary will be ongoing.

**NURS 1420U Development of Self as a Nurse I.** This course is an introduction to nursing as a culture of caring. Beginning with a focus on self and then others, students explore the meaning of lived, caring experiences. Students will explore ways of nursing as caring human beings and then within the role of the nurse. Students will explore multiple ways of knowing and critical thinking as aspects of caring. As students relate to the experience of becoming a nurse, they will be introduced to the evolution of nursing.

**NURS 1505U Professional Practice II.** This course will provide the student with the opportunity to explore the lived experience and health needs of the well older adult living community and the frail elderly within the health care system. Students will also observe, practice, research, review and critique specific skills in a laboratory. Practicum settings include hospitals, continuing care facilities and homes for the aged.

**NURS 2005U Professional Practice III.** This two-part practicum experience builds on Nursing Professional Practice - Life Transitions/Aging. In Part One the student will explore health challenges and nursing care associated with pregnancy, childbirth and neonates. In Part Two, the student will explore common health challenges and nursing care associated with chronic or pervasive health challenges, which may include the dying process. Client health challenges in this practicum are more complex and may have a higher level of acuity and greater potential for negative outcomes.

**NURS 2100U Health & Healing III.** The focus of this course is nursing science theory, needed for the care of individuals and families experiencing health challenges that are related to child bearing, child rearing, and chronic or terminal illness. Learners will use a collaborative process to study situations that illustrate selected health challenges facing the child bearing and child rearing population, and situations related to chronic and terminal illness.

**NURS 2150U Health and Healing IV.** The focus of this course is the nursing science theory, needed for the care of individuals and families experiencing health challenges such as acute illness or mental health problems. Learners will use a collaborative process to study situations that illustrate selected health challenges facing the population experiencing acute illness or mental health problems.

**NURS 2320U Health Assessment.** This course is designed to provide the student with the cognitive, affective and psychomotor skills required to conduct a complete physical examination and health assessment of the client across the life cycle. Included are health history, physical examination, health promotion, and clinical assessment. Conceptual themes include holistic health practices, health promotion, client participation, cultural and diversity factors and developmental tasks.

**NURS 2460U Pathophysiology I.** This course will be an introduction to human disease and will focus on the fundamentals of homeostasis mechanisms. The student will explore how alterations in homeostasis mechanisms disrupt the human body. Specific concepts such as homeostasis balance and acid/base balance or imbalance and how the body compensates for alterations will be studied. Common, selected diseases that occur throughout the lifespan will be used to illustrate specific concepts. A good understanding of normal anatomy and physiology is an essential prerequisite.

**NURS 2461U Pathophysiology II.** This course builds on the Processes of Human Disease: Introductory Concepts course. The student will explore complex examples of pathology and the effects on the structure and functioning of the body. Common diseases that occur throughout the lifespan will be used to illustrate each concept. A good understanding of normal anatomy and physiology is an essential prerequisite.

**NURS 2505U Professional Practice IV.** This practicum experience consists of two parts. In Part One the student will explore health challenges and nursing care to assist individuals and families in coping with mental health issues. In Part Two the student will

explore common health challenges and nursing care of children and adults who experience an acute episode of illness and whose conditions may require surgery. Client health challenges in this practicum are more complex and may have a higher level of acuity and greater potential for negative outcomes.

**NURS 2710U Ethics.** In this course the student will examine theories related to the ethical foundations of nursing practice. In particular the student will examine the professional code of ethics for nursing and the role of the nurse as patient advocate. Ethical decision-making will be explored.

**NURS 3005U Professional Practice V.** This course provides an opportunity for the student with practicum experience in caring for individuals, families, groups and communities within the context of primary health care.

**NURS 3100U Health and Healing V.** This course provides the theoretical foundations for understanding community health issues and for designing population-based strategies for promoting community health. Participants will examine concepts from nursing, epidemiology and community development as they relate to health and health promotion in communities.

