University of Ontario
INSTITUTE OF TECHNOLOGY

Academic Year 2004-05

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Our Vision

The University of Ontario Institute of Technology is an innovative and market-oriented institution, pursuing 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 career-oriented undergraduate and graduate university programs with a primary focus on those programs that are innovative and responsive to the needs of students and employers.
- Advance the highest quality of research.
- Advance the highest quality of learning, teaching, and professional practice in a technologically enabled environment.
- Contribute to the advancement of Ontario and Canada in the global context with particular focus on Durham Region and Northumberland County
- Foster a fulfilling student experience and a rewarding educational (work) environment.
- 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 faculties, Academic Council or Board of Governors of the University, the regulations and policies established by the faculties, 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. In such circumstances, the University undertakes 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 faculties; 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 are able to ask Statistics Canada to remove their identifying information from the national database.

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

Message from the President

The University of Ontario Institute of Technology proudly presents the second edition of its academic calendar with the promise that a rewarding educational experience awaits you at Canada's newest university.

On our flourishing, student-centred campus, we're assembling all the ingredients for greatness. We've begun by building on the abundantly rich, time-honoured traditions of university education – excellent teaching and groundbreaking research that enriches learning. But our vision goes one step further by ensuring our graduates are fully prepared for the world of work or graduate school.

We have concentrated on recruiting faculty blessed not only with cutting-edge research skills, but a genuine concern for students and the ability to make the classroom come alive. As Ontario's only laptop-based university, we are harnessing technology to take learning to a new level.

As you'll discover in these pages, we're offering many new undergraduate programs for 2004-05. Additional information is available on our Web site, at **www.uoit.ca**, or by e-mailing us at **admissions@uoit.ca**. As we continue to grow, more programs will be added at the undergraduate, graduate and doctoral levels.

Ultimately, education's highest calling is to develop the whole person. In that spirit, we have succeeded in providing the best in innovative education, a vibrant student life, and top-notch campus facilities. Designed by one of Canada's leading architectural firms, our rapidly growing campus represents one of the largest construction projects in Ontario. When fully completed in 2006, UOIT's beautiful academic village will include an outdoor quadrangle, connected interior walkways, and a reflecting pond that can be used for skating in the winter.

Outstanding institutions of learning share a commitment to putting students first. The very legislation that created the University of Ontario Institute of Technology in June 2002 commits us to the success of each individual student – and we take that trust very seriously. Step by step, we walk with you on this journey of discovery, and share your desire for excellence. Have a wonderful year!

Very best wishes,

Dr. 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 criterion 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 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 hour value of three.

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 faculties and can be taken for credit from one faculty 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.

Final examination: Final examinations as referenced in this Calendar should be interpreted in the ordinary sense of the word; usually covering all, or a very substantial portion of, the material dealt with in one academic term.

GPA: The abbreviation for grade point average. A semester GPA is the weighted average of the grade points awarded on the basis of academic performance during a single semester. The cumulative GPA is the weighted 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

As a rapidly growing centre of industry and innovation, Durham Region long cherished the dream of establishing its own university. The number of residents in the region is expected to reach nearly 1 million by 2021. Yet for years, Durham was the only high-population area in the province without its own university.

For more than 10 years, prominent figures in the community worked to realize their vision for a student-focused institution dedicated to great teaching, groundbreaking research, and the use of leading-edge learning technology. By initially preparing students for critically needed, knowledge-intensive careers, the University would ensure bright futures for its graduates, and generate economic growth for Durham Region and the entire province.

But from the beginning, the University's prospective founders, led by its current president, Gary Polonsky, knew it was a long shot.

In one of the earliest efforts in Ontario to combine university and college studies in one location, the Durham University Centre was created in 1996 on the campus that the University now shares with Durham College. The university courses offered at the centre were taught by professors from both Trent University and York University.

But the community refused to abandon its desire for a made-in-Durham university. In a groundswell of support, residents wrote, telephoned and e-mailed their provincial representatives and the premier urging the Ontario government to support the project.

On a historic day for Durham Region – May 9, 2001 – the government announced plans for the first brand new university in Ontario in 40 years, and earmarked $60 million in start-up funds through Ontario SuperBuild Corporation.

An operations centre was set up next to the president's office, where 11 teams, working seven days a week, produced a to-do list of 856 tasks and hundreds of sub-tasks. Team members toured top institutions across North America to study best practices.

The university officially came into being on June 27, 2002, with the legislature's passage of Bill 109, Schedule O, the University of Ontario Institute of Technology Act, 2002. It welcomed its first class of 947 students in September 2003. As Ontario's only laptop-based university, UOIT uses the latest technology to enhance learning and give students a competitive edge in tomorrow's workplace.

The university's short history is already marked by tremendous accomplishment, and an exciting future lies ahead. Full-time enrolment is expected to reach about 6,500 by 2009. New programs are in the works, and UOIT's roster of talented faculty is expanding. The university's first three buildings, designed by the award-winning firm of Diamond and Schmitt Architects Inc., will be completed by the fall of 2004, including a brand new library. Additional buildings will follow.

The university will eventually expand across Conlin Road on to land donated by the estate of industrialist E.P. Taylor. The gently rolling farmland once nurtured world-class, champion horses, like Northern Dancer. In the years ahead, it will give rise to the leaders of tomorrow.

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.

The University is the provincial leader in mobile learning. At the heart of our program is a 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.

Technical support is available through the Mobile Computing Centre and Mobile learning Web site. The site provides a rich source of online information, tutorials and services.

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

This academic year marks the grand opening of the new, state-of-the-art, 55,000-square-foot (5110 square-metre) library. The design accommodates new and emerging technologies while maintaining the values of a traditional 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 four-storey, $20.7-million library offers individual and collaborative learning spaces, research workstations, electronic classrooms, a round pavilion with a reading room and periodicals collection, and other facilities. Its design also allows for future enlargement, up to double the original size.

State-of-the-art technology adds a new dimension to searching for library resources. Students can peruse the library's bookshelves, or find material in the virtual environment with their laptop. Librarians are available to provide students with the skills to navigate effectively through the information environment.

For more information about the library and its services, please visit **www.uoit.ca**.

Section 2: Academic Schedule 2004-05

August 30, 2004	Lectures begin for consecutive education students.
September 7-8, 2004	Fall semester orientation.
September 7-10, 2004	Field experience for consecutive education students.
September 8, 2004	Deadline for payment of fees, fall semester.
September 9, 2004	Lectures begin, fall semester.
September 22, 2004	End of regular registration period; last day to add courses, fall semester.[1]
	Last day to drop courses and receive a 100 per cent refund of tuition fees, fall semester.[1]
October 6, 2004	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.[1]
	Last day to drop courses and receive a 50 per cent refund of tuition fees, fall semester.[1]
October 11, 2004	Thanksgiving Day. No lectures.
November 1-26, 2004	Field experience practicum for consecutive education students.
November 16, 2004	Last day to withdraw from fall semester courses.[1]
December 8, 2004	Lectures end, fall semester.
December 10, 2004	Last day of classes for consecutive education students.
December 10-18, 2004	Fall semester final examination period.
January 3, 2005	Lectures begin for all students, winter semester.
January 3, 2005	Deadline for payment of fees, winter semester.
January 14, 2005	Last day to submit to the Registrar notice of intention to graduate at the spring session of Convocation.
January 14, 2005	End of regular registration period; last day to add courses, winter semester.[1]
	Last day to drop courses and receive a 100 per cent refund of tuition fees, winter semester.[1]
January 28, 2005	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.[1]
	Last day to drop courses and receive a 50 per cent refund of tuition fees, winter semester.[1]

February 14-18, 2005	Midterm break (excluding consecutive education students).
March 11, 2005	Last day of classes for consecutive education students.
March 14-18,2005	Midterm break for consecutive education students.
March 16, 2005	Last day to withdraw from winter semester courses.[1]
March 21-April 22, 2005	Field experience practicum for consecutive education students.
March 25, 2005	Good Friday. No lectures.
April 8, 2005	Lectures end, winter semester.
April 11-19, 2005	Winter semester final examination period.
April 25-26, 2005	Education student-led conference.
May 2, 2005	Deadline for payment of fees, summer semester.
May 6, 2005	Lectures begin, summer semester (including 14-week summer semester and seven-week spring session).
May 10, 2005	Last day to add courses, seven-week spring session.[1]
	Last day to drop seven-week spring session courses and receive a 100 per cent refund of tuition fees.[1]
May 13, 2005	Last day to add courses, 14-week summer semester.[1]
	Last day to drop 14-week summer semester courses and receive a 100 per cent refund of tuition fees.[1]
	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.[1]
	Last day to drop seven-week spring session courses and receive a 50 per cent refund of tuition fees.[1]
May 23, 2005	Victoria Day. No lectures.
May 30, 2005	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.[1]
	Last day to drop 14-week summer semester courses and receive a 50 per cent refund of tuition fees.[1]
June 3, 2005	Spring Convocation
June 3, 2005	Last day to withdraw from seven-week spring session courses.[1]
June 15, 2005	Lectures end, seven-week spring session.
June 16-18, 2005	Spring session final examination period. No lectures for the 14-week summer semester during this period.
June 20, 2005	Lectures begin, seven-week summer session. Fourteen-week summer semester lectures resume.
June 24, 2005	Last day to add courses, seven-week summer session.[1]
	Last day to drop seven-week summer session courses and receive a 100 per cent refund of tuition fees.[1]
July 1, 2005	Canada Day. No lectures.

July 4, 2005	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.[1]
	Last day to drop seven-week summer session courses and receive a 50 per cent refund of tuition fees.[1]
July 12, 2005	Last day to withdraw from 14-week summer semester courses.[1]
July 22, 2005	Last day to withdraw from seven-week summer session courses.[1]
August 1, 2005	Civic Holiday. No lectures.
August 4, 2005	Lectures end, 14-week summer semester and seven-week summer session.
August 6-14, 2005	Summer semester final examination period.

[1] Courses offered outside the normal time frame will have add/drop deadlines prorated accordingly. In such cases, faculties will advise students of appropriate deadline dates during the first meeting of the class.

Section 3: Governing Bodies and Staff

3.1 Board of Governors, 2003-04

Chair
Garry Cubitt

Vice-Chair
Lorraine Sunstrum-Mann

Chancellor
To be named

President and Vice-Chancellor
Gary Polonsky

Members
Peter Bagnall
Joanne Burghardt
Joanna Campbell
Christa Colyer
Pierre Hinse
Denise Jones
Manon Lemonde
Gail MacKenzie
Mark Moorcroft
Mike Shields
Phillip Simmons
Beth Wilson
Doug Wilson

Secretary to the Board
Cathy Pitcher

3.2 Academic Council

Chair	
Gary Polonsky, BSc, MA, EdD	President

Members	
Bev Balenko, BA, MA	Durham College Representative
Susan Barclay-Pereira, BA (Hons), MLS, MEd	University Librarian
George Bereznai, BE (Hons), MEng, PhD	Dean, School of Engineering Systems and Nuclear Science
Carolyn Byrne, MHSc, PhD	Dean, Faculty of Health Sciences
Janice Cramer, BSc, BEd, PhD	Faculty Representative
Wesley Crichlow, BA (Hons), MEd, PhD	Faculty Representative
Ibrahim Dincer, BSc, MSc, PhD	Faculty Representative
Nada'a Fayyaz	Student Representative
Michael Finlayson, BA (Hons), MA, PhD	Provost
Kamiel Gabriel, BSc, MBA, PhD	Associate Provost, Research and Graduate Programs
Margaret Greenley, BA, MA	Vice-President, Student Affairs
Ronald Hinch, BA, MA, PhD	Dean, Faculty of Social Science
Douglas Holdway, BSc (Hons), MSc, PhD	Faculty Representative
William Hunter, BA, PhD	Dean, Faculty of Education
Richard Levin, BA (Hons), MA	Vice-President, Strategic Enrolment Management and Registrar
Brad MacIsaac, MBA	Staff Representative
Bill Muirhead, BEd, MEd, PhD	Associate Provost, Learning Technologies
John Perz, BASc, MASc, PhD	Faculty Representative
Tommy Raffoul	Student Representative
Trevor Rodgers, BSc	Staff Representative
Marc Rosen, BASc, MASc, PhD, PEng, FCSME, FEIC	Dean, Faculty of Engineering and Applied Science
Otto Sanchez, MSc, PhD	Faculty Representative
Bernadette Schell, BA, MSc, PhD	Dean, Faculty of Business and Information Technology
Anjum Siddiqui, MA, PhD	Faculty Representative
William Smith, BASc, MASc, MSc, PhD, PEng	Dean, Faculty of Science
Ed Waller, BSc, MScE, PhD	Faculty Representative

Non-voting members:	
Judy Moretton, BScN, MA	Durham College Representative
Gerry Pinkney	Vice-President, Information Technology
Elizabeth Popham, BA, MA, PhD	Trent University Representative
Donald Wallace, BA, MA, PhD	Secretary to the Council

3.3 University officers and staff

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

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

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

Associate Provost, Learning Technologies
Bill Muirhead, BEd, MEd, PhD

Associate Provost, Research and Graduate Programs
Kamiel Gabriel, BSc, MBA, PhD

Vice-President, Communications and Marketing
Bev Balenko, BA, MA

Vice-President, Finance and Strategy
Sheldon Levy, BSc (Hons), MA, LLD

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

Vice-President, Information Technology
Gerry Pinkney

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

Vice-President, Student Affairs
Margaret Greenley, BA, MA

Vice-President, Advancement
Terrence Slobodian, BA

Vice-President, Facilities and Ancillary Services
Ralph Aprile, BTech, MBA

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

Deans

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

Dean, Faculty of Education
William Hunter, BA, PhD

Dean, Faculty of Engineering and Applied Science
Marc Rosen, BASc, MASc, PhD, PEng, FCSME, FEIC

Dean, School of Energy Systems and Nuclear Science
George Bereznai, BE (Hons), MEng, PhD

Dean, Faculty of Health Sciences
Carolyn Byrne, MHSc, PhD

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

Dean, Faculty of Social Science
Ronald Hinch, BA, MA, PhD

Section 4: Admission

4.1 Application procedure

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) at **www.ouac.on.ca**. Students attending an Ontario secondary school are normally informed of OUAC application procedures and deadlines through their schools in September.

Part-time students should complete an application form at **www.uoit.ca** to be submitted directly to the Registrar's Office:

Registrar's Office, UA4240
University of Ontario Institute of Technology
2000 Simcoe St. North
Oshawa, Ontario L1H 7K4
E-mail: admissions@uoit.ca
Telephone: 905.721.3190
Fax: 905.721.3178

4.2 Application deadlines

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

4.3 Assessment of eligibility

Grade requirements stated below are normal minimum requirements. The actual cut-off levels for admission cannot be determined until 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.

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.

4.4 Admission requirements for post-degree programs

4.4.1 Admission requirements for Bachelor of Education program (consecutive)

- An undergraduate degree 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.
- A personal profile addressing skills and related work experience
- Two letters of reference
- An interview may be required
- Prior to the start of classes, results of a criminal record check and TB test must be submitted (any costs associated with these are the responsibility of the applicant).

4.5 Admission requirements for undergraduate programs

Regardless of educational background, all applicants to undergraduate programs must have specific prerequisite subject knowledge for their intended program of study. The prerequisite subjects for each program are listed in the faculty sections of this Calendar.

Current students and graduates of secondary schools (no post-secondary education) will be evaluated based on their secondary school courses. Students who have followed a secondary school curriculum other than those listed below are encouraged to contact the Registrar's Office for further information.

Those applicants with previous post-secondary education are categorized as transfer students. For these applicants, prerequisite subject requirements may be met by a combination of secondary and post-secondary studies.

4.5.1 Applicants from Ontario secondary schools

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

4.5.2 Applicants from secondary schools in other Canadian provinces

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

4.5.3 Applicants from secondary schools in other countries

Applicants from the United States must achieve high school graduation with a minimum C average. All applicants must present a SAT or an ACT score; a minimum combined SAT score of 1200 or an ACT score of 27 is recommended.

Applicants from British-patterned education (GCE) must achieve the General Certificate of Education, including a minimum of two Advanced Level courses. No grade can be below a 'C'.

Applicants from other countries should contact the Registrar's Office for admission requirements specific to their curriculum.

4.5.4 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 four 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 4.6 for information on advanced standing.

4.5.5 Students transferring from other colleges and universities (under review)
Transfer students must present the specific prerequisite subjects for their intended program of study. The prerequisite subjects for each program are listed in the faculty sections of this Calendar. Prerequisite subject requirements may be met by a combination of secondary and post-secondary studies.

4.5.6 Mature applicants
A mature applicant is defined as one who:

- will have reached the age of 21 by December 31 of the year of application;
- has been away from formal education for at least two years;
- is a Canadian citizen or permanent resident;
- has not completed any post-secondary education; and
- is not eligible for admission as a secondary school graduate

Mature students may be admitted upon successful completion of secondary-level courses in the prerequisite subjects for their intended program of study.

4.5.7 Visiting students
With a letter of permission from a recognized institution, a student studying elsewhere will be allowed to enrol in University of Ontario Institute of Technology courses pending availability. The letter of permission will be used in lieu of transcripts from their home institution. As a result, it is the responsibility of the student to ensure they have the necessary prerequisites and are academically prepared for the course. These students will be admitted as special students not seeking a degree and will be subject to the applicable application and letter of permission fees.

4.5.8 Home-schooled applicants
Home-schooled applicants will be evaluated on the basis of standardized tests (through distance learning or alternative education centres) or on a combination of SAT II tests and a portfolio. Parent generated transcripts will be accepted as a reflection of courses completed and marks attained but these transcripts must be submitted in conjunction with standardized test scores.

Applicants who have completed courses through distance learning or alternative education centres should include marks from these courses at the time of application. If official transcripts like these indicate completion of specific prerequisite subjects then there is no need to submit SAT II test scores or a portfolio.

Alternatively, applicants may write four subject-specific SAT II tests. A minimum score of 600 is required to demonstrate sufficient background in the subject. Below are the required SAT II's for each program.

Faculty of Business and Information Technology - Writing, Mathematics (Level II C), two other SAT II's

Faculty of Engineering Systems and Nuclear Science - Writing, Mathematics (Level II C), Physics and Chemistry

Faculty of Health Sciences - Writing, Mathematics (Level II C), Biology (Ecological or Molecular) and Physics or Chemistry

Faculty of Social Science - Writing, Mathematics (Level II C), two other SAT II's

Faculty of Engineering and Applied Science - Writing, Mathematics (Level II C), Physics and Chemistry

Faculty of Science - Writing, Mathematics (Level II C), Biology (Ecological or Molecular) and Physics or Chemistry

Applicants presenting SAT II test scores must also submit a personal/career portfolio. This should detail personal and community participation and achievements including academic, volunteering and mentorship. The portfolio should also include an essay detailing future goals and reasoning for application to their program of choice. A letter of reference to support the application should also be submitted.

The university reserves the right to accept or deny students based on overall performance through the variety of measures listed above.

4.5.9 Readmission of former University of Ontario Institute of Technology students

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 readmission to the University. Applications for readmission are submitted directly to the Registrar's Office.

A student who has attended another institution since his/her last attendance at the University will be required to submit official transcripts from that institution.

4.6 Advanced standing

4.6.1 Secondary school students (International Baccalaureate and Advanced Placement)

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 in high school/secondary school will be considered on a case-by-case 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 four in the Advanced Placement examinations and five in the International Baccalaureate examinations are required for advanced standing.

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

4.6.2 Students transferring from other universities

Credits from other Ontario universities within and outside Canada will be evaluated on an individual basis. Credit is subject to the University's residency requirement (section 5.16).

4.6.3 Expiration of credit

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

4.6.4 Challenge for credit

Faculties 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.

4.7 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; or

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

4.8 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 by the application deadline 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 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 faculty. Changes will be permitted only if space is available and all academic requirements are met.

4.12 Honesty in applications

Students must declare fully their educational history on 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.

4.13 Appeal of admission decisions

Individuals may appeal their admission decision in writing within 10 days to the Registrar's Office. There is a charge for such appeals which is refundable if the appeal is successful. Admission appeals are referred to the Admissions and Scholarship Committee of Academic Council.

Section 5: General Academic Regulations

5.1 Selecting courses

Requirements for programs of study are listed in the faculty 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 can 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

To benefit from a full array of course selection, a University of Ontario Institute of Technology student may wish to take a course at another institution. A letter of permission ensures 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. This allows the student to attend the host institution without formal admission. If the student is in clear academic standing and has the necessary prerequisite courses they will be granted a letter of permission for the course. Students must complete the letter of permission request form and submit a course outline to the Registrar's Office allowing a minimum three week processing time. Students are responsible for having copies of the final transcript from the host institution forwarded to the University of Ontario Institute of Technology Registrar's Office for award of transfer credit. The minimum mark a student must achieve to have the course transferred is 60 per cent.

University of Ontario Institute of Technology students must apply for a letter of permission before taking a course elsewhere. Failure to do so could result in revocation of admission.

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 taken prior to the course in question. Where a co-requisite is specified, the co-requisite must be taken at the same time or prior to 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 a 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. Credit will be granted for only those courses completed with a grade of D or better. Faculties may require higher grades in some courses to meet degree requirements. See the faculty sections of this Calendar for more information.

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 analyse 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 analyse 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.

A failing grade of WF may be assigned if a student is administratively withdrawn for non-attendance.

Courses designated for pass/fail grading will be assigned a grade of PAS or FAL. These grades will not be included in the calculation of the grade point average.