**NURS 3150U Health and Healing VI.** This course explores the lived experience and nursing care of high acuity clients and their families. The students will explore concepts, theories and principles intrinsic to the care of adults or children experiencing complicated illnesses in acute hospital and home settings. Case studies will be used to illustrate key concepts. Students will observe, practice, research, review and critique advanced nursing skills in a simulated practice setting. The focus for the concurrent practicum is in the acute care setting.

**NURS 3420U Development of Self as a Nurse II.** This course builds on the caring concepts introduced in Year one. It thereby expands caring to purposeful relationships with the aim of enhancing family development, human growth and health. Students will learn the meaning and nature of purposeful relationships with an emphasis on interpreting and facilitating family, group and team interactions. Skills will include the ability to support, empower, facilitate, and enable individuals, families and groups in health promoting relationships. Students will deal with issues such as diversity, conflict management, negotiation and change.

**NURS 3505U Professional Practice VI.** This course builds on Nursing Professional Practice V. The student learns how to manage the care of clients and their families who have multidimensional health challenges and whose conditions are, or become, unstable. Illnesses may include catastrophic events, an acute exacerbation of a chronic illness, or unexpected deterioration in illness trajectory. Client health challenges addressed in this clinical experience are complex and have a high acuity level.

**NURS 3910U Research.** This course will explore the research process as it relates to the development of nursing science and evidence-based nursing practice. Particular emphasis will be placed on clinical practice as an important source of questions for nursing research. Both qualitative and quantitative approaches to the generation of research data will be examined, including strategies associated with each of these methods. The skills and knowledge underlying the analysis and critiquing of the research literature will be addressed with particular emphasis on its applicability to research in nursing and related health disciplines. Students will be introduced to some nursing researchers and their achievements.

**NURS 4005U Professional Practice VII.** This enrichment course provides the student with the opportunity of working with a selected population of the student's choice. This practicum uses the preceptor model and may occur in a variety of settings.

**NURS 4100U Health & Healing VII.** This course focuses on the leadership and management roles of the nurse within the context of nurses' scope of practice, as defined by current legislation and professional standards and expectations. Emphasis is on nurses becoming effective members of health care as employees and future leaders and managers. Content will address leadership and management theories, organizational structure, planned change, conflict, organizational communication, problem solving, decision making, strategies for effective delegation, motivation, nursing care delivery approaches, and total quality management.




**NURS 4420U Development of Self as Nurse III.** This course focuses on nursing conceptual models as the basis for nursing practice. Select theories, including theories of caring, their philosophical foundations, concept analysis, synthesis and derivation will be explored. Students will work toward the integration of and critical reflection upon nursing theory, conceptual knowledge and practice (praxis).

**NURS 4505U Professional Practice VIII.** This provides the student with the opportunity to work and learn in a health care setting of the student's choice, based on individual learning needs and lifelong goals. This practicum uses the preceptor model and may occur in a variety of settings. Using a preceptor model the student has the opportunity to develop leadership and independence in her/his nursing practice and to achieve competency level expected for nurses entering the profession.

**NURS 4840U Health Policy.** This course will examine the broader context of the Canadian health care systems from social, political, economic, and legal/ethical perspectives. Federal, provincial and local influence on health policy will be reviewed including historical trends and future options. Primary health care will be introduced as the foundation for health care reform. Strategies for influencing health policy and the system will be examined with an emphasis on the contribution of the nursing profession.

**PHIL 1040U Philosophy: Social and Political Issues.** This course provides a comprehensive assessment of classical and contemporary conceptions of justice. The focus will be on the Libertarian, the Socialist, the Liberal, Democratic, the Communitarian, the Feminist, the Post-modern, and the Environmental views of justice. Lect: 3hrs.