If a student's grade is not available when final grades are approved at the end of a term, special designation will be temporarily added to his/her record. If a deferred examination has been granted, a grade of DEF will be assigned. If a portion of the work required for the course is incomplete, a grade of INC may be recorded. These grades may satisfy prerequisites for further courses on a temporary basis, but not beyond the end of the subsequent term after which these grades revert to "F."

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 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 fulfil the conditions of probation. Following a period of at least one semester, a suspended student may apply for readmission to the University through the Registrar's Office. This application will be considered at the discretion of the Dean of the faculty to which application is made. The student may be asked to agree to conditions for reinstatement.
Dismissal:	Any student readmitted 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 must 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 reappraisals and appeals

Matters concerning term work normally fall within the authority of the instructor. If a student has a concern regarding course work, the student should make an appointment, as soon as possible, with the instructor so that any issues can be resolved quickly and informally. Students unable to comply with given deadlines must contact their instructor prior to the deadline if an extension to the deadline is requested. All term 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.

5.11.1 Requesting a grade reappraisal

In the event that a student wishes a grade on a piece of tangible work to be reappraised, he or she should, in the first instance, bring the disputed piece of work directly to the course instructor to seek informal resolution. If this course of action does not satisfy the student, he or she may seek a final grade appeal.

5.11.2 Final grade appeals

Students may, with sufficient academic grounds, request that a final grade in a course be appealed (which will comprise only the review of specific pieces of tangible but not oral work). Grounds not related to academic merit are not relevant for grade appeals. In such cases students are advised to follow the procedures set out under 5.21.

Students are normally expected to contact the course director first to discuss the grade received and to request that their tangible work be reviewed. Students should be aware that a request for a grade appeal may result in the original grade being raised, lowered or confirmed. The deadline for submitting grade appeals is three weeks after the release of final grade reports in any term.

If the condition of sufficient academic grounds has been met, the student shall lodge a request with the Registrar's Office, who will contact the relevant Dean and collect fees incurred for the appeal. Students must specify the rationale for their appeal by making clear the component of the final grade upon which they seek appeal. The Dean will be responsible for ensuring that the work is reappraised by an appropriate faculty member, ensuring anonymity of both the student and the reappraiser, and for communicating the result of the appeal (including the reappraiser's comments) and the route of appeal to both the student and the course director. The reappraiser will be given the nature of the assignment and the rationale for the original grade. It is expected that every effort will be made to render the decision within 30 days of the reviewer having received the work.

In the event that a student is still not satisfied with the final grade or the course director is not available to review the work, a student may submit, in writing, a formal request for a grade appeal to the Academic Appeals Committee. Such appeals can only be considered only on the grounds of procedural irregularity. Appeals must be submitted within 15 working days of notification of the decision. At the discretion of the relevant faculty committee, the student and/or the faculty member may be invited to meet with the committee to present their case(s) orally. The committee's decision will be taken in camera and it is expected that parties will be informed of the decision in writing within 20 working days of the filing of the appeal.

5.11.3 Other academic appeals

Students are normally expected to contact the course director first to discuss an academic complaint.

All formal decisions of deans may be appealed to the Academic Appeals Committee. The student and instructor will both be given 10 working days to gather new evidence, if required, and to submit a letter of appeal to the Academic Appeals Committee. Under normal circumstances, a final grade will not be reported before an appeal is decided, nor will official transcripts be issued.

Appeals must contain the following;

a. the specific faculty decision which is being appealed;

b. the form of redress requested;

c. the specific grounds on which the appeal is made;

d. a summary of the evidence in support of these grounds;

e. the text of the faculty decision being appealed; and

f. the text of the relevant procedural regulations (if any) allegedly violated or otherwise deemed applicable to the case.

Appeals to the Appeals Committee for waivers of academic regulations will be permitted only on the grounds of:

a. new evidence, i.e., evidence relevant to the decision made at the faculty level but through no fault of the appellant not presented at that level. Generally speaking, events or performance subsequent to the faculty decision are not to be construed as new evidence; or

b. evidence of procedural irregularity in the faculty's consideration of the case.

5.12 Deans' Honours Lists and the President's List

Students in clear standing with a semester GPA of 3.5 to 3.79 on at least 80 per cent of a full course load at the end of a semester will receive the designation Dean's Honours List on their transcript.

Students in clear standing with a semester GPA of 3.8 or higher on at least 80 per cent of a full course load 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 faculty. Requests are referred to Faculty Councils for decision.

5.15 Academic conduct

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 Professional unsuitability

Students in programs leading to professional certification must demonstrate behaviour appropriate to practice in those professions. Where a Dean determines that behaviour inconsistent with the norms and expectations of the profession has been exhibited by a student, that student may be subject to one or more of the penalties described below. A student demonstrating professional unsuitability may be immediately suspended from any practicum, field work or similar activity at the discretion of the Dean.

5.15.3 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.

- Resubmission 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, a program, a faculty, 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 academic record.
- Such other penalty as deemed appropriate.

5.15.4 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 faculty 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 faculty 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.

5.15.5 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.

5.15.6 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, the possible penalties, and 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 faculties, the Registrar).

5.15.7 Appeals

Formal decisions of Deans relating to academic conduct or professional unsuitability may be appealed The student will be given 10 working days to gather new evidence and to submit a letter of appeal to the Academic Appeals 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. A student may apply to the Dean for continued attendance in classes and related activities while the appeal is being heard. In order for such a request to be granted, the Dean must be satisfied that there would be no detrimental effect of such continued attendance. If the appeal is granted, formal registration will be reinstated.

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 Conferral of degrees

Degrees will be deemed conferred at the time of Academic Council approval, and notation of the degree awarded will be entered on the students' records. All students who are awarded a degree are eligible to attend the session of Convocation that immediately follows the date of conferral.

5.18 Dual degrees

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

5.19 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.

5.20 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.

5.21 Appeals

This policy covers academic matters, including academic standing, other than merit-based grade appeals (see section 5.11).

Students are normally expected to contact the course director first to discuss an academic concern. If the concern is not resolved, the student may subsequently approach the Dean.

All formal decisions of Deans may be appealed to the Academic Appeals Committee. The student and instructor will both be given 10 working days to gather new evidence, if required, and to submit a letter of appeal to the Academic Appeals Committee. Under normal circumstances, a final grade will not be reported before an appeal is decided, nor will official transcripts be issued.

Appeals must contain all known relevant information and supporting documentation, including the following:

a. the specific faculty decision which is being appealed;

b. the form of redress requested;

c. the specific grounds on which the appeal is made;

d. a summary of the evidence in support of these grounds;

e. the text of the faculty decision being appealed; and

f. the text of the relevant procedural regulations (if any) allegedly violated or otherwise deemed applicable to the case.

Appeals to the Appeals Committee for waivers of academic regulations will be permitted only on the grounds of:

a. new evidence, i.e., evidence relevant to the decision made at the faculty level but through no fault of the appellant not presented at that level. Generally speaking, events or performance subsequent to the faculty decision are not to be construed as new evidence; or

b. evidence of procedural irregularity in the faculty's consideration of the case.

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, 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 (e.g. 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.

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.

Fees may also be paid via online or ATM banking at any major financial institution. To do so, students are instructed to use their student number as an account number and to indicate 'University of Ontario Institute of Technology' as the payee.

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 fees are charged on a per credit hour basis, up to the maximum annual program fee. Students who elect to complete additional courses beyond those required by the program will be charged for the additional courses at the regular per credit hour rate.

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

Program	Maximum Annual Program Fee
BA (Hons), BASc (Hons), BCom (Hons), BHSc (Hons), BSc, BSc (Hons), BSc & Mgt (Hons), BScN (Hons), BEd	$ 4,184
BEng (Hons), BEng & Mgt (Hons)	$ 4,543

6.3.2 Fees for international students

Program	Maximum Annual Program Fee
BA (Hons), BASc (Hons), BCom (Hons), BHSc (Hons), BSc, BSc (Hons), BSc & Mgt (Hons), BScN (Hons), BEd	$ 11,000
BEng (Hons), BEng & Mgt (Hons)	$ 12,000

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:	$ 535
Student organization fees:	$ 159.75

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 listed below for both the health and dental plans and the University Health Insurance Plan (UHIP) are based on 2003-2004 rates; the insurer will determine 2004-2005 rates.

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):	$ 146.83
UHIP (international students only):	$ 612.47

6.6 Mobile learning program

Mobile learning fees are charged on annually and are assessed as part of fall semester fees. All students are required to participate in the mobile learning program.

Part-time students:	$ 525
Full-time students:	$ 1480 [1]

[1] Some programs utilize technologies that require an upgraded laptop model and will be charged $1680.

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	$ 4,500
· North Hall	$ 4,900

South Village:

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

· All suites	$ 4,900

6.7.2 Campus dining plans

Students living in the South Village must choose one of the compulsory dining plans below. All other students may choose to purchase one of the voluntary dining plans. Campus dining 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.

Plan	Description	Cost
Compulsory dining plans:		
The Ultimate	14 meals per week plus $250 flex dollars	$ 3,365
The Regular	12 meals per week plus $350 flex dollars	$ 3,105
The Commuter	10 meals per week plus $450 flex dollars	$ 2,815
The Light Eater	8 meals per week plus $550 flex dollars	$ 2,495
The Mini Plan	6 meals per week plus $550 flex dollars	$ 2,027
Voluntary dining plans:		
The Ultimate	14 meals per week plus $250 flex dollars	$ 3,365
The Regular	12 meals per week plus $350 flex dollars	$ 3,105
The Commuter	10 meals per week plus $450 flex dollars	$ 2,815
The Light Eater	8 meals per week plus $550 flex dollars	$ 2,495
The Mini Plan	6 meals per week plus $550 flex dollars	$ 2,027
The Freedom	5 meals per week plus $600 flex dollars	$ 1,840
The Flex	3 meals per week plus $800 flex dollars	$ 1,530
The Ultimate Flex	$1,200 flex dollars	$ 1,200

6.8 Parking

Parking rates are determined annually. The 2003-04 parking rate schedule is as follows:

Annual permit (on-site)	$	192
Annual permit (off-site)	$	140
Semester permit	$	100
Monthly permit	$	40
Weekly permit	$	15
Daily permit	$	5
Pay n' Display	$	1.50/hr.

6.9 Miscellaneous service fees

Application for admission (part-time and non degree students)	$	35
Grade appeal fee (refundable if appeal successful)	$	30
Letter of permission (for taking courses at another post-secondary institution)	$	25
Late payment fee	$	40
Replacement parchment	$	50
Supplemental/special examination fee	$	25
Transcript	$	8
Tuition deferment	$	40
Verification of enrolment	$	10
Verification of fees paid	$	10
Mask-fitting fee (nursing)	$	15

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 and their families 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 are available through the OSAP application process.

7.2 On-campus work programs

The University provides many on-campus part-time jobs as well as full-time summer employment. Apply early if working part-time is part of your 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 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 comprehensive 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 your eligibility. Appointments are not available until the school year has commenced.

7.5 Scholarships

The University of Ontario Institute of Technology takes great pride in recognizing the academic achievements of students. Through the generous support from businesses, service organizations and individuals, the University is able to offer a number of scholarships and awards to assist undergraduate 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 current scholarships and awards for the 2004-2005 academic year; and is subject to change:

7.5.1 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:
Two 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:
Two 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.

7.5.2 Entrance scholarships (no application required)

Entrance scholarships are awarded to the 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. A listing of the scholarships available in 2004-2005 academic year is below. The recipients are selected by the Awards Committee. Notification of entrance scholarships will be mailed with the offer of admission.

Faculty of Business and Information Technology
$9,250 ($4,000 first year, $1,750 renewable in second, third and fourth years)

Faculty of Education
$9,250 ($4,000 first year, $1,750 renewable in second, third and fourth years) for concurrent education students

$4,000 (non-renewable) for 1-year consecutive education students

Faculty of Health Sciences
$9,250 ($4,000 first year, $1,750 renewable in second, third and fourth years)

Faculty of Engineering and Applied Science
$9,750 ($4,500 first year, $1,750 renewable in second, third and fourth years)

School of Engineering Systems and Nuclear Science
$9,750 ($4,500 first year, $1,750 renewable in second, third and fourth years)

Faculty of Science
$9,250 ($4,000 first year, $1,750 renewable in second, third and fourth years)

Faculty of Social Science
$9,250 ($4,000 first year, $1,750 renewable in second, third and fourth years)

7.5.3 Awards of Recognition

The University of Ontario Institute of Technology recognizes the accomplishment of all students admitted to the University by presenting the financial awards to students achieving minimum average entering grades. Amounts and cut off marks vary from year to year. Pease check the Web site for current information.

Section 8: Student Services

8.1 Introduction

The University of Ontario Institute of Technology is committed to ensuring our students experience a rich learning environment, including a high quality of student life. Advising, 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 development

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 Development 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, Campus Health Centre, alumni, academic departments, and Student Support Services to promote student activities and enhance student satisfaction and student success.

8.3 Academic assistance

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

8.4 Career and Employment Services

Career and Employment Services are available to both students and graduates. Advisors deliver workshops and individual assistance in the following areas: job search techniques, resumé and cover letter writing, interviewing skills as well as 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. 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 is available to students and graduates through the campus intranet. On-campus employer recruitment events are also featured on the Job Site.

8.5 Personal financial counselling

The Financial Aid Office provides students with advice on how to prepare a school year budget. 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 financial 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, alternative 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 (IAASP) 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, two outdoor tennis courts, basketball court, softball diamonds, soccer field and three beach volleyball courts.

8.9 Chaplain services

Chaplain services are available to students in need through community services. Students wishing to access this type of support should contact the Student Development Office to obtain a list of services available and/or referrals within the community. This assistance is extended in complete confidence, without prejudice.

8.10 Campus Health Centre

The Campus Health 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 promo-

tional workshops are available through group presentations, guest speakers and one-to-one appointments. The Campus Health 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 assessment and referral for needs. Students will receive referrals through our Student Assistance Program for six one-hour sessions with an appropriate professional outside of the University. In addition, counselling services are provided by a drug and alcohol counsellor.

8.11 Peer tutoring

Peer tutoring is provided subject to availability for 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 have four different suite types available to them, with a total of 1300 beds on campus. Suites typically contain a three piece bath, kitchenette, heating/AC, high speed Internet, local calls, two double beds and biweekly housekeeping service.

8.13 Student government

The student government enhances the educational experience and quality of life for all undergraduates at the University of Ontario Institute of Technology.

Section 9: Faculty of Business and Information Technology

Dean: Bernadette Schell, BA, MSc, PhD

Assistant Dean: Wilfred Fong, BSc, MLIS

Director, Management Development Centre: Terry Y. S. Wu, BA, MA, PhD

Professors:
Terry Y. S. Wu, BA, MA, PhD

Associate Professors:
John Friedlan, BSc, MBA, PhD, CA

William M. Goodman, BA, MA, PhD

Ali Grami, BSc, MEng, PhD, PEng
(Cross-appointment with the Faculty of Engineering and Applied Science)

Assistant Professors:
Clemens Martin, Dipi-Ing (Master), Dr-Ing (PhD),
(Cross-appointment with the Faculty of Engineering and Applied Science)

Anjum Siddiqui, MA, PhD

Paul Wayne, BA, MBA, PhD, CA

Patrick C.K. Hung, BSc, MPhil, MASc, PhD

Jennifer Percival, Bmath

Miguel Vargas Martin, BCompSc, MEng, PhD

9.1 Degree offered

Bachelor of Commerce (Honours) - BCom (Hons)
The Faculty of Business and Information Technology offers an innovative Honours Bachelor of Commerce degree. By placing a strong emphasis on how technology can enhance business opportunities, students are prepared to be on the leading-edge in industry and business.

The University's mobile learning environment (section 1.2) provides each student with a current model of the IBM ThinkPad and fully networked classrooms and study 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 faculty'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, e-marketing, or e-business and e-commerce. 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 also 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, on either 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.

9.2.4 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent and six 12U or M credits including English (ENG4U) and one math (MGA4U or MCB4U or MDM4U).

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

9.2.5 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 1

SEMESTER 1 (15 credit hours)

BUSI 1600U Management of the Enterprise
BUSI 1830U Introduction to Programming
BUSI 1900U Mathematical Foundations for Business
ECON 2010U Microeconomics
General Elective*

SEMESTER 2 (15 credit hours)
BUSI 1450U Statistics
BUSI 1650U External Environment of Management
BUSI 2000U Collaborative Leadership
BUSI 2150U Financial Accounting I
ECON 2020U Macroeconomics

YEAR 2

SEMESTER 1 (15 credit hours)
BUSI 2160U Financial Accounting II
BUSI 2201U Marketing I
BUSI 2311U Organizational Behaviour and Management of Human Resources I
BUSI 2401U Finance I
BUSI 2603U Introduction to Operations Management

SEMESTER 2 (15 credit hours)
BUSI 2170U Managerial Accounting
BUSI 2202U Marketing II
BUSI 2312U Organizational Behaviour and Management of Human Resources II
BUSI 2402U Finance II
BUSI 2604U Introduction to Project Management and Supply Chain Management

YEAR 3

SEMESTER 1 (15 credit hours)
BUSI 3040U Information Systems
Business Specialization Elective*
General Business Elective*
General Elective*
General Elective*

SEMESTER 2 (15 credit hours)
Business Specialization Elective*
Business Specialization Elective*
General Business Elective*
General Elective*
General Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
BUSI 4701U Strategic Management I
BUSI 4991U UOIT Edge I - Capstone Study Project

Business Specialization Elective*
Business Specialization Elective*
General Elective*

SEMESTER 2 (15 credit hours)
BUSI 4702U Strategic Management II
BUSI 4992U UOIT Edge II - Capstone Study Project
Business Specialization Elective* OR General Business Elective* OR General Elective*
Business Specialization Elective*
General Elective*

*ELECTIVES

BUSINESS SPECIALIZATION ELECTIVES

Accounting: Intermediate Financial Accounting I (BUSI 2101U); Intermediate Financial Accounting II (BUSI 2102U); Advanced Financial Accounting (BUSI 3101U); Contemporary Issues in Accounting (BUSI 3106U); Managerial Cost Accounting and Analysis (BUSI 3120U); Management Accounting and Control Systems (BUSI 3160U); Auditing Standards and Applications (BUSI 3170U); Auditing II (BUSI 3172U), Auditing III (BUSI 3173U), 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).

E-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 Website 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).

GENERAL BUSINESS ELECTIVES

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

General Electives

Students may select any course from any faculty, subject to credit restrictions. (See course descriptions in section 16).

9.3 Concentration in accounting

The concentration in accounting is designed for students interested in careers as professional accountants. The program will allow students to meet the course requirements of the three Canadian accounting professional designations: Chartered Accountant (CA), Certified Management Accountant (CMA), and Certified General Accountant (CGA). The program provides a heavy emphasis on accounting-related courses combined with broad coverage of the major business disciplines.

The following courses are offered to meet the requirements of the professional designations indicated:

Course	Title	CA	CMA	CGA[1]
BUSI 2150U	Financial Accounting I	_	_	_
BUSI 2160U	Financial Accounting II	_	_	_
BUSI 2101U	Intermediate Financial Accounting I	_	_	_
BUSI 2102U	Intermediate Financial Accounting II	_	_	_
BUSI 3101U	Advanced Financial Accounting	_[2]	_	_
	Advanced Financial Accounting Elective	_[2]		
BUSI 2170U	Managerial Accounting	_	_	_
BUSI 3120U	Managerial Cost Accounting and Analysis	_	_	_
BUSI 3160U	Managerial Accounting and Control Systems	_		
	Advanced Accounting Elective	_[3]		
BUSI 3170U	Auditing I	_		_
BUSI 3172U	Auditing II	_		_
BUSI 3173U	Auditing III	_		
BUSI 3110U	Introduction to Income Taxation	_	_	_
BUSI 4120U	Advanced Income Taxation	_		_
BUSI 3040U	Information Systems	_	_	_
BUSI 2401U	Finance I	_	_	_
BUSI 2402U	Finance II	_	_	_
ECON 2010U	Microeconomics	_	_	_
ECON 2020U	Macroeconomics	_	_	_
BUSI 2705U	Legal Environment of Business	_	_	_
BUSI 1450U	Statistics		_	
BUSI 2603U	Introduction to Operations Management		_	
BUSI 2604U	Intro to Project Mgmt & Supply Chain Mgmt		_	
BUSI 4701U	Strategic Management I		_	
BUSI 4702U	Strategic Management II		_	
	International Business		_	
BUSI 2311U	Org Behaviour & Human Res Management I		_	
BUSI 2312U	Org Behaviour & Human Res Management II		_	
BUSI 2201U	Marketing I		_	
BUSI 2202U	Marketing II		_	

[1] Other CGA requirements may be fulfilled by the completion of other UOIT courses. Please see the Faculty of Business and Information Technology for advice.

[2] Students pursuing the CA designation can use either BUSI 3101U or another financial accounting elective to satisfy this requirement.

[3] Students pursuing the CA designation can take an accounting elective (financial or managerial) to satisfy this requirement.

Section 10: Faculty of Education

Dean: William Hunter, BA, PhD

Assistant Professors:
Janice Cramer, BSc, BEd, PhD

Liesel Knaack, BA, BEd, MEd, PhD

Roland van Oostveen, BSc (Hons), MEd

Robin Kay, BSc, MA, PhD

10.1 Degrees offered

Bachelor of Education - BEd (consecutive)

Bachelor of Education/Bachelor of Science - BEd/BSc (concurrent) [Pending final approval]

Bachelor of Education/Bachelor of Science (Honours) - BEd/BSc (Hons) (concurrent) [Pending final approval]

The Faculty of Education enables prospective teachers to develop communication, critical thinking and problem-solving skills essential for success in the classroom. Our faculty members are highly skilled in the use of technology in teaching to ensure that our graduates are well prepared to be 21st-century educational leaders. Our programs focus on the preparation of teachers in the sciences, mathematics and computing. Students participate in co-operative learning activities based on realistic problems and scenarios and learn from extensive practical experiences.

The faculty offers choices to its students. The consecutive program is a one-year, post-degree program. The concurrent program enables students to pursue their Bachelor of Science degree while also completing their Bachelor of Education degree.

The laptop is integral to our programs 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 (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 faculty's research is primarily focused on improving educational technology such as online learning.

10.2 Program information - Bachelor of Education (consecutive)

10.2.1 General information

The Faculty of Education offers a one-year consecutive program in the preparation of science, mathematics and computer science teachers. The emphasis on technology in teaching is a defining element of the faculty'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. Cooperative 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 a minimum of sixty 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 computer science 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 to undertake roles in business in the areas of training and professional development.

10.2.4 Teacher certification

The University's Bachelor of Education consecutive and concurrent programs are designed to meet all Ontario legislated requirements and incorporate 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.

10.2.5 Admission requirements

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

- An undergraduate degree 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.
- A personal profile addressing skills and related work experience
- Two letters of reference
- An interview may be required
- Prior to the start of classes, results of a criminal record check and TB test must be submitted (any costs associated with these 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, 2004.

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.

10.2.6 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 31.5 credit hours, including all courses outlined below. Students must achieve a minimum grade point average of 2.70 to be eligible for promotion in and graduation from the Bachelor of Education (consectutive) degree program. For course descriptions, see section 16.

Year 1

SEMESTER 1 (16.5 credit hours)
EDUC 2000U Classroom Communications
EDUC 3610U Contemporary Educational Practice
EDUC 3750U Learning and Human Development
EDUC 4380U Analysis and Management of Classroom Behaviour
EDUC 4900U Field Experience I (28 days)
Curriculum Studies I *
Curriculum Studies I *

SEMESTER 2 (15 credit hours)
EDUC 3800U Teaching for Individual Needs and Diversity
EDUC 4240U Understanding Educational Research, Theory and Practice
EDUC 4590U Assessment and Evaluation
EDUC 4901U Field Experience II (32 days)

One of:
- EDUC 3470U Issues in Education
- EDUC 3560U Religious Education: Teaching in Ontario Catholic Schools
- EDUC 4610U Advanced Instructional Design

Curriculum Studies II **
Curriculum Studies II **

* Students will complete two of the following courses in semester 1: CURS 4100U, CURS 4120U, CURS 4130U, CURS 4140U, CURS 4160U, CURS 4180U. 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 2: CURS 4101U, CURS 4121U, CURS 4131U, CURS 4141U, CURS 4161U, CURS 4181U. 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 4100U & CURS 4101U Intermediate/Senior Biology
CURS 4120U & CURS 4121U Intermediate/Senior Chemistry
CURS 4130U & CURS 4131U Intermediate/Senior Physics
CURS 4140U & CURS 4141U Intermediate/Senior Mathematics
CURS 4160U & CURS 4161U Intermediate/Senior Computer Studies
CURS 4180U & CURS 4181U Intermediate/Senior General Science

10.3 Program information

Bachelor of Education/Bachelor of Science - BEd/BSc (concurrent)
Bachelor of Education/Bachelor of Science (Honours) - BEd/BSc (Hons) (concurrent)

10.3.1 General information

In co-operation with the Faculty of Science, a concurrent teacher education program is offered whereby candidates complete education courses concurrently with their science courses. The University of Ontario Institute of Technology offers two concurrent education programs: a BEd/BSc and a BEd/BSc (Hons).

The four-year program has been designed to ensure that students complete a minimum of 10 courses in their first teachable subject and a minimum of six courses in their second teachable subject. Graduates will receive a BSc in either Biological or Physical Science and a BEd.

Students in the five-year program will complete all the required coursework for an Honours BSc degree in Biological Science (with opportunities to specialize in one of its two streams: environmental toxicology or pharmaceutical biotechnology) or a BSc (Hons) in Physical Science with a specialization in one of: chemistry, mathematics or physics. Students who choose not to specialize must take a minimum of 10 courses in their first teaching subject and six courses in their second teaching subject.

The Faculty of Education's concurrent education programs prepare students to teach in the areas of science, mathematics or computer science. The emphasis on technology in teaching is a defining element of the faculty's concurrent programs. Students use technology in both their science and education classes so that they will understand how to integrate technology into classroom practice. Cooperative 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. There is a specific focus on the new and very rigorous Ontario mathematics and science curriculum. Graduates of these programs will be prepared to teach in the Intermediate/Senior (I/S) divisions (Grades 7-12) of Ontario schools.

10.3.2 Practicum

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

10.3.3 Careers

Graduates are prepared to teach in the Ontario education system where the demand for teachers of mathematics, science and computer science 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 to undertake roles in business in the areas of training and professional development.

10.3.4 Teacher certification

The University's Bachelor of Education consecutive and concurrent programs are 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.

10.3.5 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 75 per cent on six 12U or M credits including English (ENG4U), calculus (MCB4U) and two of biology (SBI4U), chemistry (SCH4U), physics (SPH4U) or algebra and geometry (MAG4U). In addition, a combined minimum 75 per cent average in math and science courses is required.

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

A criminal reference check and a Tuberculin (TB) test are also required.

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.

10.3.6 Degree requirements - BEd/BSc (concurrent)
General program requirements - Bachelor of Science

The following are the requirements for the BSc degree that serves as the science base for the four-year concurrent science education model. The Bachelor of Science program requires the completion of 90 credit hours as indicated below:

Science Core - 36 credit hours

This includes nine credit hours in each of:

- biology
- chemistry
- physics
- mathematics (This must include one of the courses Statistics and Probability for Physical Science STAT 2010U or Statistics and Probability for Biological Science STAT 2020U.)

Additional Acceptable Science Credits - 36 credit hours

- Scientific Computing Tools, CSCI 1000U (Year 1) is a required course within this category.

Students must successfully complete the remaining 33 credit hours in chemistry, physics, mathematics, biology, and/or computer studies. Students must select two subject areas from this list as 'teachable subjects'. For the first teachable subject, they must successfully complete 30 credit hours (this can include those in the Science Core). For the second teachable subject, they must successfully complete 18 credit hours (this can include those in the Science Core).

Non-Science Electives - 18 credit hours

These will include electives outside or linked to the discipline, to be selected from offerings through other faculties at the University of Ontario Institute of Technology or through Trent University at the University of Ontario Institute of Technology.

- Learning and Human Development, EDUC 3750U is a mandatory non-science elective

Note:

The program must include a total of 27 credit hours in science at the third or fourth year level. Of these, at least nine credit hours must be at the fourth year level. No more than 30 credit hours may be taken at the first year level.

CONCURRENT BEd/BSc
YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I or PHY 1030U Physics for Biosciences I*

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
EDUC 2900U Introduction to Teaching and Field Experience I (10 days)
MATH 1020U Calculus II
PHY 1020U Physics II or PHY 1040U Physics for Biosciences II*

* Students who wish to have physics as one of their teachable subjects must take PHY 1010U and PHY 1020U. However, students who achieve a B standing or higher in both PHY 1030U and PHY 1040U will be permitted to proceed to higher level physics courses.

YEAR 2

SEMESTER 1 (15 credit hours)
One course chosen from each of Chemistry, Physics, and Biology
STAT 2010U Statistics and Probability for Physical Science OR
STAT 2020U Statistics and Probability for Biological Science
Elective*

SEMESTER 2 (15 credit hours)
EDUC 2000U Classroom Communications
EDUC 2901U Field Experience II (15 days)
EDUC 3750U Learning and Human Development
Two courses from first teachable subject
One course from second teachable subject
One additional science course

YEAR 3

SEMESTER 1 (15 credit hours)
EDUC 3610U Contemporary Educational Practice
EDUC 4380U Analysis and Management of Classroom Behaviour
Two courses from first teachable subject
One course from second teachable subject
Liberal Studies or Education Elective[1]

SEMESTER 2 (15 credit hours)
EDUC 3800U Teaching for Individual Needs and Diversity
EDUC 4590U Assessment and Evaluation
EDUC 4902U Field Experience III (Practicum) (25 days)
Curriculum Studies I *
Curriculum Studies I *
One course from first teachable subject
Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
EDUC 4903U Field Experience IV (Practicum) (33 days)
Curriculum Studies II **
Curriculum Studies II **
Liberal Studies or Education Elective[2]
Elective*

SEMESTER 2 (15 credit hours)
EDUC 4240U Understanding Educational Research, Theory and Practice
Two courses from first teachable subject
One course from second teachable subject
Elective*

Students will select ONE education elective.

[1] It is strongly recommended that the education elective Religious Education: Teaching in Ontario Catholic Schools, EDUC 3560U be taken at this point in the program.

[2] It is strongly recommended that the education electives Issues in Education, EDUC 3970U or Advanced Instructional Design, EDUC 4610U be taken at this point in the program.

10.3.7 Degree Requirements - BEd/BSc (Hons) (concurrent)
Concurrent BEd/BSc (Hons) - BIOLOGICAL SCIENCE

YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1030U Physics for Biosciences I*

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
EDUC 2900U Introduction to Teaching and Field Experience I (10 days)
MATH 1020U Calculus II
PHY 1040U Physics for Biosciences II*
* Students who wish to have physics as one of their teachable subjects must take PHY 1010U and PHY 1020U.

YEAR 2

SEMESTER 1 (15 credit hours)
BIOL 2010U Introductory Physiology
BIOL 2030U Cell Biology
CHEM 2020U Introduction to Organic Chemistry
EDUC 2000U Classroom Communications
STAT 2020U Statistics and Probability for Biological Science
One course from second teachable subject

SEMESTER 2 (15 credit hours)
BIOL 2020U Genetics and Molecular Biology
BIOL 2040U Biochemistry
EDUC 2901U Field Experience II (15 days)
EDUC 3750U Learning and Human Development
One course from second teachable subject
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
BIOL 3050U Developmental Biology
EDUC 3610U Contemporary Educational Practice
EDUC 4380U Analysis and Management of Classroom Behaviour
Two courses from second teachable subject
Biology Elective

SEMESTER 2 (15 credit hours)
BIOL 3030U Microbiology and Immunology
EDUC 4902U Field Experience III (Practicum) (20 days)
One course from Biology
One additional Science course
Elective*
Liberal Studies or Education Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
Three courses from Biology
One additional Science course
Elective*

SEMESTER 2 (15 credit hours)
EDUC 3800U Teaching for Individual Needs and Diversity
EDUC 4590U Assessment and Evaluation
EDUC 4903U Field Experience IV (Practicum) (25 days)
Curriculum Studies I *
Curriculum Studies I *
Elective*
Elective*

YEAR 5

SEMESTER 1 (15 credit hours)
EDUC 4240U Understanding Educational Research, Theory and Practice
EDUC 4904U Field Experience V (Practicum) (28 days)
Curriculum Studies II **
Curriculum Studies II **
Elective*

SEMESTER 2 (15 credit hours)
Three courses from Biology
One additional Science course
Liberal Studies or Education elective

Science Core - nine, including two in biology and two in each of the possible second teachable subjects*

Bioscience Core - six

Upper Year Specialization - Eight more biological science

Add. Science - total nine, including Stats & Probability** and Intro to Organic Chemistry**, and four courses in second teachable T2

Liberal Studies - eight

* If Computational Science provides the second teachable (Computer Studies), one of the unspecified Science courses will have to be Comp. Sci.

** Stats & Probability or Intro to Organic Chemistry count as one of the required T2 courses for math or chemistry second teachables, respectively.

Specific programs must satisfy the general requirements for Science Honours programs, that at least 12 courses must be at third or fourth year level, and at least four of these must be at the fourth year level; for Biology Honours, at least two of the fourth year courses must be in biology. At most 14 courses in total (five in addition to the required first year core) may be at the first year level.

CONCURRENT BEd/BSc (Hons) - PHYSICAL SCIENCE (CHEMISTRY SPECIALIZATION)
YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
EDUC 2900U Introduction to Teaching and Field Experience I (10 days)
MATH 1020U Calculus II
PHY 1020U Physics II

* Students who wish to have physics as one of their teachable subjects should take PHY 1010U and PHY 1020U. However, students who achieve a B standing or higher in both PHY 1031U and PHY 1040U will be permitted to proceed to second year physics courses.

YEAR 2

SEMESTER 1 (15 credit hours)
CHEM 2010U Structure and Bonding
CHEM 2020U Introduction to Organic Chemistry
CHEM 2030U Analytical Chemistry
EDUC 2000U Classroom Communications
STAT 2010U Statistics and Probability for Physical Science
One course from second teachable subject

SEMESTER 2 (15 credit hours)
BIOL 2040U Biochemistry
CHEM 2040U Thermodynamics and Kinetics
EDUC 2901U Field Experience II (15 days)
EDUC 3750U Learning and Human Development
One course from second teachable subject
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
CHEM 3020U Organic Chemistry
CHEM 3510U Inorganic Chemistry I
CHEM 3530U Instrumental Analytical Chemistry I
EDUC 3610U Contemporary Educational Practice
EDUC 4380U Analysis and Management of Classroom Behaviour
One course from second teachable subject

SEMESTER 2 (15 credit hours)
CHEM 3040U Fundamentals of Physical Chemistry
CHEM 3520U Inorganic Chemistry II
CHEM 3540U Instrumental Analytical Chemistry II
EDUC 4902U Field Experience III (Practicum) (20 days)
Liberal Studies or Education Elective*
Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
CHEM 4020U Advanced Organic Chemistry
CHEM 4040U Physical Chemistry
CHEM 4050U Environmental Chemistry
One additional Science course
Elective*

SEMESTER 2 (15 credit hours)
EDUC 3800U Teaching for Individual Needs and Diversity
EDUC 4590U Assessment and Evaluation
EDUC 4903U Field Experience IV (Practicum) (25 days)
Curriculum Studies I *
Curriculum Studies I *
Elective*
Elective*

YEAR 5

SEMESTER 1 (15 credit hours)
EDUC 4240U Understanding Educational Research, Theory and Practice
EDUC 4904U Field Experience V (Practicum) (28 days)
Curriculum Studies II **
Curriculum Studies II **
Elective*

Semester 2 (15 credit hours)
CHEM 4010U Industrial Chemistry
CHEM 4060U Chemical and Molecular Spectroscopy
One course from second teachable subject
One additional Science course
Liberal Studies or Education elective*

Mathematics Requirements
Science Core - nine, including two in chemistry and two in each of the possible second teachable subjects*

Upper Year Specialization - 16 more chemistry courses including biochemistry

Add. Science - total seven, including Statistics & Probability** and four courses in second teachable T2

Liberal Studies - eight

* If Computational Science provides the second teachable (Computer Studies), one of the unspecified Science courses will have to be Comp. Sci.

** If Math is the second teachable, Stats & Probability counts as one of the required T2 courses.

Specific programs must satisfy the general requirements for Science Honours programs, that at least 12 courses must be at third or fourth year level, and at least four of these must be at the fourth year level. At most 14 courses in total (five in addition to the required first year core) may be at the first year level.

Note: The order of courses may be changed; e.g., students who start out in a Science program and transfer to Concurrent Education might take Introduction to Teaching in second year.

CONCURRENT BEd/ BSc (Hons) - PHYSICAL SCIENCE (PHYSICS SPECIALIZATION)
YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
EDUC 2900U Introduction to Teaching and Field Experience I (10 days)
MATH 1020U Calculus II
PHY 1020U Physics II
* Students who wish to have physics as one of their teachable subjects should take PHY 1010U and PHY 1020U. However, students who achieve a B standing or higher in both PHY 1031U and PHY 1040U will be permitted to proceed to second year physics courses.

YEAR 2

SEMESTER 1 (15 credit hours)
EDUC 2000U Classroom Communications
PHY 2010U Electricity and Magnetism I
PHY 2030U Mechanics I
PHY 2050U Thermodynamics
STAT 2010U Statistics and Probability for Physical Science
One additional Science course (MATH 2050U recommended)

SEMESTER 2 (15 credit hours)
EDUC 2901U Field Experience II (15 days)
EDUC 3750U Learning and Human Development
MATH 2060U Differential Equations
PHY 2020U Electricity and Magnetism II
PHY 2040U Mechanics II
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
EDUC 3610U Contemporary Educational Practice
EDUC 4380U Analysis and Management of Classroom Behaviour
PHY 3010U Statistical Physics I
PHY 3020U Quantum Physics I
PHY 3030U Electronics
One course from second teachable subject

SEMESTER 2 (15 credit hours)
EDUC 4902U Field Experience III (Practicum) (20 days)
PHY 3040U Mathematical Physics
PHY 3050U Waves and Optics
PHY 3060U Fluid Mechanics
One course from second teachable subject
Liberal Studies or Education Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
PHY 4010U Quantum Physics II
PHY 4020U Statistical Physics II
One course from second teachable subject
Elective*
Elective*

SEMESTER 2 (15 credit hours)
EDUC 3800U Teaching for Individual Needs and Diversity
EDUC 4590U Assessment and Evaluation
EDUC 4903U Field Experience IV (Practicum) (25 days)
Curriculum Studies I *
Curriculum Studies I *
Elective*
Elective*

YEAR 5

SEMESTER 1 (15 credit hours)
EDUC 4240U Understanding Educational Research, Theory and Practice
EDUC 4904U Field Experience V (Practicum) (28 days)
Curriculum Studies II **
Curriculum Studies II **
Elective*

SEMESTER 2 (15 credit hours)
PHY 4030U Atomic and Molecular Physics
PHY 4600U Thesis Project
One Physics course at the fourth year level
One course from second teachable subject
Liberal Studies or Education elective*

Physics Requirements

Science Core - nine, including two in Physics and two in each of the possible second teachable subjects*

Upper Year Specialization - 16 more Physics courses

Add. Science - total seven, including Statistics & Probability and Differential Equations** and four courses in second teachable T2

Liberal Studies - eight

* If Computational Science provides the second teachable (Computer Studies), Science seven or an elective will have to be Comp. Sci.

** If Math is the second teachable, Stats & Probability and the MATH courses count among the required T2 courses.

Specific programs must satisfy the general requirements for Science Honours programs, that at least 12 courses must be at third or fourth year level, and at least four of these must be at the fourth year level. At most 14 courses in total (five in addition to the required first year core) may be at the first year level.

Note: The order of courses may be changed; e.g., students who start out in a Science program and transfer to Concurrent Education might take Introduction to Teaching in second year.

CONCURRENT BEd/BSc (Hons) - PHYSICAL SCIENCE (MATHEMATICS SPECIALIZATION)
YEAR 1

Semester 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

Semester 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
EDUC 2900U Introduction to Teaching and Field Experience I (10 days)
MATH 1020U Calculus II
PHY 1020U Physics II
* Students who wish to have physics as one of their teachable subjects should take PHY 1010U and PHY 1020U. However, students who achieve a B standing or higher in both PHY 1031U and PHY 1040U will be permitted to proceed to second year physics courses.

YEAR 2

SEMESTER 1 (15 credit hours)
EDUC 2000U Classroom Communications
MATH 2010U Advanced Calculus I
MATH 2030U Set Theory
MATH 2050U Linear Algebra
STAT 2010U Statistics and Probability for Physical Science
One course from second teachable area

SEMESTER 2 (15 credit hours)
MATH 2020U Advanced Calculus II
MATH 2060U Differential Equations
MATH 2070U Numerical Methods
EDUC 2901U Field Experience II (15 days)
EDUC 3750U Learning and Human Development
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
EDUC 3610U Contemporary Educational Practice
EDUC 4380U Analysis and Management of Classroom Behaviour
MATH 3020U Real Analysis
MATH 3030U Linear Algebra II
MATH 3040U Operations Research I
MATH 3050U Partial Differential Equations

SEMESTER 2 (15 credit hours)
EDUC 4902U Field Experience III (Practicum) (20 days)
MATH 3060U Complex Analysis
MATH 3070U Algebraic Structures
One course from second teachable subject
One additional Science course
Liberal Studies or Education Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
MATH 4010U Advanced Differential Equations
MATH 4020U Numerical Analysis
MATH 4030U Biomathematics
One course from second teachable subject
Liberal Studies or Education Elective*

SEMESTER 2 (15 credit hours)
EDUC 3800U Teaching for Individual Needs and Diversity
EDUC 4590U Assessment and Evaluation
EDUC 4903U Field Experience IV (Practicum) (25 days)
Curriculum Studies I *
Curriculum Studies I *
Elective*
Elective*

YEAR 5

SEMESTER 1 (15 credit hours)
EDUC 4240U Understanding Educational Research, Theory and Practice
EDUC 4904U Field Experience V (Practicum) (28 days)
Curriculum Studies II **
Curriculum Studies II **
Elective*

SEMESTER 2 (15 credit hours)
MATH 4050U Advanced Partial Differential Equations
One course from second teachable subject
One additional Science course
Liberal Studies or Education elective*
Elective*

Mathematics Requirements

Science Core - nine, including two in Mathematics and two in each of the possible second teachable subjects*

Upper Year Specialization - 16 more Mathematics courses

Add. Science - total seven, including Statistics & Probability and four courses in second teachable T2

Liberal Studies - eight

* If Computational Science provides the second teachable (Computer Studies), a Science Elective will have to be Comp. Sci.

Specific programs must satisfy the general requirements for Science Honours programs, that at least 12 courses must be at third or fourth year level, and at least four of these must be at the fourth year level. At most 14 courses in total (five in addition to the required first year core) may be at the first year level.