**PHY 1010U Physics I.** Introduction to basic mechanics. Newton's laws of motion; kinematics and dynamics in one and two dimensions; work and energy; friction; momentum and collisions; angular momentum, torque and rotation of rigid bodies; planetary motion; simple harmonic motion; static equilibrium; fluid mechanics. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: Advanced Functions and Introductory Calculus 4U or OAC Calculus (required); Physics 4U or OAC Physics (recommended). Notes: Students without the Physics prerequisite require the permission of the instructor in charge of the course, and will be responsible for making up background material.

**PHY 1020U Physics II.** Introduction to electromagnetism and optics. Electric charge and Coulomb's law; electric field, electric flux, Gauss' law; electrostatic potential, capacitance; Kirchoff's laws in DC circuits. Magnetic forces and magnetic field; Biot-Savart law; Ampere's law; magnetic flux, Faraday's law, inductance; AC circuits. Electromagnetic waves; wave propagation; waves in matter. Geometrical and wave optics. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: PHY 1010U.

**PHY 2010U Electricity and Magnetism I.** Vectors in Cartesian, polar and cylindrical coordinates; scalar and vector fields; electric field, electric potential; Gauss' law; line and surface integrals; gradient and divergence operators; Poisson's and Laplace's equations; dipoles, multipole expansions; capacitance; polarization, electric displacement and boundary conditions; DC circuit analysis; capacitors and RC transients. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: PHY 1020U, MATH 1020U.

**PHY 2020U Electricity and Magnetism II.** Lorentz force law; divergence and curl of the magnetic field, applications of Ampere's law; the magnetic vector potential; motional electromotive force, electromagnetic induction and Faraday's law; induced electric field; energy in magnetic fields; conservation laws, continuity equation; Maxwell's equations; Poynting's theorem; waves in one dimension, boundary conditions, reflection and transmission, electromagnetic waves in a vacuum. Lect: 3hrs, Lab: 3hrs biweekly, Other: 2hrs biweekly. Prerequisites: PHY 2010U

**PHY 2030U Mechanics I.** One-dimensional motion; simple harmonic oscillator; two- and three- dimensional motion, including concepts of vector calculus; Newton's law of gravitation applied to celestial mechanics; nonlinear dynamics and chaos; comparison of nonlinear and linear systems. Computational techniques for solving mechanics problems; error analysis and propagation of errors. Lect: 3hrs, Other: 2hrs. Prerequisites: PHY 1010U, CSCI 1000U, MATH 1020U.

**PHY 2040U Mechanics II.** Special theory of relativity; inertial and non-inertial frames in Newtonian mechanics, rotating coordinate systems; dynamics of systems of particles, Hamilton's principle, Euler-Lagrange equation, Lagrangian for particles and systems; rigid body dynamics; static equilibrium. Deterministic chaos; Poincaré surfaces, Lyapunov exponents, maps, flows and bifurcations, strongly irregular motion and ergodicity, regular and irregular motion in conservative systems. Lect: 3hrs, Other: 2hrs. Prerequisites: PHY 2030U

**PHY 2050U Thermodynamics.** Basic concepts of thermodynamics; the First and Second Laws; properties and behaviour of pure substances; ideal gases and mixtures; the equation of state for a perfect gas; Maxwell's relations; heat transfer by conduction, convection and radiation. Lect: 3hrs, Other: 1hr. Prerequisites: PHY 1010U, MATH 1010U. Credit may be obtained for only one of PHY 2050U and CHEM 2040U.

**PHY 3010U Statistical Physics I.** This course shows how macroscopic thermodynamics can be explained by a statistical treatment of microscopic interactions, both classical and quantum. The course will introduce the dynamical basis of temperature, entropy, chemical potential and other equilibrium thermodynamic quantities. Lect: 3hrs. Prerequisites: PHY 2010U, PHY 2050U.

**PHY 3020U Quantum Physics I.** This course explores the development of the quantum theory and contrasts its underlying structure with classical physics. The probabilistic nature of quantum mechanics will be introduced to describe the results of the two-slit experiment, interference, wave-particle duality and the uncertainty principle. Quantum principles will be applied to important standard problems. Lect: 3hrs. Prerequisites: PHY 2020U, MATH 2060U (recommended).