Note: The order of courses may be changed; e.g., students who start out in a Science program and transfer to Concurrent Education might take Introduction to Teaching in second year.

CONCURRENT BSc (Hons) / BEd - PHYSICAL SCIENCE (NO SPECIALIZATION)

YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
EDUC 2900U Introduction to Teaching and Field Experience I (10 days)
MATH 1020U Calculus II
PHY 1020U Physics II

* Students who wish to have physics as one of their teachable subjects should take PHY 1010U and PHY 1020U. However, students who achieve a B standing or higher in both PHY 1031U and PHY 1040U will be permitted to proceed to second year physics courses.

YEAR 2

SEMESTER 1 (15 credit hours)
EDUC 2000U Classroom Communications
STAT 2010U Statistics and Probability for Physical Science
Four courses in Physical Science

SEMESTER 2 (15 credit hours)
EDUC 2901U Field Experience II (15 days)
EDUC 3750U Learning and Human Development
Three courses in Physical Science
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
EDUC 3610U Contemporary Educational Practice
EDUC 4380U Analysis and Management of Classroom Behaviour
Three courses in Physical Science
One additional Science elective

SEMESTER 2 (15 credit hours)
EDUC 4902U Field Experience III (Practicum) (20 days)
Two courses in Physical Science
Two additional Science electives
Liberal Studies or Education Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
Two courses in Physical Science
One additional Science elective
Elective*
Elective*

SEMESTER 2 (15 credit hours)
EDUC 3800U Teaching for Individual Needs and Diversity
EDUC 4590U Assessment and Evaluation
EDUC 4903U Field Experience IV (Practicum) (25 days)
Curriculum Studies I *
Curriculum Studies I *
Elective*
Elective*

YEAR 5

Semester 1 (15 credit hours)
EDUC 4240U Understanding Educational Research, Theory and Practice
EDUC 4904U Field Experience V (Practicum) (28 days)
Curriculum Studies II **
Curriculum Studies II **
Elective*

SEMESTER 2 (15 credit hours)
Two courses in Physical Science
Two additional Science electives
Liberal Studies or Education elective*

Physical Science Requirements

Science Core - Nine, including two in each of the possible teachable subjects except one in comp. sci.

Upper Year Specialization - 17 more physical science courses (chem., comp. sci., math. and phys) including Statistics & Probability*

Add. Science Electives (may include courses from biological and environmental sciences, and engineering)* - six

Liberal Studies - eight

* Courses in the teachable subjects may be taken in both the specialization and elective series (including Stat. & Prob. when math. is selected as a teachable subject); in some cases it may be possible to get a second and third teachable subject.

Specific programs must satisfy the general requirements for Science Honours programs; at least 12 courses must be at third or fourth year level, and at least four of these must be at the fourth year level. Because of prerequisites, this requirement can be satisfied in practice only by taking upper year courses beyond the minimum 10 in the first teachable. At most 14 courses (five in addition to the required first year science core) may be at the first year level.

Note: The order of courses may be changed; e.g., students who start out in a Science program and transfer to Concurrent Education might take Introduction to Teaching in second year.

Section 11: Faculty of Engineering and Applied Science

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

Program Director: Ebrahim Esmailzadeh, BSc (Hons) (Eng), MPhil, PhD, CEng, FASME, FIMechE

Professors:
Ibrahim Dincer, BSc, MSc, PhD

Ebrahim Esmailzadeh, BSc (Hons)(Eng), MPhil., PhD, CEng, FASME, FIMechE

Associate Professor:
Ali Grami, BSc, MEng, PhD, PEng (Cross-appointment with the Faculty of Business and Information Technology)

Assistant Professors:
Clemens Martin, Dipi-Ing (Master), Dr-Ing (PhD), (Cross-appointment with the Faculty of Business and Information Technology)

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11.1 Degrees offered

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

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

Bachelor of Engineering (Honours) in Mechanical Engineering: Energy Engineering option - BEng (Hons)

Bachelor of Engineering (Honours) in Mechanical Engineering: Mechatronics Engineering option - BEng (Hons)

Bachelor of Engineering and Management (Honours) in Manufacturing Engineering and Management - BEng & Mgt (Hons)

Bachelor of Engineering and Management (Honours) in Mechanical Engineering and Management - BEng & Mgt (Hons)

Bachelor of Engineering and Management (Honours) in Mechanical Engineering and Management: Energy Engineering option - BEng & Mgt (Hons)

Bachelor of Engineering and Management (Honours) in Mechanical Engineering and Management: Mechatronics Engineering option - BEng & Mgt (Hons)

The Faculty of Engineering and Applied Science offers manufacturing engineering, mechanical engineering and other manufacturing- and mechanical-related programs. Designed to meet the needs of industry, these programs offer a solid grounding in basic sciences and mathematics, robotics, mechatronics, solid mechanics, controls, computer-aided design and artificial intelligence. Students will also have the opportunity to participate in an internship program to allow them to gain experiential learning by spending 12 to 16 months working in industry following third year.

Each student benefits from the University's mobile learning environment (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, and flexible manufacturing facility with advanced manufacturing and automation technologies that is capable of manufacturing a variety of products.

To help meet industry's need for engineers with strong business skills, the faculty has developed several combination engineering and management programs.

The faculty's research focuses on flexible manufacturing systems, high-performance manufacturing, automotive engineering, energy, active control of vibration and sound, nonlinear dynamics and chaos, efficient and environmentally conscious manufacturing, robotics, mechatronics, computer-integrated manufacturing, and micro-electromechanical systems.

In subsequent years, the Faculty of Engineering and Applied Science plans to offer undergraduate programs in electrical engineering, computer engineering, software engineering, and automotive engineering, as well as graduate programs.

11.2 Program information - Bachelor of Engineering (Honours) in Manufacturing Engineering

11.2.1 General information

The Faculty of Engineering and Applied Science is one of only three in Canada offering a dedicated program in manufacturing engineering. 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 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.

11.2.2 Work placement/internship opportunities

The University's proximity to a large number of diverse mechanical, manufacturing, and automotive engineering companies provides many opportunities for work placements. In addition, a 12 to 16 month optional engineering internship program is available for students completing third year.

11.2.3 Careers

Manufacturing is a $290 billion business in Ontario, employing over 1,000,000 people directly and another 1,000,000 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. Graduates may also choose to pursue further studies towards higher degrees or start their own businesses.

11.2.4 Professional designation

The Manufacturing Engineering 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 (PEng) in Ontario and in any province or territory in Canada.

11.2.5 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U) with a minimum grade of 60 per cent, physics (SPH4U), chemistry (SCH4U), calculus (MCB4U) and algebra and geometry (MAG4U). In addition, a combined minimum 70 per cent average in math and science courses is required.

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

11.2.6 Degree requirements

To be eligible for the BEng (Hons) degree in Manufacturing Engineering, students must successfully complete 126 credit hours, including all courses outlined below. For elective options see the list below. For course descriptions see section 16.

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

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

YEAR 1

SEMESTER 1 (15 credit hours)
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2020U Statics and Dynamics
ENGR 2220U Structure and Properties of Materials
ENGR 2310U Concurrent Engineering and Design
ENGR 2640U Thermodynamics and Heat Transfer
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (15 credit hours)
ENGR 2420U Solid Mechanics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

SEMESTER 1 (15 credit hours)
ENGR 3030U Computer-Aided Design
ENGR 3190U Manufacturing and Production Processes
ENGR 3270U Kinematics and Dynamics of Machines
ENGR 3350U Control Systems
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
ENGR 3300U Integrated Manufacturing Systems I
ENGR 3390U Mechatronics
ENGR 3460U Industrial Ergonomics
ENGR 4045U Quality Control

YEAR 4

SEMESTER 1 (15 credit hours)
ENGR 3395U Manufacturing Systems Design
ENGR 4280U Robotics and Automation
ENGR 4390U Modelling Manufacturing Systems
Engineering Elective*
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
ENGR 4015U Reliability and Maintenance
ENGR 4300U Integrated Manufacturing Systems II
ENGR 4999U Design Thesis
JSTS 4210U Ethics and Law for Professionals
Liberal Studies Elective (Advanced)*

***ELECTIVES**

Engineering Electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other engineering programs may be allowed as engineering electives provided students have the necessary prerequisites.

The following are approved courses as engineering electives:
ENGR 4160U Artificial Intelligence in Engineering
ENGR 4260U Automotive Engineering
ENGR 4380U Life Cycle Engineering
ENGR 4540U Energy Efficiency, Management and Simulation

Liberal Studies Electives
See section 11.5.

11.3 Program information - Bachelor of Engineering (Honours) in Mechanical Engineering

- **Comprehensive Mechanical Engineering program - BEng (Hons)**
- **Energy Engineering option - BEng (Hons)**
- **Mechatronics Engineering option - BEng (Hons)**

11.3.1 General information

The University of Ontario Institute of Technology's four-year mechanical engineering program offers three education streams including mechanical engineering, as well as mechanical engineering with a specialization in energy engineering or mechatronics engineering. These unique areas of specialization are in high demand by various industries and employers.

In the first two years, students take fundamental courses in math, sciences, and computing, as well as introductory engineering courses. Many courses in the first two years are common to many engineering programs offered at the University of Ontario Institute of Technology. In the last two years of study, students focus on their area of specialization either in traditional mechanical engineering or mechanical engineering with an option in energy or mechatronics engineering.

11.3.2 Work placement/internship opportunities

The University's proximity to a large number of diverse mechanical, manufacturing, and automotive engineering companies provides many opportunities for work placements. In addition, a 12 to 16 month optional engineering internship program is available for students completing third year.

11.3.3 Careers

Graduates of the mechanical engineering program will have the expertise to work and manage the work of others in areas of research, development, design, maintenance, and operations. These opportunities arise in a variety of industries and services including automotive, heavy and precision machinery, heating, ventilation and air conditioning, machines and mechanisms, transportation, dynamics and vibrations, prime movers, robotics and automation, information/telecommunications, and energy and environment. Careers are available in private enterprise as well as government and non-government organizations. Graduates may also choose to pursue further studies for higher degrees or start their own businesses.

11.3.4 Professional designation

The Mechanical Engineering 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 (PEng) in Ontario and in any province or territory in Canada.

11.3.5 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U) with a minimum grade of 60 per cent, physics (SPH4U), chemistry (SCH4U), calculus (MCB4U) and algebra and geometry (MAG4U). In addition, a combined minimum 70 per cent average in math and science courses is required.

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

11.3.6 Degree requirements - Mechanical Engineering

To be eligible for the BEng (Hons) degree in Mechanical Engineering, students must successfully complete 126 credit hours, including all courses outlined below. For elective options see the list below. For course descriptions see section 16.

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

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

YEAR 1

SEMESTER 1 (15 credit hours)
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2020U Statics and Dynamics
ENGR 2220U Structure and Properties of Materials
ENGR 2310U Concurrent Engineering and Design
ENGR 2320U Thermodynamics
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (15 credit hours)
ENGR 2420U Solid Mechanics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

SEMESTER 1 (15 credit hours)
ENGR 3030U Computer-Aided Design
ENGR 3190U Manufacturing and Production Processes
ENGR 3270U Kinematics and Dynamics of Machines
ENGR 3350U Control Systems
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
ENGR 3210U Mechanical Vibrations
ENGR 3220U Machine Design
ENGR 3390U Mechatronics
ENGR 3930U Heat Transfer

YEAR 4

SEMESTER 1 (15 credit hours)
ENGR 4210U Advanced Solid Mechanics and Stress Analysis
ENGR 4220U Mechanical Systems Design
ENGR 4280U Robotics and Automation
Engineering Elective*
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
ENGR 4240U Applied Thermal and Fluids Engineering
ENGR 4250U Advanced Materials Engineering
ENGR 4999U Design Thesis
JSTS 4210U Ethics and Law for Professionals
Liberal Studies Elective (Advanced)*

*ELECTIVES

Engineering Electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other streams in the Mechanical Engineering program and from other engineering programs may be allowed as engineering electives provided students have the necessary prerequisites.

The following are approved courses as engineering electives:
ENGR 4160U Artificial Intelligence in Engineering
ENGR 4260U Automotive Engineering
ENGR 4380U Life Cycle Engineering
ENGR 4540U Energy Efficiency, Management and Simulation

Liberal Studies Electives
See section 11.5.

11.3.7 Degree Requirements - Mechanical Engineering: Energy Engineering option

To be eligible for the BEng (Hons) degree in Mechanical Engineering, Energy Engineering option, students must successfully complete 126 credit hours, including all courses outlined below. For elective options see the list below. For course descriptions see section 16.

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

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

YEAR 1

SEMESTER 1 (15 credit hours)
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2020U Statics and Dynamics
ENGR 2220U Structure and Properties of Materials
ENGR 2310U Concurrent Engineering and Design
ENGR 2320U Thermodynamics
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (15 credit hours)
ENGR 2420U Solid Mechanics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

SEMESTER 1 (15 credit hours)
ENGR 3030U Computer-Aided Design
ENGR 3260U Introduction to Energy Systems
ENGR 3350U Control Systems
ENGR 3930U Heat Transfer
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
ENGR 3410U Electromechanical Energy Conversion
ENGR 3420U Energy and Environmental Impact
ENGR 3450U Combustion and Engines
ENGR 4240U Applied Thermal and Fluids Engineering

YEAR 4

SEMESTER 1 (15 credit hours)
ENGR 4230U Thermofluids and Energy Systems Design
ENGR 4410U Fossil Fuel Energy Conversion
ENGR 4430U Sustainable and Alternative Energy Technologies
Engineering Elective*
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
ENGR 4440U Advanced Power Generation
ENGR 4450U Thermal Environmental Engineering
ENGR 4999U Design Thesis
JSTS 4210U Ethics and Law for Professionals
Liberal Studies Elective (Advanced)*

***ELECTIVES**

Engineering Electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other streams in the Mechanical Engineering program and from other engineering programs may be allowed as engineering electives provided students have the necessary prerequisites.

The following are approved courses as engineering electives:
ENGR 4160U Artificial Intelligence in Engineering
ENGR 4260U Automotive Engineering
ENGR 4380U Life Cycle Engineering
ENGR 4540U Energy Efficiency, Management and Simulation

Liberal Studies Electives
See section 11.5.

11.3.8 Degree Requirements - Mechanical Engineering: Mechatronics Engineering option
To be eligible for the BEng (Hons) degree in Mechanical Engineering, Mechatronics Engineering option, students must successfully complete 126 credit hours, including all courses outlined below. For elective options see the list below. For course descriptions see section 16.

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

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year four.

YEAR 1

SEMESTER 1 (15 credit hours)
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2020U Statics and Dynamics
ENGR 2220U Structure and Properties of Materials
ENGR 2310U Concurrent Engineering and Design
ENGR 2640U Thermodynamics and Heat Transfer
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (15 credit hours)
ENGR 2420U Solid Mechanics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

SEMESTER 1 (15 credit hours)
ENGR 3030U Computer-Aided Design
ENGR 3190U Manufacturing and Production Processes
ENGR 3270U Kinematics and Dynamics of Machines
ENGR 3350U Control Systems
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
ENGR 3320U Fluid Power Systems
ENGR 3330U Circuit Design
ENGR 3390U Mechatronics
Liberal Studies Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
ENGR 4280U Robotics and Automation
ENGR 4310U Electronics
ENGR 4320U Advanced Mechatronics
ENGR 4330U Mechatronic Systems Design
Engineering Elective*

SEMESTER 2 (15 credit hours)
ENGR 3410U Electromechanical Energy Conversion
ENGR 4350U Microprocessors
ENGR 4999U Design Thesis
JSTS 4210U Ethics and Law for Professionals
Liberal Studies Elective (Advanced)*

*ELECTIVES

Engineering Electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other streams in the Mechanical Engineering program and from other engineering programs may be allowed as engineering electives provided students have the necessary prerequisites.

The following are approved courses as engineering electives:
ENGR 4160U Artificial Intelligence in Engineering
ENGR 4260U Automotive Engineering
ENGR 4380U Life Cycle Engineering
ENGR 4540U Energy Efficiency, Management and Simulation

Liberal Studies Electives
See section 11.5.

11.4 Program information - Engineering and Management programs

Bachelor of Engineering and Management (Honours) in Manufacturing Engineering and Management - BEng & Mgt (Hons)

Bachelor of Engineering and Management (Honours) in Mechanical Engineering and Management - BEng & Mgt (Hons):

- **Comprehensive Mechanical Engineering program**
- **Energy Engineering option**
- **Mechatronics Engineering option**

11.4.1 General information

The engineering and management combination programs meet the rapidly increasing need for engineers with the leadership skills to succeed in business and management. The University of Ontario Institute of Technology offers several engineering and management programs in manufacturing engineering, mechanical engineering, and mechanical engineering with a specialization in mechatronics or energy engineering. Students study the complete engineering program, and also gain critical management skills in key areas of business operations management including accounting, finance, operations, human resources and marketing.

Students in these programs take two semesters of business and management courses for 30 credit hours after successfully completing third year. The regular fourth year of the engineering program is then taken in year five of the program. The two semesters of business and management courses may be taken at other years in the program with permission.

11.4.2 Work placement/internship opportunities

The University's proximity to a large number of diverse mechanical, manufacturing, and automotive engineering companies provides many opportunities for work placements. In addition, a 12 to 16 month optional engineering internship program is available for students completing third year.

11.4.3 Careers

Graduates of the engineering and management programs will be in high demand among employers in Ontario and beyond, working in areas of research, development, design, maintenance and operations in a variety of industries and services including transportation (especially automotive and aerospace), heavy and precision machinery, robotics, information/telecommunications, electronics, computer, energy, chemical, construction and other sectors. Graduates may also choose to pursue further studies toward higher degrees.

With additional expertise in business and management, graduates of these programs will have a broader understanding of the business and management aspects of companies, allowing them to readily take on managerial roles or start their own businesses.

11.4.4 Professional designation

The engineering and management programs are designed to meet the requirements of the Canadian Engineering Accreditation Board. Each graduate is eligible to apply for licensing as a professional engineer (PEng) in Ontario and in any province or territory in Canada.

11.4.5 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U) with a minimum grade of 60 per cent, physics (SPH4U), chemistry (SCH4U), calculus (MCB4U) and algebra and geometry (MAG4U). In addition, a combined minimum 70 per cent average in math and science courses is required.

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

11.4.6 Degree requirements - Manufacturing Engineering and Management

To be eligible for the BEng & Mgt (Hons) degree in Manufacturing Engineering and Management students must successfully complete 156 credit hours, including all courses outlined below. For elective options see the list below. For course descriptions see section 16.

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

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year five.

YEAR 1

SEMESTER 1 (15 credit hours)
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2020U Statics and Dynamics
ENGR 2220U Structure and Properties of Materials
ENGR 2310U Concurrent Engineering and Design
ENGR 2640U Thermodynamics and Heat Transfer
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (15 credit hours)
ENGR 2420U Solid Mechanics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

SEMESTER 1 (15 credit hours)
ENGR 3030U Computer-Aided Design
ENGR 3190U Manufacturing and Production Processes
ENGR 3270U Kinematics and Dynamics of Machines
ENGR 3350U Control Systems
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
ENGR 3300U Integrated Manufacturing Systems I
ENGR 3390U Mechatronics
ENGR 3460U Industrial Ergonomics
ENGR 4045U Quality Control

YEAR 4

SEMESTER 1 (15 credit hours)
BUSI 1101U Financial Accounting
BUSI 2401U Finance I
BUSI 2201U Marketing I
BUSI 2311U Organizational Behaviour and Management of Human Resources I
ENGR 2340U Engineering Operations and Project Management I**

SEMESTER 2 (15 credit hours)
BUSI 2170U Managerial Accounting
BUSI 2202U Marketing II
BUSI 2312U Organizational Behaviour and Management of Human Resources II
BUSI 2402U Finance II
ENGR 2350U Engineering Operations and Project Management II**

YEAR 5

SEMESTER 1 (15 credit hours)
ENGR 3395U Manufacturing Systems Design
ENGR 4280U Robotics and Automation
ENGR 4390U Modelling Manufacturing Systems
Engineering Elective*
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
ENGR 4015U Reliability and Maintenance
ENGR 4300U Integrated Manufacturing Systems II
ENGR 4999U Design Thesis
JSTS 4210U Ethics and Law for Professionals
Liberal Studies Elective (Advanced)*

***ELECTIVES**

Engineering Electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other engineering programs may be allowed as engineering electives provided students have the necessary prerequisites.

The following are approved courses as engineering electives:
ENGR 4160U Artificial Intelligence in Engineering
ENGR 4260U Automotive Engineering
ENGR 4380U Life Cycle Engineering
ENGR 4540U Energy Efficiency, Management and Simulation

Liberal Studies Electives
See section 11.5.

** In 2004-05, the courses ENGR 2340U Engineering Operations and Project Management I and ENGR 2350U Engineering Operations and Project Management II may be replaced by BUSI 2603U and BUSI 2604U, respectively.

11.4.7 Degree Requirements - Mechanical Engineering and Management

To be eligible for the BEng & Mgt (Hons) degree in Mechanical Engineering and Management students must successfully complete 156 credit hours, including all courses outlined below. For elective options see the list below. For course descriptions see section 16.

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

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year five.