**PHY 3030U Electronics.** This course provides students with a strong understanding of electronic applications, starting with analysis of DC, AC and transient electric circuits; operational amplifiers, feedback and op-amp circuits; digital electronics, logic circuits, Boolean Algebra, memories and counters. Semiconductor physics will be introduced, with applications to diodes, junction and field effect transistors, and FET and MOSFET amplifiers. Lect: 3hrs, Lab: 3hrs biweekly. Prerequisites: PHY 2020U.

**PHY 3040U Mathematical Physics.** Application of ordinary and partial differential equations to physical problems, including boundary and initial value problems associated with heat, wave and Laplace equations. This course will include Fourier analysis, and expansions in Bessel and Legendre functions. Problems will be solved with computers, using both algebraic and numerical methods. Lect: 3hrs. Prerequisites: MATH 2060U. Note: Students will benefit from taking MATH 3050U along with this course.

**PHY 3050U Waves and Optics.** Waves topics include: damped and forced oscillations; coupled oscillators and normal modes; travelling and standing waves; boundary conditions and energy transfer; dispersion. Optics topics include: geometrical optics: reflection, refraction and transmission of electromagnetic waves; interference; diffraction; applications of optics including optical imaging and processing, interferometers, lasers, fibre optics, and nonlinear optical devices. Lect: 3hrs, Lab: 3hrs biweekly. Prerequisites: PHY 2030U.

**PHY 3060U Fluid Mechanics.** Static properties of fluids; kinematics of fluids, conservation of mass and the continuity equation; dynamics of fluids, Euler's equation, Bernoulli's equation; the energy equation. Viscous fluids, laminar and turbulent flows, flow in pipes and fittings, the Moody diagram. Flows around immersed bodies; lift and drag. Boundary layers, flow separation, flow measurement techniques. Lect: 3hrs. Prerequisites: PHY 2040U.

**PHY 4010U Statistical Physics II.** Macro and microstates, statistical weight, Boltzmann and Gibbs distributions, partition and grand partition functions; microcanonical, canonical and grand canonical ensembles; statistical mechanics of isolated and interacting systems. Bose-Einstein and Fermi-Dirac statistics. Quantum statistics of ideal gases; blackbody radiation; paramagnetism in solids. Lect: 3hrs. Prerequisites: PHY 3010U.

**PHY 4020U Quantum Physics II.** Expands upon the concepts covered in the introductory course, with particular emphasis on applications to real systems. This course examines approximation methods including time-independent and dependent perturbation theory, variational methods, the WKB approximation and scattering theory. Mathematical computer programs will be used to solve problems. Lect: 3hrs. Prerequisites: PHY 3020U.

**PHY 4030U Atomic and Molecular Physics.** Mathematical and theoretical fundamentals of atomic and molecular physics will be introduced through an examination of the hydrogen atom. Further topics will include central forces and angular momentum, complex atoms, electric and magnetic interactions, and transition probabilities. Atomic systems will be stressed, but some time will be spent examining simple molecular systems, including electronic structure, vibration and rotation of diatomic molecules. Lect: 3hrs. Prerequisites: PHY 3040U, PHY 4010U, PHY 4020U.

**PHY 4600U Thesis Project.** The thesis project provides students with the opportunity to integrate and synthesize knowledge gained throughout their program of study, to satisfy specific objectives and requirements. The project may comprise an individual or group project, or an individual research project. Each student must write an individual thesis independently. Prerequisites: Completion of 3 years of Physics Specialization. Note: Students will carry out independent or group work under the guidance of individual Physics professors.

**PHY 4610U Biophysics of Excitable Cells.** Provides a basic understanding of the physical phenomena underlying nerve and membrane activity and illustrates how these influence the structure and function of excitable cells. It will be demonstrated how neural processes are utilized in sensory processes, such as the eye and ear. Lect: 3hrs. Prerequisites: PHY 1020U, BIOL 1020U.

**POSC 1010U Political Science.** This introductory course provides an introduction to the democratic system of government in Canada. It describes the organization of the three levels of government; federal, provincial and municipal. It introduces the political institutions and practices with emphasis on the constitution, parliament and cabinet. The interaction of each level and the democratic and legislative process is discussed. The course includes the services of each level of government and the impact on the justice system. Lect: 3hrs.

**PSYC 1000U Introductory Psychology.** This course introduces students to the vocabulary and principles of psychology. It also surveys the major theories and research related to the scientific study of human behaviour. Students will be encouraged to develop an understanding of the principles that underlie human behaviour. In addition, students will gain some insight into how and why people think, learn and behave. An attempt will be made to illustrate theory with practical examples, which are meaningful to students. The course examines the scientific process of research, physiology and perception, learning, memory and motivation, consciousness, stress, health, adjustment, and social psychology.

**PSYC 2010U Developmental Psychology.** This course is a comprehensive study of human development across the life-span from a developmental psychology perspective. The course examines developmental processes and milestones of the individual from conception through late adulthood, with particular emphasis on behavioural and cognitive development. Students will be introduced to the major psychological theories, theorists, and controversies in the field of human development.



**RADI 3200U Introduction to Imaging.** A study of the values, uses and principles of image formation using radiation techniques. The emphasis in this course is on software that complements the hardware aspects studied in the "Introduction to Radiation Machines" course. Topics studied include: principles of image formation, reconstruction and evaluation; real-time imaging; image quality and sensitivity; data analysis; X-ray imaging, transmission and scattering X-ray computed tomography (CT), positron emission tomography (PET), single photon emission computed tomography; electron beam tomography (EBT); (-ray imaging; compton scatter tomography; ultrasound techniques; magnetic resonance imaging (MRI); neutron radiography; fast neutron transmission spectroscopy. Lect: 3hrs. Prerequisites: ENGR 2500U, BIOL 2840U, ENGR 2220U. Co-Requisites: RADI 3610U.

**RADI 3550U Radiation Detection and Measurement.** In this course students learn how to measure radiation. They study the meaning and significance of the units for measuring radiation, the equipment that can be used to detect radiation, and the mathematical techniques used to inter-

pret various detector readings. Topics covered include the nature and safe handling of radiation sources; measurement of source strength; the statistics of radiation counting; characteristics and utilization of various radiation detectors; radiation spectroscopy with scintillation detectors; semiconductor detectors; in-core and out-of-core neutron detectors; spectroscopy of fast neutrons; the application of radiation detectors and instrumentation; use of dosimeters; characteristics and utilization of radiation detectors devices needed for various radiation measurements; principles of nuclear instrument operation; factors considered to select nuclear instruments. Lect: 3hrs, Lab: 2hrs. Prerequisites: ENGR 2500U, ENGR 2950.

**RADI 3610U Introduction to Radiation Machines.** This course describes the various methods by which radiation can be produced, and explains the operating principles, design and construction of such machines. Included are machines that produce gamma, neutron, electron-beam, ion-beam, photon, laser and ultra-violet radiation. Also considers the use of radiation machines for industrial and medical applications, food irradiation, equipment sterilization. Techniques to be studied include X-ray computed tomography (CT), positron emission tomography (PET), electron beam tomography (EBT) and magnetic resonance imaging (MRI). Lect: 3hrs. Prerequisites: ENGR 2500U, ENGR 3740U. Co-Requisite: RADI 3200U.

**RADI 3690U Radiation Chemistry and Processing.** This course introduces students to work with radioactive materials, to determine the activities of such compounds and the parameters that affect the radioactivity of materials. The effects of various types and intensity of radiation on organic and inorganic materials, and on living organisms are studied. Students will consider beneficial changes to the properties of materials subjected to radiation, including the irradiation of food and other consumer products. Lect: 3hrs, Lab: 1hr, Other: 1hr. Prerequisites: CHEM 1020U, ENGR 2500U, BIOL 2840U. Co-Requisites: ENGR 2200U.