YEAR 1

SEMESTER 1 (15 credit hours)
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2020U Statics and Dynamics
ENGR 2220U Structure and Properties of Materials
ENGR 2310U Concurrent Engineering and Design
ENGR 2320U Thermodynamics
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (15 credit hours)
ENGR 2420U Solid Mechanics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

SEMESTER 1 (15 credit hours)
ENGR 3030U Computer-Aided Design
ENGR 3190U Manufacturing and Production Processes
ENGR 3270U Kinematics and Dynamics of Machines
ENGR 3350U Control Systems
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
ENGR 3210U Mechanical Vibrations
ENGR 3220U Machine Design
ENGR 3390U Mechatronics
ENGR 3930U Heat Transfer

YEAR 4

SEMESTER 1 (15 credit hours)
BUSI 1101U Financial Accounting
BUSI 2201U Marketing I
BUSI 2311U Organizational Behaviour and Management of Human Resources I
BUSI 2401U Finance I
ENGR 2340U Engineering Operations and Project Management I**

SEMESTER 2 (15 credit hours)
BUSI 2170U Managerial Accounting
BUSI 2202U Marketing II
BUSI 2312U Organizational Behaviour and Management of Human Resources II
BUSI 2402U Finance II
ENGR 2350U Engineering Operations and Project Management II**

YEAR 5

SEMESTER 1 (15 credit hours)
ENGR 4210U Advanced Solid Mechanics and Stress Analysis
ENGR 4220U Mechanical Systems Design
ENGR 4280U Robotics and Automation
Engineering Elective*
Liberal Studies Elective*

SEMESTER 2 (15 CREDIT HOURS)
ENGR 4240U Applied Thermal and Fluids Engineering
ENGR 4250U Advanced Materials Engineering
ENGR 4999U Design Thesis
JSTS 4210U Ethics and Law for Professionals
Liberal Studies Elective (Advanced)*

***ELECTIVES**

Engineering Electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other streams in the Mechanical Engineering program and from other engineering programs may be allowed as engineering electives provided students have the necessary prerequisites.

The following are approved courses as engineering electives:
ENGR 4160U Artificial Intelligence in Engineering
ENGR 4260U Automotive Engineering
ENGR 4380U Life Cycle Engineering
ENGR 4540U Energy Efficiency, Management and Simulation

Liberal Studies Electives
See section 11.5.

** In 2004-05, the courses ENGR 2340U Engineering Operations and Project Management I and ENGR 2350U Engineering Operations and Project Management II may be replaced by BUSI 2603U and BUSI 2604U, respectively.

11.4.8 Degree Requirements - Mechanical Engineering and Management: Energy Engineering option

To be eligible for the BEng & Mgt (Hons) degree in Mechanical Engineering and Management (Energy Engineering Option), students must successfully complete 156 credit hours, including all courses outlined below. For elective options see the list below. For course descriptions see section 16.

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

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year five.

YEAR 1

SEMESTER 1 (15 credit hours)
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
ENVS 1000U Environmental Science
PHY 1020U Physics II
MATH 1020U Calculus II

YEAR 2

SEMESTER 1 (19 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2020U Statics and Dynamics
ENGR 2220U Structure and Properties of Materials
ENGR 2310U Concurrent Engineering and Design
ENGR 2320U Thermodynamics
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (15 credit hours)
ENGR 2420U Solid Mechanics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

SEMESTER 1 (15 credit hours)
ENGR 3030U Computer-Aided Design
ENGR 3260U Introduction to Energy Systems
ENGR 3350U Control Systems
ENGR 3930U Heat Transfer
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
ENGR 3410U Electromechanical Energy Conversion
ENGR 3420U Energy and Environmental Impact
ENGR 3450U Combustion and Engines
ENGR 4240U Applied Thermal and Fluids Engineering

YEAR 4

SEMESTER 1 (15 credit hours)
BUSI 1101U Financial Accounting
BUSI 2201U Marketing I
BUSI 2311U Organizational Behaviour and Management of Human Resources I
BUSI 2401U Finance I
ENGR 2340U Engineering Operations and Project Management I**

SEMESTER 2 (15 credit hours)
BUSI 2170U Managerial Accounting
BUSI 2202U Marketing II
BUSI 2312U Organizational Behaviour and Management of Human Resources II
BUSI 2402U Finance II
ENGR 2350U Engineering Operations and Project Management II**

YEAR 5

SEMESTER 1 (15 credit hours)
ENGR 4230U Thermofluids and Energy Systems Design
ENGR 4410U Fossil Fuel Energy Conversion
ENGR 4430U Sustainable and Alternative Energy Technologies
Engineering Elective*
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
ENGR 4440U Advanced Power Generation
ENGR 4450U Thermal Environmental Engineering
ENGR 4999U Design Thesis
JSTS 4210U Ethics and Law for Professionals
Liberal Studies Elective (Advanced)*

***ELECTIVES**

Engineering Electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other streams in the Mechanical Engineering program and from other engineering programs may be allowed as engineering electives provided students have the necessary prerequisites.

The following are approved courses as engineering electives:
ENGR 4160U Artificial Intelligence in Engineering
ENGR 4260U Automotive Engineering
ENGR 4380U Life Cycle Engineering
ENGR 4540U Energy Efficiency, Management and Simulation

Liberal Studies Electives
See section 11.5.

** In 2004-05, the courses ENGR 2340U Engineering Operations and Project Management I and ENGR 2350U Engineering Operations and Project Management II may be replaced by BUSI 2603U and BUSI 2604U, respectively.

11.4.9 Degree Requirements - Mechanical Engineering and Management: Mechatronics Engineering option

To be eligible for the BEng & Mgt (Hons) degree in Mechanical Engineering and Management (Mechatronics Engineering option) students must successfully complete 156 credit hours, including all courses outlined below. For elective options see the list below. For course descriptions see section 16.

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

All courses in years one and two, except EDUC 1470U and BUSI 2000U, are prerequisites to all non-elective courses in year five.

YEAR 1

SEMESTER 1 (15 credit hours)
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2020U Statics and Dynamics
ENGR 2220U Structure and Properties of Materials
ENGR 2310U Concurrent Engineering and Design
ENGR 2640U Thermodynamics and Heat Transfer
MATH 2860U Differential Equations for Engineers

Semester 2 (15 credit hours)
ENGR 2420U Solid Mechanics
ENGR 2790U Electric Circuits
ENGR 2860U Fluid Mechanics
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

Semester 1 (15 credit hours)
ENGR 3030U Computer-Aided Design
ENGR 3190U Manufacturing and Production Processes
ENGR 3270U Kinematics and Dynamics of Machines
ENGR 3350U Control Systems
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
ENGR 3320U Fluid Power Systems
ENGR 3330U Circuit Design
ENGR 3390U Mechatronics
Liberal Studies Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
BUSI 1101U Financial Accounting
BUSI 2201U Marketing I
BUSI 2311U Organizational Behaviour and Management of Human Resources I
BUSI 2401U Finance I
ENGR 2340U Engineering Operations and Project Management I**

SEMESTER 2 (15 credit hours)
BUSI 2170U Managerial Accounting
BUSI 2202U Marketing II
BUSI 2312U Organizational Behaviour and Management of Human Resources II
BUSI 2402U Finance II
ENGR 2350U Engineering Operations and Project Management II**

YEAR 5

SEMESTER 1 (15 credit hours)
ENGR 4280U Robotics and Automation
ENGR 4310U Electronics
ENGR 4320U Advanced Mechatronics
ENGR 4330U Mechatronics Systems Design
Engineering Elective*

SEMESTER 2 (15 credit hours)
ENGR 3410U Electromechanical Energy Conversion
ENGR 4350U Microprocessors
ENGR 4999U Design Thesis
JSTS 4210U Ethics and Law for Professionals
Liberal Studies Elective (Advanced)*

***ELECTIVES**

Engineering Electives

Courses selected for the engineering elective must be approved by the Faculty of Engineering and Applied Science. Engineering courses from other streams in the Mechanical Engineering program and from other engineering programs may be allowed as engineering electives provided students have the necessary prerequisites.

The following are approved courses as engineering electives:
ENGR 4160U Artificial Intelligence in Engineering
ENGR 4260U Automotive Engineering
ENGR 4380U Life Cycle Engineering
ENGR 4540U Energy Efficiency, Management and Simulation

Liberal Studies Electives
See section 11.5.

** In 2004-05, the courses ENGR 2340U Engineering Operations and Project Management I and ENGR 2350U Engineering Operations and Project Management II may be replaced by BUSI 2603U and BUSI 2604U, respectively.

11.5 Liberal Studies Electives

Courses selected for the liberal studies elective must be approved by the Faculty of Engineering and Applied Science.

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 2190U Issues in Diversity
JSTS 2550U Psychological Explanations of Criminal Behaviour
JSTS 2710U Sociological Theories of Crime
PSYC 2010U Developmental Phychology
Other liberal studies electives will be identified in the future.

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 Energy Systems and Nuclear Science

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

Associate Professor:
Edward Joseph Waller, BSc, MScE, PhD, PEng

12.1 Degrees offered

Bachelor of Applied Science (Honours) in Nuclear Power - BASc (Hons) [Pending final approval]

Bachelor of Engineering (Honours) in Energy Systems Engineering - BEng (Hons) [Pending final approval]

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

Bachelor of Science (Honours) in Radiation Science - BSc (Hons)

Bachelor of Science in Radiation Science: Health Physics (Honours) - BSc (Hons) [Pending final approval]

Bachelor of Science in Radiation Science and Management (Honours) - BSc & Mgt (Hons)

Bachelor of Science in Radiation Science and Management: Health Physics (Honours) - BSc & Mgt (Hons)

The programs offered in the School of Energy Systems and Nuclear Science have been created in consultation with key industry representatives in the fields of energy and radiation, to meet the many challenges and growing employment demand in these fields. Many of the programs in this school are unique in Canada.

Applications that involve energy systems in general and nuclear power plants in particular, benefit many aspects of our lives and we depend on qualified people to design and develop new techniques, operate and maintain existing equipment, and ensure that the benefits of energy technologies are applied as widely as possible. Students will benefit from the University's mobile learning environment (section 1.2) which provides technically enhanced learning and teaching, including computer simulation of nuclear power plants.

The faculty's research includes nuclear reactor design, solar, wind, biomass and nuclear power plant design and simulation, the life-cycle analysis of alternative energy systems, radiation biophysics and dosimetry, environmental effects of radiation, production and utilization of radioisotopes, and material analysis with radiation techniques.

12.2 Program information - Bachelor of Applied Science (Honours) in Nuclear Power - BASc (Hons)

12.2.1 General information

The University of Ontario Institute of Technology designed the Bachelor of Applied Science (Honours) in Nuclear Power to meet a significant demand in nuclear power industries for graduates with strong practical experience, technical knowledge and management skills. Industry practitioners may receive up to two years' credit for education and training courses completed as part of their employment or earlier studies.

The curriculum has been designed to provide an understanding of the principles and applications of nuclear power technology, the ability to think independently, to take a systematic approach to problem solving, and to develop skills in teamwork and collaboration.

Students will learn and gain experience via a flexible combination of lectures, laboratory experiments, field trips, computer simulations, independent research and design tasks, individual and group projects, and by documenting and presenting their findings to both peers and academic staff.

Graduates will be highly skilled professionals who help to create wealth for the communities they serve and who have the expertise to work and manage the work of others in one or more specialist areas of nuclear power plant and related industries.

12.2.2 Careers

Graduates will find employment and progress to positions of increasing responsibility in a range of technology-based companies and institutions, with a particular emphasis in nuclear power related specialties.

12.2.3 Admission Requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U), physics (SPH4U), chemistry (SCH4U), calculus (MCB4U) and algebra and geometry (MAG4U). In addition, a combined minimum 70 per cent average in math and science courses is required, with no grade below 60 per cent.

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

12.2.4 Degree requirements

YEAR 1

SEMESTER 1 (15 credit hours)
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (15 credit hours)
CHEM 1800U Chemistry for Engineers
ENGR 1200U Introduction to Programming
ENGR 2220U Structure and Properties of Materials
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

Semester 1 (15 credit hours)
EDUC 1200U History of Science and Technology
ENGR 2500U Introduction to Nuclear Physics
ENGR 2640U Thermodynamics and Heat Transfer
ENGR 2790U Electric Circuits
MATH 2860U Differential Equations for Engineers
Liberal Studies Elective*

SEMESTER 2 (15 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2330U Mechanical Equipment and Systems
ENGR 2360U Electric Power Systems
ENGR 2860U Fluid Mechanics
ENGR 2950U Radiation Protection

YEAR 3

SEMESTER 1 (15 credit hours)
BUSI 3700U Strategic Management for Professionals
ENGR 3540U Nuclear Steam Supply Systems
ENGR 3820U Nuclear Reactor Kinetics
ENGR 4730U Reactor Instrumentation and Control
Technical Elective*

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
ENGR 3550U Nuclear Plant Steam Utilization Systems
ENGR 3560U Radioactive Waste Management
ENVS 1000U Environmental Science
Technical Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
BUSI 2603U Introduction to Operations Management
ENGR 4360U Nuclear Plant Electric and Auxiliary Systems
ENGR 4550U Thesis Project I
ENGR 4640U Nuclear Plant Operation
Technical Elective*

SEMESTER 2 (15 credit hours)
BUSI 2604U Introduction to Project Management and Supply Chain Management
ENGR 3530U Safety and Quality Management
ENGR 4370U Nuclear Plant Safety
ENGR 4560U Thesis Project II
ENGR 4810U Nuclear Fuel Cycle

12.3 Program information - Bachelor of Engineering (Honours) in Energy Systems Engineering - BEng (Hons)

12.3.1 General information

Students in the Honours Bachelor of Engineering in Energy Systems Engineering will learn the skills to design and develop tomorrow's energy systems. This degree program is the first stand-alone program of its kind in Canada. The program was developed to meet the rapidly increasing demand for graduates with the knowledge and skills required to help Canada and the rest of the world to meet the terms of the Kyoto agreement, while ensuring that the growing consumption of energy can be satisfied economically and with minimum impact on the environment.

The curriculum was designed to provide an understanding of the principles and applications of the full range of energy systems and technologies from traditional fossil-fuelled energy systems to alternative energy technologies. This includes the production, storage, distribution and utilization of energy.

12.3.2 Careers

Graduates will be well prepared to work with systems that involve the generation, transmission or utilization of energy. Career opportunities are increasing for graduates in industry, government and non-government organizations. Graduates may also choose to start their own energy enterprise or pursue graduates studies.

12.3.3 Professional designation

This program was developed to meet the requirements of the Canadian Engineering Accreditation Board. Graduates will be eligible to apply for licensure as a professional engineer in any Canadian province or territory.

12.3.4 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U), physics (SPH4U), chemistry (SCH4U), calculus (MCB4U) and algebra and geometry (MAG4U). In addition, a combined minimum 70 per cent average in math and science courses is required, with no grade below 60 per cent.

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

12.3.5 Degree requirements

YEAR 1

SEMESTER 1 (18 credit hours)
CHEM 1010U Chemistry I
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
CHEM 1020U Chemistry II
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (18 credit hours)
EDUC 1200U History of Science and Technology
ENGR 2140U Problem Solving, Modelling and Simulation
ENGR 2220U Structure and Properties of Materials
ENGR 2860U Fluid Mechanics
MATH 2860U Differential Equations for Engineers
Liberal Studies Elective*

SEMESTER 2 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2010U Thermodynamic Cycles
ENGR 2330U Mechanical Equipment and Systems
ENGR 2790U Electric Circuits
MATH 2070U Numerical Methods
MATH 2810U Advanced Engineering Mathematics OR
STAT 2800U Statistics and Probability for Engineers

YEAR 3

SEMESTER 1 (18 credit hours)
ENGR 3030U Computer Aided Design
ENGR 3260U Introduction to Energy Systems
ENGR 3350U Control Systems
ENGR 3380U Strength of Materials
ENGR 3530U Safety and Quality Management
ENGR 3930U Heat Transfer

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
ENGR 2360U Electric Power Systems
ENGR 3730U Solar Energy Technologies
ENGR 3830U Wind Energy Systems
ENGR 3840U Fuel Cell Design

YEAR 4

SEMESTER 1 (18 credit hours)
BUSI 3700U Strategic Management for Professionals
ENGR 4470U Hydrogen Power Systems
ENGR 4410U Fossil Fuel Energy Conversion
ENGR 4660U Risk Analysis Methods
ENGR 4994U Thesis Design Project I

SEMESTER 2 (18 credit hours)
ENGR 4460U Nuclear Power Systems
ENGR 4480U Emerging Energy Systems
ENGR 4530U Hydroelectric Power
ENGR 4998U Thesis Design Project II
JSTS 4210U Ethics and Law for Professionals

12.4 Program information - Bachelor of Engineering (Honours) in Nuclear Engineering

12.4.1 General information

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 first two years of study 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.

12.4.2 Work placement/internship opportunities

The University's proximity to a large number of diverse manufacturing companies provides many opportunities for work placements. In addition, a 12 to 16 month optional internship program is available for students completing third year of the program.

12.4.3 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.

12.4.4 Professional designation

This program meets the requirements of the Canadian Engineering Accreditation Board. Each graduate is eligible to apply for licensing as a professional engineer in Ontario.

12.4.5 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U), physics (SPH4U), chemistry (SCH4U), calculus (MCB4U) and algebra and geometry (MAG4U). In addition, a combined minimum 70 per cent average in math and science courses is required, with no grade below 60 per cent.

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

12.4.6 Degree requirements

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 1 (18 credit hours)
EDUC 1200U History of Science and Technology
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
BIOL 1840U Biology for Engineers OR ENVS 1000U Environmental Science
CHEM 1800U Chemistry for Engineers
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (18 credit hours)
ENGR 2140U Problem Solving, Modelling and Simulation
ENGR 2220U Structure and Properties of Materials
ENGR 2500U Introduction to Nuclear Physics
ENGR 2860U Fluid Mechanics
MATH 2860U Differential Equations for Engineers
Liberal Studies Elective*

SEMESTER 2 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENGR 2010U Thermodynamic Cycles
ENGR 2950U Radiation Protection
MATH 2070U Numerical Methods
MATH 2810U Advanced Engineering Mathematics OR
STAT 2800U Statistics and Probability for Engineers
Liberal Studies Elective*

YEAR 3

SEMESTER 1 (18 credit hours)
ENGR 3030U Computer Aided Design
ENGR 3380U Strength of Materials
ENGR 3530U Safety and Quality Management
ENGR 3570U Environmental Effects of Radiation
ENGR 3740U Digital Electronics
ENGR 3930U Heat Transfer

SEMESTER 2 (18 credit hours)
BUSI 2050U Economics for Professionals
ENGR 3610U Corrosion for Engineers
ENGR 3640U Radioactive Waste Management Design
ENGR 3780U Nuclear Reactor Design
ENGR 3820U Nuclear Reactor Kinetics
Engineering Design Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
ENGR 3570U Environmental Effects of Radiation
ENGR 4660U Risk Analysis Methods
RADI 4430U Production and Utilization of Radioactive Isotopes
RADI 4995U Thesis Project I
Senior Science OR Engineering Elective

SEMESTER 2 (15 credit hours)
RADI 4040U Material Analysis using Nuclear Techniques
RADI 4320U Applications of Radiation Techniques in Medicine
RADI 4999U Thesis Project II
Senior Science OR Engineering Elective
Liberal Studies Elective*

***ELECTIVES**

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

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

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

12.5 Program information - Bachelor of Science (Honours) in Radiation Science

12.5.1 General information

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.

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 a thesis project.

Students in the Bachelor of Science (Honours) in Radiation Science have the opportunity to take the Health Physics option. Health physics is a well-recognized branch of radiation science with a wide range of applications in many industries, such as nuclear power, non-destructive examinations, health care, agriculture, research, education, environmental protection, and the enforcement of government regulations. Graduates from this program will be positioned to meet a significant workforce demand.

Learning takes place in a variety of settings including lectures, tutorials, field visits, and laboratory. These programs includes mandatory liberal arts electives and business courses designed to develop students' interpersonal, problem-solving, and holistic thinking skills.

12.5.2 Work placement/internship opportunities

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.

12.5.3 Careers

There is a growing global demand for radiation science specialists. Graduates have many career opportunities, particularly in the healthcare 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.

12.5.4 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U), physics (SPH4U), chemistry (SCH4U), calculus (MCB4U) and algebra and geometry (MAG4U). In addition, a combined minimum 70 per cent average in math and science courses is required, with no grade below 60 per cent.

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

12.5.5 Degree requirements - BSc (Hons) in Radiation Science

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 1

SEMESTER 1 (18 credit hours)
CHEM 1010U Chemistry I
EDUC 1050U Technical Communications
EDUC 1200U History of Science and Technology
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
BIOL 1840U Biology for Engineers
CHEM 1020U Chemistry II
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (15 credit hours)
BIOL 2840U Cell and Molecular Biology
CHEM 2020U Introduction to Organic Chemistry
ENGR 2140U Problem Solving, Modelling and Simulation
ENGR 2500U Introduction to Nuclear Physics
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENVS 1000U Environmental Science
ENGR 2950U Radiation Protection
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers
Liberal Studies Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
CHEM 3020U Organic Chemistry
ENGR 2220U Structure and Properties of Materials
ENGR 3530U Safety and Quality Management
ENGR 3740U Digital Electronics
RADI 3690U Radiation Chemistry and Processing

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
RADI 3200U Introduction to Imaging
RADI 3550U Radiation Detection and Measurement
RADI 3610U Introduction to Radiation Machines
Liberal Studies Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
ENGR 3570U Environmental Effects of Radiation
RADI 4995U Thesis Project I
ENGR 4660U Risk Analysis Methods
RADI 4430U Production and Utilization of Radioactive Isotopes
Senior Science OR Engineering Elective

SEMESTER 2 (15 credit hours)
RADI 4040U Material Analysis using Nuclear Techniques
RADI 4320U Applications of Radiation Techniques in Medicine
RADI 4999U Thesis Project II
Senior Science OR Engineering Elective
Liberal Studies Elective*

***Liberal Studies Electives**
Courses selected for the Liberal Studies Elective must be approved by the Dean of the faculty or his/her designate.