**RADI 4040U Material Analysis using Nuclear Techniques.** This course concentrates on the application of radiation techniques to the analysis of materials, including the structure and composition of various objects. An important area of application is the detection of materials that represent a threat to security, safety, health and the environment. Topics studied include: principles, methodology; instrumentation and characteristics of nuclear analytical techniques; radiotracers; thermal and fast neutron activation techniques; prompt gamma radiation measurement techniques; measurement of gamma radiation from inelastic neutron collision; track-etch techniques; X-ray fluorescence techniques; radiometric analysis; activation analysis using neutrons, protons and photons; characterization of atmospheric particulates; measurement of heavy metal concentration in water and soil; cost-effectiveness of various non-destructive testing methods. Lect: 3hrs, Lab: 2hrs. Prerequisites: ENGR 4430U, ENGR 2220U.

**RADI 4320U Applications of Radiation Techniques in Medicine.** A study of the characteristics of radionuclides and related instruments used for various medical applications; use of isotopes for radiology, nuclear medicine and radiation therapy; sterilization of medical materials and equipment; special requirements for isotope production, transportation, use and disposal of radioisotopes in a medical environment; practical observations and experiments; medical use of lasers, UV, visible, infrared, radio-frequency and microwaves; dose impacts on patients and workers; dose calculation algorithms and treatment optimization; internal and external radioactive sources; clinical productivity and treatment optimization software. Lect: 3hrs, Lab: 2hrs. Prerequisites: ENGR 4430U, BIOL 2840U.

**RADI 4430U Production and Utilization of Radioactive Isotopes.** Topics include: production, equilibrium levels and decay of radioactive isotopes and activities; chemistry of transuranic elements; chemical processes in the nuclear fuel cycle; radiation sources for industrial application; detection and measurement of high energy radiation; chemical, physical, biochemical and microbiological effects of radiation; radiation sterilization; food irradiation; environmental conservation by radiation; safety aspects of industrial radiation processing; current and future applications of radiation processing. Lect: 3hrs, Lab: 1hr, Other: 1hr. Prerequisites: RADI 3690, RADI 3610.

**RADI 4995U Thesis Project I.** The thesis project provides students with the opportunity, under the supervision of a faculty member, to integrate and synthesize knowledge gained throughout their program of study, to satisfy specific objectives and requirements. The project topic will be selected to include some aspects of the student's specialization, and will require the organization and conduct of a project with a significant analytical component, including consideration of technical, economic, environmental and other societal impacts. Thesis Project I will typically be a group project, but with each student having clearly defined roles, objectives and outcomes. The requirements include a written paper and a group presentation of the project outcomes. Lect: 1hr, Lab: 4hrs, Other: 1hr. Prerequisites: Professor's Permission.

**RADI 4999U Thesis Project II.** The thesis project provides students with the opportunity, under the supervision of a faculty member, to integrate and synthesize knowledge gained throughout their program of study, to satisfy specific objectives and requirements. The project topic will be selected to include some aspects of the student's specialization, and will require the organization and conduct of a project with a significant analytical component, including consideration of technical, economic, environmental and other societal impacts. Thesis Project II will typically be an individual research or design project, although with the approval of the professor, a significant and clearly delineated individual contribution to a group project is acceptable. The requirements include a written paper and an individual presentation of the project outcomes. Lect: 1hr, Lab: 4hrs, Other: 1hr. Prerequisite: Professor's Permission.

**SCIE 1900U Astronomy.** An introduction to the origin, evolution and structure of the solar system; stars and stellar evolution; pulsars, black holes, quasars and cosmology. This course is designed primarily for non-science students. Lect: 3hrs.