12.5.6 Degree Requirements - BSc (Hons) in Radiation Science: Health Physics option
To be eligible for the BSc (Hons) degree in Radiation Science, Health Physics option, students must successfully complete 129 credit hours, including all courses outlined below. For course descriptions, see section 16.

YEAR 1

SEMESTER 1 (18 credit hours)
CHEM 1010U Chemistry I
EDUC 1050U Technical Communications
EDUC 1200U History of Science and Technology
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
BIOL 1840U Biology for Engineers
CHEM 1020U Chemistry II
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (15 credit hours)
BIOL 2840U Cell and Molecular Biology
CHEM 2020U Introduction to Organic Chemistry
ENGR 2140U Problem Solving, Modelling and Simulation
ENGR 2500U Introduction to Nuclear Physics
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENVS 1000U Environmental Science
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers
RADI 2100U Radiological and Health Physics
RADI 2110U Health Physics Laboratory

YEAR 3

SEMESTER 1 (15 credit hours)
ENGR 2220U Structure and Properties of Materials OR HLSC 1200U Anatomy and Physiology I
ENGR 3530U Safety and Quality Management
ENGR 3860U Introduction to Nuclear Technology
RADI 3220U Radiation Biophysics and Dosimetry
RADI 3230U Scientific Instrumentation

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
RADI 3200U Introduction to Imaging
RADI 3550U Radiation Detection and Measurement
RADI 3610U Introduction to Radiation Machines
Liberal Studies Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
ENGR 3570U Environmental Effects of Radiation
ENGR 4660U Risk Analysis Methods
RADI 4430U Production and Utilization of Radioactive Isotopes
RADI 4995U Thesis Project I
Senior Science OR Engineering Elective

SEMESTER 2 (15 credit hours)
RADI 4040U Material Analysis using Nuclear Techniques OR
RADI 3690U Radiation Chemistry and Processing
RADI 4320U Applications of Radiation Techniques in Medicine
RADI 4999U Thesis Project II
Senior Science OR Engineering Elective
Liberal Studies Elective*

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

12.6 Program information - Radiation Science and Management Programs

12.6.1 General information
The radiation science and management combination programs meet the rapidly increasing need for radiation scientists with the leadership skills to succeed in business and management. Students study the radiation science program, as well as gain critical management skills in key areas of business including accounting, finance, operations, human resources and marketing.

12.6.2 Careers
There is a growing global demand for radiation science specialists with business training. Graduates have many career opportunities, particularly in the healthcare 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.

12.6.3 Admission requirements
Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U), physics (SPH4U), chemistry (SCH4U), calculus (MCB4U) and algebra and geometry (MAG4U). In addition, a combined minimum 70 per cent average in math and science courses is required, with no grade below 60 per cent.

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

12.6.4 Degree Requirements - Radiation Science and Management
To be eligible for the BSc & Mgt (Hons) degree in Radiation Science and Management, students must successfully complete 159 credit hours, including all courses outlined below. For course descriptions, see section 16.

YEAR 1

SEMESTER 1 (18 credit hours)
CHEM 1010U Chemistry I
EDUC 1050U Technical Communications
EDUC 1200U History of Science and Technology
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
BIOL 1840U Biology for Engineers
CHEM 1020U Chemistry II
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (15 credit hours)
BIOL 2840U Cell and Molecular Biology
CHEM 2020U Introduction to Organic Chemistry
ENGR 2140U Problem Solving, Modelling and Simulation
ENGR 2500U Introduction to Nuclear Physics
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENVS 1000U Environmental Science
ENGR 2950U Radiation Protection
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers
Liberal Studies Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
CHEM 3020U Organic Chemistry
ENGR 2220U Structure and Properties of Materials
ENGR 3530U Safety and Quality Management
ENGR 3740U Digital Electronics
RADI 3690U Radiation Chemistry and Processing

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
RADI 3200U Introduction to Imaging
RADI 3550U Radiation Detection and Measurement
RADI 3610U Introduction to Radiation Machines
Liberal Studies Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
ENGR 3570U Environmental Effects of Radiation
RADI 4995U Thesis Project I
ENGR 4660U Risk Analysis Methods
RADI 4430U Production and Utilization of Radioactive Isotopes
Senior Science OR Engineering Elective

SEMESTER 2 (18 credit hours)
RADI 4040U Material Analysis using Nuclear Techniques
RADI 4320U Applications of Radiation Techniques in Medicine
RADI 4999U Thesis Project II
Senior Science OR Engineering Elective
Liberal Studies Elective*

YEAR 5

SEMESTER 1 (15 credit hours)
BUSI 1101U Financial Accounting
BUSI 2401U Finance I
BUSI 2201U Marketing I
BUSI 2311U Organizational Behaviour and Management of Human Resources I
ENGR 2340U Engineering Operations and Project Management I**

SEMESTER 2 (15 credit hours)

BUSI 2170U Managerial Accounting
BUSI 2202U Marketing II
BUSI 2312U Organizational Behaviour and Management of Human Resources II
BUSI 2402U Finance II
ENGR 2350U Engineering Operations and Project Management II**

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

12.6.5 Degree Requirements - Radiation Science and Management: Health Physics option
To be eligible for the BSc & Mgt (Hons) degree in Radiation Science and Management, Health Physics option, students must successfully complete 159 credit hours, including all courses outlined below. For course descriptions, see section 16.

YEAR 1

SEMESTER 1 (18 credit hours)
CHEM 1010U Chemistry I
EDUC 1050U Technical Communications
EDUC 1200U History of Science and Technology
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

SEMESTER 2 (18 credit hours)
BIOL 1840U Biology for Engineers
CHEM 1020U Chemistry II
EDUC 1470U Impact of Science and Technology on Society
ENGR 1200U Introduction to Programming
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (15 credit hours)
BIOL 2840U Cell and Molecular Biology
CHEM 2020U Introduction to Organic Chemistry
ENGR 2140U Problem Solving, Modelling and Simulation
ENGR 2500U Introduction to Nuclear Physics
MATH 2860U Differential Equations for Engineers

SEMESTER 2 (18 credit hours)
BUSI 2000U Collaborative Leadership
ENVS 1000U Environmental Science
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers
RADI 2100U Radiological and Health Physics
RADI 2110U Health Physics Laboratory

YEAR 3

SEMESTER 1 (15 credit hours)
ENGR 2220U Structure and Properties of Materials OR HLSC 1200U Anatomy and Physiology I
ENGR 3530U Safety and Quality Management
ENGR 3860U Introduction to Nuclear Technology
RADI 3220U Radiation Biophysics and Dosimetry
RADI 3230U Scientific Instrumentation

SEMESTER 2 (15 credit hours)
BUSI 2050U Economics for Professionals
RADI 3200U Introduction to Imaging
RADI 3550U Radiation Detection and Measurement
RADI 3610U Introduction to Radiation Machines
Liberal Studies Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
ENGR 3570U Environmental Effects of Radiation
ENGR 4660U Risk Analysis Methods
RADI 4430U Production and Utilization of Radioactive Isotopes
RADI 4995U Thesis Project I
Senior Science OR Engineering Elective

SEMESTER 2 (18 CREDIT HOURS)
RADI 4040U Material Analysis using Nuclear Techniques OR
RADI 3690U Radiation Chemistry and Processing
RADI 4320U Applications of Radiation Techniques in Medicine
RADI 4999U Thesis Project II
Senior Science OR Engineering Elective
Liberal Studies Elective

YEAR 5

SEMESTER 1 (15 credit hours)
BUSI 1101U Financial Accounting
BUSI 2401U Finance I
BUSI 2201U Marketing I
BUSI 2311U Organizational Behaviour and Management of Human Resources I
ENGR 2340U Engineering Operations and Project Management I**

SEMESTER 2 (15 CREDIT HOURS)
BUSI 2170U Managerial Accounting
BUSI 2202U Marketing II
BUSI 2312U Organizational Behaviour and Management of Human Resources II
BUSI 2402U Finance II
ENGR 2350U Engineering Operations and Project Management II**

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

** In 2004-05, the courses ENGR 2340U Engineering Operations and Project Management I and ENGR 2350U Engineering Operations and Project Management II may be replaced by BUSI 2603U and BUSI 2604U, respectively.

12.7 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 13: Faculty of Health Sciences

Dean: Carolyn Byrne, MHSc, PhD

Associate Professors:
Manon Lemonde, RN, PhD

Otto Sanchez, MSc, PhD

Assistant Professor:
Eileen Edmonds, RN, MEd

13.1 Degrees offered

Bachelor of Science in Nursing (Honours) - BScN (Hons)
Bachelor of Health Science (Honours) in Medical Laboratory Science - BHSc (Hons)

In the Faculty of Health Sciences, students acquire the foundations for excellence in clinical practice along with the lifelong learning, research, teamwork and leadership skills essential for a successful career in the health field. The degree programs in the Faculty of Health Sciences are designed to prepare graduates for rewarding careers in the 21st-century.

The Faculty of Health Sciences offers a Bachelor of Science in Nursing (BScN) degree in collaboration with Durham College. The concept of caring is central to the faculty'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.

In the Bachelor of Health Science (Honours) in Medical Laboratory Science students learn fundamental skills in biological, physical and health sciences, as well as strong laboratory practice and interpersonal skills.

The faculty provides state-of-the-art technically enhanced laboratories and facilities. Students in the Faculty of Health Sciences will benefit from the University's mobile learning environment (see section 1.2).

The research focus on community health issues is enhanced through partnerships with local hospitals, public health organizations and social service agencies.

13.2 Program information - Bachelor of Science in Nursing (Honours)

13.2.1 General information

The Faculty of Health Sciences, in collaboration with Durham College, offers a Bachelor of Science in Nursing BScN (Hons). The faculty'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.

This fully integrated partnership provides 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. The state-of-the-art nursing labs provide students with practical, hands-on experience in hospital and home-care settings—with the latest technology right at their fingertips.

13.2.2 Practicum

Over fifty employers from the health sector provide practicum experience and supervision.

13.2.3 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.

13.2.4 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.

13.2.5 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U), biology (SBI4U), chemistry (SCH4U), and mathematics (MGA4U, MCB4U, or MDM4U).

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

For graduates of nursing programs at colleges other than Durham please note that year 3 will not be offered until 2005-06.

13.2.6 Degree requirements

To be eligible for the BScN (Hons) degree, students must successfully complete 120 credit hours. Degree and program requirements are subject to change without notice. The program map below is only a guide and is to be used in combination with proper advising. Students wishing to make changes to their program of study should consult their faculty advisor. Students must achieve a minimum grade of 'C' in all nursing courses (identified by the subject code NURS) to be eligible for the degree. For course descriptions, see section 16.

YEAR 1

SEMESTER 1 (15 credit hours)
HLSC 1200U Anatomy and Physiology
NURS 1100U Health and Healing I
NURS 1420U Development of Self as a Nurse I
NURS 1005U Professional Practice I
SOCI 1000U Introductory Sociology

SEMESTER 2 (15 credit hours)
BIOL 1810U Biochemistry for Health Science
HLSC 1201U Anatomy and Physiology II
NURS 1150U Health and Healing II
NURS 1505U Professional Practice II
PSYC 1000U Introductory Psychology

YEAR 2

SEMESTER 1 (15 credit hours)
BIOL 2830U Microbiology for Health Science
HLSC 2460U Pathophysiology I
NURS 2005U Nursing Professional Practice III
NURS 2100U Health and Healing III
NURS 2320U Health Assessment

SEMESTER 2 (15 credit hours)
BIOL 2810U Pharmacology for Health Science
BIOL 2820U Nutrition for Health Science
HLSC 2461U Pathophysiology II
NURS 2150U Health and Healing IV
NURS 2505U Nursing Professional Practice IV

YEAR 3

SEMESTER 1 (15 credit hours)
HLSC 3710U Ethics
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

SEMESTER 2 (15 credit hours)
BUSI 2000U Collaborative Leadership
HLSC 3910U Research
NURS 3150U Health and Healing VI
NURS 3505U Nursing Professional Practice VI
PSYC 2010U Developmental Psychology

YEAR 4

SEMESTER 1 (15 credit hours)
HLSC 4840U Health Policy
NURS 4005U Nursing Professional Practice VII
NURS 4100U Health and Healing VII
NURS 4420U Development of Self as a Nurse III
Level II Sociology elective

SEMESTER 2 (15 credit hours)
NURS 4505U Nursing Professional Practice VIII
Elective*
Elective*

*Note: Electives may be any 3000 or 4000 level elective or prior approval from the faculty.

13.2.7 Progression requirements

For promotion, a student must achieve a minimum grade of "C" in all professional nursing courses (includes all NURS courses) other than those nursing courses graded as pass-fail in order to be eligible to enrol in professional nursing courses in the subsequent semester. Students who earn a grade lower than "C" in these courses will be given a probationary standing (as defined in University's general academic regulations), regardless of their overall GPA. A second consecutive grade less than "C" in a given professional nursing course will result in a suspended status.

Nursing professional practice courses are graded on a pass-fail basis. The first failed grade (FAL) in a nursing practice course will result in a probationary standing.

A second failed grade (FAL) in a nursing practice course (either a repeated or subsequent practice course) will result in a withdrawn standing.

At any point during the academic term, the faculty of Health Sciences reserves the right to terminate a student's experience in a nursing practice setting, when patterns of behaviour place the student, clients or others at risk. This action will result in the student receiving a failed grade (FAL) for the course. In this circumstance, students shall have established rights of appeal; however, they cannot remain in the course while the appeal is underway. The appeal will be conducted promptly in order to protect student's rights.

The Dean can waive the regulations above in exceptional circumstances. In such cases, it shall be the Dean's responsibility to specify the requirements for regaining satisfactory standing on the regular progression ladder and to notify the Registrar in writing of that decision.

13.3 Program information - Bachelor of Health Science (Honours) in Medical Laboratory Science - BHSc (Hons)

13.3.1 General information

The University of Ontario Institute of Technology offers a Bachelor of Health Science (Honours) in Medical Laboratory Science, the first degree of its kind in Ontario. With tremendous advances in medical research in recent years, modern health care has become increasingly dependent on complex laboratory tests to diagnose and treat disease. As a result, the demand for medical laboratory technologists is rapidly increasing in Canada.

Medical laboratory technologists perform general tests in all laboratory areas and analyse results to aid in patient diagnosis. Students learn fundamental skills in biological, physical and health sciences, as well as strong laboratory practice and interpersonal skills.

13.3.2 Practicum

Starting in your first year, students will have the opportunity to apply their knowledge and get hands-on experience. As the theoretical knowledge expands so does experiential knowledge; by fourth year students will be out in a clinical setting for the final two semesters. Students will work under the supervision of a medical laboratory technologist and perform increasingly complex procedures on real biological specimens. Clinical placements give students hands-on practice, experience in different work environments, and the opportunity to network with potential employers.

13.3.3 Careers

The employment outlook for medical technologists is expected to grow more than the average for all occupations through the year 2010, with approximately 50,000 additional jobs opening up in North America during the next decade. Graduates of this program will have the high-demand skills needed to work in a variety of practice settings including hospital and industrial laboratories, clinics, cancer centres, pharmaceutical firms, environmental testing facilities, DNA/RNA analysis laboratories, and more. They may also choose a career in medical research or pursue graduate studies.

13.3.4 Professional qualifications

Following satisfactory completion of the educational program, graduates are eligible to write the examinations offered by the Canadian Society for Medical Laboratory Science (CSMLS) to obtain national certification. CSMLS certification is recognized throughout Canada.

13.3.5 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U) with a minimum grade of 60 per cent, one of calculus (MCB4U) or algebra and geometry (MGA4U), and two of biology (SBI4U), physics (SPH4U), or chemistry (SCH4U). In addition, a combined minimum 70 per cent average in math and science courses is required.

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

13.3.6 Degree requirements

To be eligible for the BHSc (Hons) degree, students must successfully complete 120 credit hours. Degree and program requirements are subject to change without notice. The program map below is only a guide and is to be used in combination with proper advising. Students wishing to make changes to their program of study should consult their faculty advisor. For course descriptions, see section 16.

YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
HLSC 1200U Anatomy & Physiology I
MATH 1880U Mathematical Modelling for Health Science
Elective

SEMESTER 2 (15 CREDIT HOURS)
BIOL 1020U Biology II
BIOL 1810U Biochemistry for Health Science
CHEM 1020U Chemistry II
HLSC 1201U Anatomy and Physiology II
MLSC 1010U Introduction to Medical Laboratory Practice

YEAR 2

SEMESTER 1 (18 credit hours)
BIOL 1820U Microbiology for Health Science
BIOL 2030U Cell Biology
BIOL 3020U Principles of Pharmacology and Toxicology
CHEM 2030U Analytical Chemistry
HLSC 2460U Pathophysiology I
HLSC 2030U Interpersonal Communication

SEMESTER 2 (18 credit hours)
BIOL 2020U Genetics and Molecular Biology
BUSI 2000U Collaborative Leadership
CHEM 3830U Instrumental Analytical Chemistry
HLSC 2461U Pathophysiology II
MLSC 2110 Clinical Biochemistry I
PHY 1810U Physics for Health Sciences

YEAR 3

SEMESTER 1 (15 credit hours)
HLSC 3710U Ethics
MLSC 3110U Clinical Biochemistry II
MLSC 3120U Clinical Hematology
MLSC 3130U Clinical Microbiology
STAT 3800U Statistics for Health Science

SEMESTER 2 (15 credit hours)
MLSC 3210U Laboratory Management and Quality Assurance
MLSC 3220U Hemostasis and Transfusion Science
MLSC 3230U Histology
MLSC 3300U Clinical Practicum I (4 weeks)
MLSC 3910U Clinical Problems and Research Seminar

YEAR 4

SEMESTER 1 (12 credit hours)
MLSC 4300U Clinical Practicum II (13 weeks)
NURS 4840U Health Policy
Elective

SEMESTER 2 (12 credit hours)
MLSC 4301U Clinical Practicum III (13 weeks)
MLSC 4400U Clinical Thesis I
Elective

Section 14: Faculty of Science

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

Associate Dean: John Perz, BASc, MASc, PhD

Student Advisor: Kimberley McCartney, BSc (Hons)

Email: **schoolofscience@uoit.ca**

Web site: **http://www.science.uoit.ca**

Director, Science and Technology Clinic: John Lit, DSc

Professors:
Douglas Holdway, BSc (Hons), MSc, PhD

John Lit, DSc

Associate Professors:
Anatoli Chkrebtii, MSc, PhD

Christa L. Colyer, BSc (Hons), MSc, PhD

Assistant Professors:
Julia Green-Johnson, BSc (Hons), MSc, PhD

Greg Lewis, BSc (Hons), MSc, PhD

Mark Staley, BSc, MSc, PhD

Senior Laboratory Instructors:
Sylvie Bardin, BSc, MSc, PhD

Richard Bartholomew, BSc (Hons), MSc, PhD

Valeri Kapoustine, MSc, PhD

14.1 Degrees offered

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

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

Bachelor of Science (Honours) in Chemistry - BSc (Hons)

Bachelor of Science (Honours) in Computing Science - BSc (Hons)
[Pending final approval]

Bachelor of Science (Honours) in Energy and the Environment - BSc (Hons)
[Pending final approval]

Bachelor of Science (Honours) in Mathematics - BSc (Hons)

Bachelor of Science (Honours) in Physics - BSc (Hons)

Bachelor of Science (Honours)/Bachelor of Education - BSc (Hons)/BEd (concurrent)
[Pending final approval]

Bachelor of Science/Bachelor of Education - BSc/BEd (concurrent) [Pending final approval]

The Faculty of Science offers seven four-year programs, one in the biological sciences and six in the physical sciences. A combined program in concurrent education (BSc and BEd) is also offered, in collaboration with the Faculty of Education. These programs are highly focused on subjects relevant to emerging areas of science knowledge and practice. The biological sciences program provides two innovative concentrations, in pharmaceutical biotechnology and environmental toxicology. In addition, students will be able to work with an advisor to customize a program to match their interests and career plans by selecting a complementary studies stream. In physical sciences, students can choose to pursue a general course of study (Physical Science), or to specialize in chemistry, computing science, energy and environment science, mathematics, or physics. In all programs, secondary concentrations are also available in biology, chemistry, computing science, mathematics and physics. A secondary specialization is available in computational science.

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 (section 1.2).

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

14.2 Admission requirements (for Bachelor of Science programs)

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U), calculus (MCB4U), and two of physics (SPH4U), chemistry (SCH4U), biology (SBI4U), or algebra and geometry (MAG4U).

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

There are additional requirements for the Concurrent Education programs. For details, please see the Faculty of Education section of this Calendar (section 10).

14.3 Careers

Teaching, research and occupations in the pharmaceutical and biotechnology industries, particularly in agriculture biotechnology, are just some of the career choices for graduates in Biological Science. Rewarding careers, such as teaching, technical and field work with industry and the public sector, scientific communications, commerce, research and postgraduate studies are some of the many options open to graduates in Physical Science. Human Resources Development Canada predicts the demand for biology and physical science professionals to increase more rapidly than the number of qualified employment seekers.

14.4 Program information - Bachelor of Science (Honours) in Biological Science

14.4.1 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 faculty'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.

14.4.2 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.

14.4.3 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 from the environmental toxicology stream 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 and industries involved in environmental assessments.