**SCIE 1910U Science in Context.** A survey of selected topics from biology, chemistry, computing science, mathematics, and physics, and their significance in today's context. This course is designed primarily for non-science students. Lect: 3hrs.

**SOCI 1000U Introductory Sociology.** Sociology is the study of people and how they interact with each other and various social groups. This course deals with the study of people's lives, their relationship to society as a whole, and how people are affected by the society in which they live. The concepts, theories and methods of the discipline will be introduced and discussed with particular emphasis on the dynamics of Canadian society and Canadian social problems. Lect: 3hrs.

**STAT 2010U Statistics and Probability for Physical Science.** This course introduces the concepts and techniques of statistics and probability to collect, present, analyze and interpret data, and make decisions in the presence of variability. Students study a selection of topics relevant to biological science selected from: basic concepts of probability theory: events, sample spaces, probability; basic concepts of discrete mathematics: set theory, propositional logic, combinatorics; probability: marginal probability, conditional probability, independence, discrete and continuous random variables; probability distributions: binomial, Poisson, uniform, normal, etc.; mean and variance; the central limit theorem; statistical inference: estimation, significance tests, confidence intervals; introduction to experimental design; applications to quality control. Lect: 3hrs, Other: 1hr. Prerequisites: MATH 1020U. Credit may be obtained for only one of the following: STAT 2010U, STAT 2020U, STAT 2800U, STAT 3800U, BUSI 1450U, JSTS 2810U.

**STAT 2020U Statistics and Probability for Biological Science.** This course introduces the concepts and techniques of statistics and probability to collect, present, analyze and interpret data, and make decisions in the presence of variability. Students study a selection of topics relevant to biological science, selected from: basic concepts of probability theory: events, sample spaces, probability; basic concepts of discrete mathematics: set theory, propositional logic, combinatorics; probability: marginal probability, conditional probability, independence, discrete and continuous random variables; probability distributions: binomial, Poisson, uniform, normal, etc.; mean and variance; the central limit theorem; statistical inference: estimation, significance tests, confidence intervals; introduc-

tion to experimental design; applications to quality control. Lect: 3hrs, Other: 1hr. Prerequisites: MATH 1020U. Credit may be obtained for only one of the following: STAT 2010U, STAT 2020U, STAT 2800U, STAT 3800U, BUSI 1450U, JSTS 2820U.

**STAT 2800U Statistics and Probability for Engineers.** Sample spaces, probability, conditional probability, independence. Bayes' theorem, probability distributions, algebra of expected values, descriptive statistics. Inferences concerning means, variances, and proportions. Parameter estimation, correlation. Introduction to quality control and reliability. Lect: 3hrs, Other: 1hr. Prerequisites: MATH 1020U. Credit may be obtained for only one of the following: STAT 2010U, STAT 2020U, STAT 2800U, STAT 3800U, BUSI 1450U, JSTS2820U.

**STAT 3010U Biostatistics.** Designed to help students understand and apply the commonly used advanced statistical methods to data that they are likely to encounter in their careers. The emphasis is on the design of research projects, data acquisition, analysis and interpretation of results. Topics to be covered include multiple regression, two factor ANOVA, logistic regression, nonparametric analysis, and resampling methods. Lect: 3hrs. Prerequisites: STAT 2010U or STAT 2020U.

**STAT 3800U Statistics for Health Science.** This course offers an introduction to descriptive and inferential statistics. Topics to be included are: frequency distributions, measures of central tendency and variability, correlation and regression, elementary sampling theory and tests of significance. The application of statistical methods to the study of nursing questions will be examined in depth, with examples from the literature. Lect 3hrs. Credit may be obtained for only one of the following: STAT 2010U, STAT 2020U, STAT 2800U, STAT 3800U, BUSI 1450U, JSTS 2820.



# Index

University of Ontario
Institute of Technology

2000 Simcoe Street North, Oshawa, ON Canada L1H 7K4
T 1.866.844.8648 or 905.721.3190 F 905.721.3178 www.uoit.ca