14.4.4 Program details and degree requirements

Students interested in the two primary areas-of-emphasis streams (pharmaceutical biotechnology or environmental toxicology) will follow specified program maps, which prescribe the sequence of courses. A graduate of the University of Ontario Institute of Technology's 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 (Biology I) and 1020U (Biology II)
- CHEM 1010U (Chemistry I) and 1020U (Chemistry II)
- CSCI 1000U (Scientific Computing Tools)
- MATH 1010U (Calculus I) and 1020U (Calculus II)
- PHY 1030U (Physics for Biosciences I) and PHY 1040U (Physics for Biosciences II)*

*Students who wish to take upper year physics courses must take PHY 1010U and PHY 10204. However, students who achieve a B standing or higher in both PHY 1030U and PHY 1040U will be permitted to proceed to higher level physics courses.

Biological Science additional Core courses - 18 credit hours

In addition to the two first-year courses in biology (BIOL 1010U and BIOL 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 third or fourth year level, with a minimum of six of these credit hours at the fourth 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:

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

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
- energy and environment science
- manufacturing
- mathematics
- physics

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 nine credit hours in required courses outside or linked to the discipline:

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

NOTE:
* The program must include 36 credit hours in science courses at the third and fourth year level. 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.

14.4.5 Program details - PHARMACEUTICAL BIOTECHNOLOGY

YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1030U Physics for Biosciences I**

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1040U Physics for Biosciences II**
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

SEMESTER 1 (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 2 (15 credit hours)
BIOL 2020U Genetics and Molecular Biology
BIOL 2040U Biochemistry
BUSI 2000U Collaborative Leadership
Elective*
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
BIOL 3010U Laboratory Methods in Molecular Biology
BIOL 3020U Principles of Pharmacology and Toxicology
BIOL 3050U Developmental Biology
CHEM 2030U Analytical Chemistry
Elective*

SEMESTER 2 (15 credit hours)
BIOL 3030U Microbiology and Immunology
BIOL 3040U Physiology of Regulatory Systems
BUSI 1600U Management of the Enterprise
CHEM 3830U Instrumental Analytical Chemistry
Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
BIOL 4040U Applied Molecular Biology
BIOL 4070U Advanced Biochemistry
BIOL 4510U Independent Research Project I
Elective*
Elective*

SEMESTER 2 (15 credit hours)
BIOL 4050U Advanced Topics in Pharmaceutical Biotechnology
BIOL 4060U Functional Genomics and Proteomics
BIOL 4080U Bioethics
BIOL 4520U Independent Research Project II
Elective*

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

**Students who wish to take upper year physics courses must take PHY 1010U and PHY 10204. However, students who achieve a B standing or higher in both PHY 1030U and PHY 1040U will be permitted to proceed to higher level physics courses.

14.4.6 Program details - ENVIRONMENTAL TOXICOLOGY

YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1030U Physics for Biosciences I

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1040U Physics for Biosciences II
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

SEMESTER 1 (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 2 (15 credit hours)
BIOL 2020U Genetics and Molecular Biology
BIOL 2040U Biochemistry
BUSI 2000U Collaborative Leadership
ENVS 1000U Environmental Science
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
BIOL 3020U Principles of Pharmacology and Toxicology
BIOL 3050U Developmental Biology
CHEM 2030U Analytical Chemistry
Elective*
Elective*

SEMESTER 2 (15 credit hours)
BIOL 3030U Microbiology and Immunology
BUSI 1600U Management of the Enterprise
CHEM 3830U Instrumental Analytical Chemistry
STAT 3010U Biostatistics in Life Sciences
Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
BIOL 4010U Introduction to Environmental Research Methods
BIOL 4020U Environmental Risk Characterization
BIOL 4510U Independent Research Project I
CHEM 4050U Environmental Chemistry
Elective*

SEMESTER 2 (15 credit hours)
BIOL 4030U Advanced Topics in Environmental Toxicology
BIOL 4080U Bioethics
BIOL 4520U Independent Research Project II
Biological Science Elective
Elective*

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

**Students who wish to take upper year physics courses must take PHY 1010U and PHY 10204. However, students who achieve a B standing or higher in both PHY 1030U and PHY 1040U will be permitted to proceed to higher level physics courses.

14.5 Physical Science programs

14.5.1 General information

The curriculum provides a foundation in chemistry, physics, mathematics, and computing 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) programs in the physical sciences allow students to specialize in chemistry, computing science, energy and the environment, mathematics, or physics. Alternatively, using the guidelines provided below, students might work with an academic advisor to customize a Physical Science program to match their interests and career plans. Students may also select a secondary area-of-emphasis stream, in any of the specialization areas or in Biological Science. Except for computing science, the first year of the program is common for all programs, allowing students time to explore the possibilities before committing themselves to a final choice.

14.5.2 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.

14.5.3 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. Combined with the University's Bachelor of Education students can help to fill the need for mathematics, science and computer science teachers in Ontario's secondary schools.

14.5.4 Program overview and degree requirements

Students interested in the Physical Science programs will follow specified program maps, which prescribe the sequence of courses, as described below. A graduate from one of the University of Ontario Institute of Technology's Physical Science programs must successfully complete 120 credit hours according to the requirements indicated below. These requirements apply to all programs.

First-year required science core - 27 credit hours *

- BIOL 1010U (Biology I) and 1020U (Biology II)
- CHEM 1010U (Chemistry I) and 1020U (Chemistry II)
- CSCI 1000U (Scientific Computing Tools)
- MATH 1010U (Calculus I) and 1020U (Calculus II)
- PHY 1010U (Physics I) and 1020U (Physics II)

*Note: The Bachelor of Science (Honours) in Computing Science has different first year core courses. Please refer to the program map for details.

Upper-year Science Courses - 69 credit hours

These must include:

STAT 2010U Statistics and Probability for Physical Science

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

Each primary specialization has a particular set of courses that must be taken to satisfy degree requirements. Program maps for each primary specialization are given below.

The remaining science courses must be selected from lists of science electives approved by the Dean of Science. The total number of credit hours required for each program is specified in the program map. Approved science electives will be identified each semester on the list of course offerings, in the subject areas of:

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

Particular sets of science electives are designated as secondary concentrations. Examples of primary/secondary combinations include chemistry/mathematics, mathematics/computing science, mathematics/physics, and physics/chemistry. A secondary area of specialization is also offered in computational science. 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 1600U Management of the Enterprise
- BUSI 2000U Collaborative Leadership

The total number of credit hours for additional non-science electives is specified in each program map.

NOTE:
- The program must include 36 credit hours in science courses at the third and fourth year level. 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.

14.5.5 Program details - BACHELOR OF SCIENCE (HONOURS) IN CHEMISTRY

YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1020U Physics II
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

SEMESTER 1 (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 2 (15 credit hours)

BIOL 2040U Biochemistry
BUSI 2000U Collaborative Leadership
CHEM 2040U Thermodynamics and Kinetics
Elective*
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
CHEM 3020U Organic Chemistry
CHEM 3510U Inorganic Chemistry I
CHEM 3530U Instrumental Analytical Chemistry I
Elective*
Elective*

SEMESTER 2 (15 credit hours)
BUSI 1600U Management of the Enterprise
CHEM 3040U Fundamentals of Physical Chemistry
CHEM 3520U Inorganic Chemistry II
CHEM 3540U Instrumental Analytical Chemistry II
Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
CHEM 4020U Advanced Organic Chemistry
CHEM 4040U Physical Chemistry
CHEM 4050U Environmental Chemistry
CHEM 4400U Thesis Project
Elective*

SEMESTER 2 (15 credit hours)
CHEM 4010U Industrial Chemistry
CHEM 4060U Chemical and Molecular Spectroscopy
Elective*
Elective*
Elective*

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

14.5.6 Program details - BACHELOR OF SCIENCE (HONOURS) IN COMPUTING SCIENCE

YEAR 1

SEMESTER 1 (15 credit hours)
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
CSCI 1010U Discrete Structures in Computer Science
MATH 1010U Calculus I
PHY 1010U Physics I

SEMESTER 2 (15 credit hours)
BIOL 1840U Biology for Engineers
CHEM 1020U Chemistry II
CSCI 1020U Fundamentals of Programming
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

SEMESTER 1 (15 credit hours)
CSCI 2010U Principles of Computer Science
CSCI 2060U Computer Architecture I
MATH 2050U Linear Algebra I
Elective*
Elective*

SEMESTER 2 (15 credit hours)
BUSI 2000U Collaborative Leadership
CSCI 2020U Software Systems Development and Integration
MATH 2072U Computational Science I
STAT 2010U Statistics and Probability for Physical Science
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
CSCI 3010U Simulation and Modelling
CSCI 3030U Operating Systems and Networking
CSCI 3040U Database Systems and Concepts
CSCI 3050U System Analysis and Design in Applications
Elective*

SEMESTER 2 (15 credit hours)
BUSI 1600U Management of the Enterprise
CSCI 3060U Computer Architecture II
CSCI 3070U Software Engineering
CSCI 3080U Analysis and Design of Algorithms
Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
CSCI 3020U Scientific Visualization and Computer Graphics
CSCI 4010U Compilers
CSCI 4020U Elements of Theory of Computation
CSCI 4400U Thesis Project
Elective*

SEMESTER 2 (15 credit hours)
CSCI 4030U Ethics, Law, and the Social Impact of Computing
Computing Science Elective**
Computing Science Elective**
Elective*
Elective*

* Note: students are required to take 12 credit hours in science electives and 12 credit hours in liberal studies electives for this program.

** Computing Science Electives:
CSCI 4610U Artificial Intelligence
CSCI 4620U Human-Computer Interaction
CSCI 4630U High-Performance Computing
CSCI 4640U Distributed Computing
MATH 4020U Computational Science II

14.5.7 Program details - Bachelor of Science (Honours) in Energy and the Environment

14.5.7.1 ENERGY AND THE ENVIRONMENT - CHEMISTRY STREAM

YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1020U Physics II
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

SEMESTER 1 (15 credit hours)
CHEM 2010U Structure and Bonding
CHEM 2020U Introduction to Organic Chemistry
ENVS 2020U Introductory Energy Science
STAT 2010U Statistics and Probability for Physical Science
Elective*

SEMESTER 2 (15 credit hours)
BIOL 2040U Biochemistry
BUSI 2000U Collaborative Leadership
CHEM 2040U Thermodynamics and Kinetics
ENVS 2010U introductory Environment Science
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
CHEM 2030U Analytical Chemistry
CHEM 3020U Organic Chemistry
CHEM 3510U Inorganic Chemistry I
Elective*
Elective*

SEMESTER 2 (15 credit hours)
BUSI 1600U Management of the Enterprise
CHEM 3040U Fundamentals of Physical Chemistry
CHEM 3530U Instrumental Analytical Chemistry I
PHY 3060U Fluid Mechanics
PHY 3070U Relativity and Nuclear Energy

YEAR 4

SEMESTER 1 (15 credit hours)
CHEM 4020U Advanced Organic Chemistry
CHEM 4040U Advanced Physical Chemistry
CHEM 4050U Environmental Chemistry
CHEM 4070U Fossil Fuels and Biomass
Elective*

SEMESTER 2 (15 credit hours)
CHEM 4010U Industrial Chemistry
CHEM 4080U Hydrogen-Based Energy Systems and Fuel Cells
ENVS 4010U Economics and Politics of the Environment
Elective*
Elective*

* Note: students are required to take 12 credit hours in science electives and 12 credit hours in liberal studies electives for this program.

14.5.7.2 ENERGY AND THE ENVIRONMENT - PHYSICS STREAM

YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1020U Physics II
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

SEMESTER 1 (15 credit hours)
ENVS 2020U Introductory Energy Science
MATH 2050U Linear Algebra
PHY 2010U Electricity and Magnetism I
STAT 2010U Statistics and Probability for Physical Science
Elective*

SEMESTER 2 (15 credit hours)
BUSI 2000U Collaborative Leadership
ENVS 2010U introductory Environment Science
MATH 2060U Differential Equations
PHY 2020U Electricity and Magnetism II
PHY 2030U Mechanics I

YEAR 3

SEMESTER 1 (15 credit hours)
MATH 3050U Partial Differential Equations
PHY 2050U Thermodynamics and Heat Transfer
PHY 3020U Quantum Mechanics I
PHY 3030U Electronics
Elective*

SEMESTER 2 (15 credit hours)
BUSI 1600U Management of the Enterprise
PHY 3010U Statistical Mechanics I
PHY 3050U Waves and Optics
PHY 3060U Fluid Mechanics
PHY 3070U Relativity and Nuclear Energy

YEAR 4

SEMESTER 1 (15 credit hours)
PHY 4040U Solar Energy and Photovoltaics
PHY 4050U Earth-Based Energy Systems
PHY 4600U Thesis Project
Elective*
Elective*

SEMESTER 2 (15 credit hours)
CHEM 4080U Hydrogen-Based Energy Systems and Fuel Cells
ENVS 4010U Economics and Politics of the Environment
Elective*
Elective*
Elective*

* Note: students are required to take 12 credit hours in science electives and 12 credit hours in liberal studies electives for this program.

14.5.8 Program details - BACHELOR OF SCIENCE (HONOURS) IN MATHEMATICS

YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1020U Physics II
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

SEMESTER 1 (15 credit hours)
MATH 2010U Advanced Calculus I
MATH 2030U Set Theory
MATH 2050U Linear Algebra
STAT 2010U Statistics and Probability for Physical Science
Elective*

SEMESTER 2 (15 credit hours)
BUSI 2000U Collaborative Leadership
MATH 2020U Advanced Calculus II
MATH 2060U Differential Equations
MATH 2072U Computational Science I
Elective*

YEAR 3

SEMESTER 1 (15 credit hours)
MATH 3020U Real Analysis
MATH 3030U Linear Algebra II
MATH 3050U Partial Differential Equations
Elective*
Elective*

SEMESTER 2 (15 credit hours)
BUSI 1600U Management of the Enterprise
MATH 3060U Complex Analysis
MATH 3070U Algebraic Structures
Elective*
Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
MATH 4010U Advanced Differential Equations
MATH 4020U Computational Science II
MATH 4030U Biomathematics
MATH 4400U Thesis Project
Elective*

SEMESTER 2 (15 credit hours)
MATH 3040U Operations Research I
MATH 4050U Advanced Partial Differential Equations
Elective*
Elective*
Elective*

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

14.5.9 Program details - BACHELOR OF SCIENCE (HONOURS) IN PHYSICS

YEAR 1

SEMESTER 1 (15 credit hours)
BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

SEMESTER 2 (15 credit hours)
BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1020U Physics II
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

SEMESTER 1 (15 credit hours)
PHY 2010U Electricity and Magnetism I
PHY 2030U Mechanics I
STAT 2010U Statistics and Probability for Physical Science
Elective* (MATH 2050 - Linear Algebra is strongly recommended)
Elective*

SEMESTER 2 (15 credit hours)
PHY 2020U Electricity and Magnetism II
PHY 2040U Mechanics II
PHY 2050U Thermodynamics
MATH 2060U Differential Equations
BUSI 2000U Collaborative Leadership

YEAR 3

SEMESTER 1 (15 credit hours)
PHY 3010U Statistical Physics I
PHY 3020U Quantum Physics I
PHY 3030U Electronics
Elective*
Elective*

SEMESTER 2 (15 credit hours)
BUSI 1600U Management of the Enterprise
PHY 3040U Mathematical Physics
PHY 3050U Waves and Optics
PHY 3060U Fluid Mechanics
Elective*

YEAR 4

SEMESTER 1 (15 credit hours)
PHY 4010U Quantum Physics II
PHY 4020U Statistical Physics II
PHY 4600U Thesis Project
Senior Physics Elective **
Elective*

SEMESTER 2 (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 for this program.

** Any senior physics course not specified in the program map is acceptable.

14.6 Concurrent Education Programs

14.6.1 General Information

Four- and five-year concurrent teacher education programs are offered in collaboration with the Faculty of Education. The concurrent education programs allow students to complete a three-year Bachelor of Science degree or a four-year Honours Bachelor of Science and a Bachelor of Education simultaneously.

14.6.2 Careers

Graduates will be prepared to teach in the Ontario education system where the demand for teachers of mathematics, science and computer science 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 to undertake roles in business in the areas of training and professional development. The University's concurrent education programs are designed to meet all Ontario regulatory requirements and incorporate 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.

14.6.3 Program details and degree requirements

The Bachelor of Science portion of the program requires the completion of 90 credit hours as indicated below:

Required Science Core - 36 credit hours
This includes nine credit hours in each of:

- biology
- chemistry
- physics
- mathematics (This must include Statistics and Probability (STAT 2010 or STAT 2020))

Additional Science Credits - total of 36 credit hours
Scientific Computing Tools (year 1) is required.

The remaining 33 credit hours must be completed in chemistry, physics, mathematics, biology, and/or computing science. Students must select two subject areas from this list as 'teachable subjects'. For the first teachable subject, they must successfully complete 30 credit hours (this can include those in the Science Core). For the second teachable subject, they must successfully complete 18 credit hours (this can include those in the Science Core).

Non-Science Electives - 18 credit hours
Learning and Human Development (EDUC 3750U) is required.

These will include electives outside or linked to the discipline, to be selected from offerings through other faculties at the University of Ontario Institute of Technology or through Trent University at the University of Ontario Institute of Technology.

Note: The program must include a total of 27 credit hours in science at the third or fourth year level. Of these, at least nine credit hours must be at the fourth year level. No more than 30 credit hours may be taken at the first year level.

For additional details, including program maps, please see the Faculty of Education (section 10).

14.7 Secondary Concentrations and Specializations

Secondary concentrations are available in biology, chemistry, computing science, mathematics and physics. A secondary specialization is available in computational science (see below).

Completion of a secondary concentration requires a minimum of 18 credit hours in the subject area.

Students will be able to work with an academic advisor to design a secondary area of concentration to match their interests and career plans.

14.7.1 Secondary Specialization in Computational Science

A secondary area of specialization consisting of 21 credit hours is available in computational science. The new discipline of computational science has emerged primarily over the past decade as a third methodology for carrying out scientific investigations, alongside the traditional approaches of theory and experiment. Computational science combines the application of numerical methods, mathematical models, and computer algorithms, with knowledge in a particular discipline to study problems that are intractable or difficult to study using conventional approaches. Examples include the study of stock market collapses, the evolution of interstellar galaxies, and the molecular-level properties of nanomaterials. Computational science seeks to gain insight through the development and implementation of mathematical models of phenomena by means of their computer simulation. Visualization of the results of such simulations is a key ingredient in the methodology. This specialization may be combined with any of the primary University of Ontario Institute of Technology science specialization areas, including: biology, chemistry, physics, and mathematics. Students with this specialization can expect to enhance their opportunities in the marketplace.

Course Requirements
CSCI 1000U Scientific Computing Tools
CSCI 1020U Fundamentals of Computer Programming
CSCI 2010U Principles of Computer Science
CSCI 3010U Simulation and Modelling
CSCI 3020U Scientific Visualization and Computer Graphics
MATH 2072U Computational Science I (formerly Numerical Methods)
MATH 4020U Computational Science II (formerly Numerical Analysis)

Section 15: Faculty of Social Science

Dean: Ronald Hinch, BA, MA, PhD

Professor:
Brian Campbell, BA, BPhil, PhD

Associate Professors:
Wesley Crichlow, BA (Hons), MEd, PhD

Hannah Scott, BA, MA, PhD

15.1 Degree offered

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

The Faculty of Social Science 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 (section 1.2).

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

15.2 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.

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

15.3.1 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 programs such as business, science and liberal arts.

15.3.2 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.

15.3.3 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 per cent on six 12U or M credits including English (ENG4U).

All other applicants should refer to section 4.5 of the Calendar for the requirements for their specific category of admission.

15.3.4 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 1

SEMESTER 1 (15 credit hours)
JSTS 1000U Introduction to Criminal Justice
JSTS 1260U Introduction to Canadian Legal System
PHIL 1040U Philosophy: Social and Political Issues
POSC 1010U Political Science
Elective

SEMESTER 2 (15 credit hours)
JSTS 1420U Ethical Reasoning and Critical Thinking
PSYC 1000U Introductory Psychology
SOCI 1000U Introductory Sociology
Law Elective:
JSTS 1600U Criminal Law OR
JSTS 1610U Customs and Immigration Law
Elective

YEAR 2

SEMESTER 1 (15 credit hours)
BUSI 2000U Collaborative Leadership
JSTS 2040U Justice Theory and Policy
One of: JSTS 2190U Issues in Diversity OR
JSTS 2490U Issues in the Family
JSTS 2550U Psychological Explanations of Criminal Behaviour
JSTS 2900U Research Methods

SEMESTER 2 (15 credit hours)
JSTS 2370U Theory and Practice of Mediation
JSTS 2640U Rights and Freedoms in the Justice System
JSTS 2710U Sociological Theories of Crime
JSTS 2820U Quantitative Methods
Elective

YEAR 3

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

SEMESTER 2 (15 credit hours)
JSTS 3520U Social Justice and Conflict
JSTS 3650U Issues in Organized Crime
JSTS 3710U Corrections I
JSTS 3780U Public Administration
JSTS 3900U Field Work Practicum I

YEAR 4

SEMESTER 1 (15 credit hours)
JSTS 4000U Advanced Justice Studies
JSTS 4020U Policing II
JSTS 4250U Alternative Methods in Justice
JSTS 4900U Field Work Practicum II
Elective

SEMESTER 2 (15 credit hours)
JSTS 4340U Policy Analysis
JSTS 4580U Leadership and Administration
JSTS 4710U Corrections II
JSTS 4999U Integrating Project
Elective

Section 16: Course Descriptions

Each course description is followed by a list of the credit hours (cr) and contact hours for the course. Contact hours are divided into lecture (lec), laboratory (lab), tutorial (tut) and other (oth) hours. A course with a listing of 3 cr, 3 lec, 3 lab, 1 tut, 2 oth, is weighted at three credit hours with three hours of lectures, three laboratory hours, one hour of tutorial and two other contact hours per week.

Courses offered in condensed format will have the number of contact hours prorated accordingly.

Other notations in the course descriptions:

A **cross-listed course** is a single course which is listed under two or more faculties and identified by different course numbers. The course can be taken for credit from one faculty only.

A **credit restriction** occurs where two or more courses are closely related and credit is 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. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisites: OAC or 12U Biology (recommended). Credit restriction: 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. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisite: BIOL 1010U.

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. 3 cr, 3 lec, 2 tut (biweekly). Credit restriction: BIOL 2040U.

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. 3 cr, 3 lec, 2 tut. Credit restriction: BIOL 1010U.

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 physiolog-

ical approaches to understand the regulation of different systems in plants and animals. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisite: 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. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisite: BIOL 1020U. Credit restriction: 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. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisite: BIOL 1020U. Credit restriction: 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. 3 cr, 3 lec, 2 tut (biweekly). Prerequisites: BIOL 1020U, CHEM 2020U. Credit restriction: BIOL 1810U.

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. 3 cr, 3 lec. Credit restriction: 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. 3 cr, 3 lec. Prerequisite: BIOL 1810U. Credit restriction: BIOL 3650U.

BIOL 2830U Microbiology for Health Science (formerly BIOL 1820U). Introductory microbiology is a survey study of the comparative biology of micro-organisms, directed toward students in health and biological science programs. Common infectious diseases will be examined using a body systems approach. Online tutorial 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. 3 cr, 3 lec. Credit restriction: BIOL 1820U. Note: There will be an online tutorial.

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. 3 cr, 3 lec, 2 lab (biweekly), 2 tut (biweekly). Prerequisite: BIOL 1840U. Credit restrictions: BIOL 2020U, 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 analyse experimental results obtained with these techniques. 3 cr, 6 lab. 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. 3 cr, 3 lec, 1 tut. Prerequisites: BIOL 2010U, BIOL 2040U. Credit restriction: 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. 3 cr, 3 lec, 3 lab (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). 3 cr, 3 lec, 3 lab (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. 3 cr, 2 lec, 3 lab (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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec, 1 tut. Prerequisite: BIOL 2020U.

BIOL 3630U Soil-Plant Relationships. Explores the interrelationships between 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. 3 cr, 3 lec. Prerequisite: BIOL 2010U.

BIOL 3640U 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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec. Prerequisite: BIOL 2040U. Credit restriction: 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. 3 cr, 3 lec, 3 tut. Prerequisite: 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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec. Prerequisite: BIOL 3020U. Note: 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. 3 cr, 3 lec. 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. 3 cr, 3 lec. Prerequisite: 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 a historical, sociological, and philosophical perspective, with a consideration of how religious beliefs, political ideology, and the law influence positions. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 9 oth. Prerequisite: Registration in year four of a Biological Science program. Note: 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. 3 cr, 9 oth. Prerequisite: BIOL 4510U. Note: 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 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 credit hours (one half-course) at UOIT may be applied to the requirements of the BSc degree. 3 cr. 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 affects will be studied. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec. 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. 3 cr, 3 lec.

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. 3 cr, 3 lec. Credit restrictions: 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. 3 cr.

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. 3 cr, 3 lec. Note: This course is not available to computer science students for credit.

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. 3cr, 3 lec.

BUSI 1650U External Environment of Management. 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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec. 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 analyse the basic characteristics and properties of functions, and to become more successful in mathematical problem solving with the use of technology. 3 cr, 3 lec.

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. 3 cr, 3 lec.

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. 3 cr. 3 lec.

BUSI 2101U Intermediate Financial Accounting I.

BUSI 2102U Intermediate Financial Accounting II.

BUSI 2150U Financial Accounting I. Financial accounting is concerned with producing information about an economic entity and communicating that information to people who are external to the entity that want or need the information for making decisions. This course is designed to provide an understanding of the accounting process and the choices that exist so that students can be informed and skilled users of accounting information. The course focuses on uses of accounting information for different decisions and from different stakeholder perspectives, and considers the economic and

behavioural effects that accounting treatments have on users and preparers. There is an emphasis on interpreting, analysing, and understanding information. Readings from current publications are used to integrate practical applications of the issues discussed in class. This course is not designed to develop accountants, but it is appropriate for accounting majors. Classroom techniques that develop students' critical skills will be used. 3 cr, 3 lec.

BUSI 2160U Financial Accounting II. This course is a continuation of BUSI 2150U. It will build on the concepts and skills developed in BUSI 2150U. Readings from current publications are used to integrate practical applications of the issues discussed in class. Case studies, classroom discussions, student presentations and research projects are used to students' critical skills. This course is not designed to develop accountants, but it is appropriate for accounting majors. 3 cr, 3 lec. Prerequisite: BUSI 2150U.

BUSI 2170U Managerial Accounting. This course is an introduction to managerial accounting concepts with a focus on decision making. The course is case oriented and stresses both a manager's and an accountant's perspective on accounting information. Application of techniques is stressed. Students will learn to evaluate techniques based on their implicit assumptions, costs and benefits and appropriateness for specific decisions. Application of concepts and development of critical thinking skills are crucial aspects of this course. 3 cr, 3 lec.

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. 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. 3 cr, 3 lec.

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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec.

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. 3 cr, 3 lec. Prerequisite: BUSI 2311U.

BUSI 2340U Organizational Issues: Problems and Directions.

BUSI 2390U Training and Development.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec.

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 2603U Introduction to Operations Management. 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. 3 cr, 3 lec.

BUSI 2604U Introduction to Project Management and Supply Chain Management. 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. 3 cr, 3 lec. Prerequisite: BUSI 2603U.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec.

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. 3 cr. 3 lec.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec.

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 3172U Auditing II. This course extends students' knowledge of auditing by examining the role of the profession in society today, evaluating current issues facing auditors, and building on their understanding of the general audit frame work and its fundamental theories. It also examines specific audit topics such as comprehensive auditing, audit of not-for-profit organizations, environmental auditing and small business audits. 3 cr, 3 lec. Prerequisite: BUSI 3171U.

BUSI 3173U Auditing III. This course is designed to introduce and enhance the students' knowledge about the topic of auditing in computerized environments. The course will focus on issues like information system concepts, audit and control risks, and implementation and evaluation of security and controls. 3 cr, 3 lec. Prerequisite: BUSI 3172U.

BUSI 3200U Marketing Communications.

BUSI 3210U Consumer Behaviour.

BUSI 3260U Marketing Research.

BUSI 3280U Brand Management.

BUSI 3510U Internet Engineering.

BUSI 3520U Applied Internet Multimedia.

BUSI 3530U HTML and Web site Design and Management.

BUSI 3540U Object Oriented Programming.

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. 3 cr, 3 lec.

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 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. 3 cr, 3 lec.

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 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. 3 cr, 3 lec.

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. 3 cr, 3 lec. Prerequisite: BUSI 4701U.

BUSI 4991U 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 understanding of the technology, environment, markets, and operations of a real organization by applying the theory and knowledge that they have learned. 3 cr, 3 lec.

BUSI 4992U UOIT Edge II. This is a continuation of 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. 3 cr, 3 lec. Prerequisite: BUSI 4991U.

CHEM 1010U Chemistry I. The concepts of chemistry including simple reactions and stoichiometry; acids, bases, salts; titration; gases; atomic and molecular structure and chemical bonding; introduction to nuclear chemistry and the law of radioactive decay. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisite: OAC or 12U Chemistry (recommended). Credit restriction: CHEM 1800U. 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.

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 and reaction mechanisms; chemical and ionic equilibria; buffers; introduction to organic chemistry and the reactions of organic compounds; polymer chemistry; redox reactions and electrochemistry. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisite: CHEM 1010U. Credit restriction: 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. 3 cr, 3 lec, 2 lab (biweekly), 2 tut (biweekly). Prerequisite: OAC or 12U Chemistry. Credit restrictions: CHEM 1010U, 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. 3 cr, 3 lec, 1 tut. Prerequisite: 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. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisite: 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. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisite: 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. 3 cr, 3 lec, 3 lab (biweekly). Prerequisites: CHEM 1020U, MATH 1020U. Credit restriction: 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. 3 cr, 3 lec, 3 lab (biweekly). Prerequisite: 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. 3 cr, 3 lec, 3 lab (biweekly). Prerequisite: 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. 3 cr, 3 lec, 3 lab (biweekly). Prerequisite: CHEM 2010U. Note: 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. 3 cr, 3 lec, 3 lab (biweekly). Prerequisite: CHEM 3510U. Note: 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. 3 cr, 3 lec, 1 tut. Prerequisite: CHEM 2030U. Credit restriction: CHEM 3830U. Note: 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. 3 cr, 3 lec, 1 tut. Prerequisite: CHEM 3530U. Credit restriction: CHEM 3830U. Note: 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. 3 cr, 3 lec, 1 tut. Prerequisite: CHEM 2030U. Credit restrictions: CHEM 3530U, 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. 3 cr, 3 lec. Prerequisite: CHEM 3520U. Note: 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 retrosynthetic 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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec, 3 lab (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. 3 cr, 3 lec. Prerequisites: CHEM 2020U, CHEM 2030U. Note: 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. 3 cr, 3 lec. Prerequisite: CHEM 3040U.

CHEM 4070U Fossil Fuels and Biomass. This course will address future world energy needs and sources and focus on the continued use of fossil fuels and the use of biomass, especially in developing countries. Students will study origins and compositions and conventional processing of these sources of energy. Topics will also include the production of ethanol and methane from biomass; origins, effects and methods of reducing acid rain; CO2 and enhanced greenhouse gas effect; and the concept of total cost analysis, with some simple examples. 3 cr, 3 lec, 2 tut. Prerequisites: CHEM 2020U; (CHEM 2040U or PHY2050U), ENVS 2010U, ENVS 2020U.

CHEM 4080U Hydrogen-Based Energy Systems and Fuel Cells. This course explores hydrogen as an energy storage medium, where hydrogen fits into the overall landscape of energy carriers, provides a general outline of the issues surrounding hydrogen and fuel cell technologies, and gives a general introduction to the relevant properties of hydrogen. 3 cr, 3 lec. Prerequisite: CHEM 1020U, (CHEM 2040U or PHY 2050U).

CHEM 4400U Thesis Project.

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), graphics tools, scientific text processing (LaTeX), presentation tools (PowerPoint). 3 cr, 3 lec, 2 tut.

CSCI 1010U Discrete Structures in Computer Science. A course providing a foundation in finite mathematics required for advanced computing science courses. For example, an ability to derive and comprehend a formal proof is essential in formal specification and cryptography. Set theory concepts are used in software engineering and image processing. 3 cr, 3 lec, 2 tut.

CSCI 1020U Fundamentals of Programming (Formerly CSCI 1600U). This course provides a basic introduction to computer programming using the C programming language. Topics include basic computer hardware and software concepts, problem analysis, design of algorithms and programs, the basic principles of object-oriented languages. 3 cr, 3 lec, 2 tut. Prerequisite: CSCI 1000U. Credit Restrictions: BUSI 1830U, ENGR 1200U, CSCI 1600U.

CSCI 2010U Principles of Computer Science. This course introduces students to general computer programming principles and the analysis of algorithms and data structures. Topics include problem analysis, design of algorithms and programs, selection of data types, decision-making, and program correctness. The course uses an object-oriented programming language such as Java or C++. Applications to business, science and engineering are illustrated. The focus is on the effective choice of algorithm and data structure and the use of a disciplined programming style which permits programs to be understood and read by others. 3 cr, 3 lec, 1 tut. Prerequisites: CSCI 1010, CSCI 1020U. Recommended co-requisite: CSCI 2060U.

CSCI 2020U Software Systems Development and Integration. This course introduces the main elements of software systems development, including: file systems and structures, expression syntax, scripting languages, software tools and philosophy, graphical user interface design, databases, coding standards, performance, and debugging and testing. 3 cr, 3 lec, 2 tut. Prerequisite: CSCI 2010U.

CSCI 2060U Computer Architecture I. This course introduces the basic ideas of computer organization and underlying digital logic that implements a computer system. Starting from representation of information, the course looks at logic elements used for storing and processing information. The course also discusses how the information storage and processing elements are linked together to function as a computer system. 3 cr, 3 lec, 2 tut. Prerequisite: CSCI 1010U. Co-requisite: CSCI 2010U.

CSCI 3010U Simulation and Modelling. This course provides a basic introduction to simulation and modelling. The goal is provide the student with an appreciation of the role of simulation in various scientific, engineering, and business fields, and to provide some experience in writing simulation programs. 3 cr, 3 lec, 2 tut. Prerequisites: CSCI 1020U, MATH 2070U.

CSCI 3020U Scientific Visualization and Computer Graphics. This course provides a basic introduction to computer graphics and scientific visualization. Basic properties of display devices, graphics objects, and common graphics operations will be identified. The use of colour, texture, lighting and surface/contour plots will be surveyed. Examples from modelling of PDEs will be presented. 3 cr, 3 lec, 2 tut. Prerequisite: CSCI 2010U, MATH 2072U.

CSCI 3030U Operating Systems and Networking. This course will cover a variety of topics related to computer operating systems, with emphasis on components that are unique to the role of an operating system as the interface layer between the computer hardware and the application software. The course will discuss techniques for sharing the processor, memory, secondary storage and networking between programs. The basics of networking will also be introduced, particularly involving higher protocol levels. 3 cr, 3 lec, 1 tut. Prerequisites: CSCI 2010U, CSCI 2060U.

CSCI 3040U Database Systems and Concepts. The aim of the course is to provide students with an overview of database management system architectures and environments, an understanding of basic database design and implementation techniques, and practical experience of designing and building a relational database. 3 cr, 3 lec, 1 lab. Prerequisite: CSCI 2010U.

CSCI 3050U System Analysis and Design in Application. An introduction to issues and techniques in the design and construction of software systems, and the theory and models of software evolution. Topics include: software engineering principles, requirements analysis and specifications, software design principles, object-oriented analysis and design, standards, project development and testing. 3 cr, 3 lec, 2 tut. Prerequisite: CSCI 2010U.

CSCI 3060U Computer Architecture II. This course presents advanced topics in computer architecture, building on the concepts presented in Computer Architecture I. The emphasis is on analyzing how the various components or subsystems of a computer system interact with and affect each other. This will enable the student to see how the performance of computer systems is affected by modifying their architecture. 3 cr, 3 lec, 2 tut. Prerequisites: CSCI 2060U, CSCI 3030U.

CSCI 3070U Software Engineering. This course is an examination of the software engineering process and the production of reliable software systems. It includes an advanced look at techniques for the design and development of complex software. Since this is an advanced software engineering course, the material will consist of those topics and techniques that are at the leading-edge of current thinking about object-oriented analysis, design and modelling, software architectures and development paradigms, software reviews, software quality, software engineering, ethics, maintenance and formal specifications. 3 cr, 3 lec, 2 tut. Prerequisite: CSCI 3050U.

CSCI 3072U Computational Science II. This course provides a variety of results and algorithms from a theoretical and practical point of view. Students study approximation of functions; quadrature; numerical solution of ordinary differential equations; the algebraic eigenvalue problem. Maple, MatLab or other software will be used in assignments. 3 cr, 3 lec. Prerequisites: MATH 2072U, CSCI 3020U.

CSCI 3080U Analysis and Design of Algorithms. This course exposes students to the fundamental techniques for designing efficient computer algorithms, proving their correctness, and analysing their complexity. Topics include: basic algorithm analysis, greedy algorithms, divide-and-conquer algorithms, dynamic programming algorithms, search-space and tree-traversal algorithms, computational complexity, and heuristics. 3 cr, 3 lec, 2 tut. Prerequisite: CSCI 2010U.

CSCI 4010U Compilers. This course provides a detailed study of the compilation process for a procedural language. Students will develop an understanding of compiler design and put these principles into practice through the construction of a fully functioning compiler for a small procedural language using widely available tools for compiler construction and a general-purpose programming language. 3 cr, 3 lec, 1 tut. Prerequisites: CSCI 3030U, CSCI 3060U.

CSCI 4020U Elements of Theory of Computation. Provides and develops an understanding of which problems are inherently computable and which problems are tractable or feasible. Topics include: Church's thesis, recursively enumerable sets, Godel's incompleteness theorem and the relationships of these results to complexity results involving Turing machine models and P vs NP hardness. 3 cr, 3 lec, 1 tut. Prerequisite: CSCI 3080U.

CSCI 4030U Ethics, Law and the Social Impacts of Computing. This course is an examination of the impact that computing has on society and the impact that society has on computing. The development of laws and social mechanisms has not kept pace with the rapid development and deployment of computing and computing devices in our society. The ethics to deal with this situation exist but are not widely studied by students of computing. Current issues, developments and trends in computing ethics and law will be examined. The impact that computing has on society will be examined in light of the need for professional ethics and appropriate laws and regulatory agencies. 3 cr, 3 lec, 2 tut. Prerequisites: CSCI 3070U.

CSCI 4400U 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 design project, or an individual research proj-

ect. The tutorial sessions will be used for instruction in communications, and will involve individual student presentations. A written document by each student is required before the end of the term. 3 cr, 3 oth. Prerequisite: Good standing in 4th year of Computing Science program.

CSCI 4610U Artificial Intelligence. This course introduces students to the fundamental concepts and techniques of artificial intelligence. Topics include: fundamental definitions and philosophical questions; search and constraint satisfaction; knowledge representation and reasoning; advanced search techniques; agents; machine learning and neural networks; AI planning systems. 3 cr, 3 lec. Prerequisites: CSCI 2010U.

CSCI 4620U Human-Computer Interaction. This course provides an introduction to human-computer interaction (HCI), with emphasis placed on understanding human behaviour with interactive objects, general knowledge of HCI design issues, and a human-centred approach to software design. The course will stress the design of usable interfaces, including the consideration of cognitive factors and social contexts within which computer systems are used. Students will receive an introduction to HCI while applying this theory to a design project. 3 cr, 2 lec, 2 tut. Prerequisite: CSCI 3070U.

CSCI 4630U High Performance Computing. This course allows the student to explore issues in high-performance computing, specifically in the areas of parallel software design and programming. The major paradigms of parallel architectures and parallel complexity will be covered. Topics covered include: current trends in high-performance computing (grid computing, etc.), parallel programming models, parallel programming with MPI, designing parallel systems, efficiency and debugging, performance analysis and profiling, parallel complexity theory, applications in scientific computing. 3 cr, 2 lec, 2 tut. Prerequisites: CSCI 3010U, CSCI 3030U, CSCI 3070U.

CSCI 4640U Distributed Computing. This course exposes the student to the major paradigms of distributed computing, from sockets to client/server to web services and grid computing. Topics covered include: distributed computing paradigms and models, distributed databases and storage issues, security (including encryption, certificates, attacks, authentication, authorization, digital signatures, firewalls, access control lists, capability access), internet issues: name services, DNS, web services, grid computing; Globus, OGSA, project management in distributed computing, testing and performance, and design issues including in-depth coverage of techniques such as sockets, threads, Java RMI, Corba, Tomcat, servelets, and Globus. 3 cr, 3 lec, 2 tut. Prerequisites: CSCI 3030U, CSCI 3070U.

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. 3 cr, 1.5 lec, 1.5 lab, 1 oth (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. 3 cr, 1.5 lec, 1.5 lab, 1 oth (online). Prerequisite: 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. 3 cr, 1.5 lec, 1.5 lab, 1 oth (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. 3 cr, 1.5 lec, 1.5 lab, 1 oth (online). Prerequisite: 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. 3 cr, 1.5 lec, 1.5 lab, 1 oth (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. 3 cr, 1.5 lec, 1.5 lab, 1 oth (online). Prerequisite: 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. 3 cr, 1.5 lec, 1.5 lab, 1 oth (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. 3 cr, 1.5 lec, 1.5 lab, 1 oth (online). Prerequisite: 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 the ways in which teachers 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 informational science and computer engineering technology, relevant Ontario Ministry of Education guidelines, policies and resource documents, teaching philosophies, instructional and assessment techniques for classroom contexts appropriate to the subject. 3 cr, 4 lec, 1 oth (online).

CURS 4161U Curriculum Studies II: Computer Studies. A study of the general principles of curriculum design and development. 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 the high school environment. Students will explore the development of lessons and units of instruction for particular topics in the Ontario curriculum. 3 cr, 4 lec, 1 oth (online). Prerequisite: 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. 3 cr, 1.5 lec, 1.5 lab, 1 oth (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. 3 cr, 1.5 lec, 1.5 lab, 1 oth (online). Prerequisite: 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 to 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. 3 cr, 3 lec.

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 principle 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. 3 cr, 3 lec. Prerequisite: BUSI 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. 3 cr, 3 lec, 1 tut.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec.

EDUC 2000U Classroom Communications. This course is designed to strengthen the students' abilities to communicate effectively through speaking, writing, listening and use of information and communications technology (ICT). The course uses a variety of activities and technologies that are appropriate to the range of communication skills necessary for teaching. A portion of this course will be taught in a condensed module prior to the beginning of classes. 1.5 cr.

EDUC 2900U Introduction to Teaching and Field Experience I. In this first course in education, concurrent science/education students will be introduced to the profession of teaching through the Standards of Teaching and Ethical Standards as set out by the Ontario College of Teachers. They will begin their development as professionals through ample practice in reflective journal writing, goal setting and the initial development of a professional portfolio. They will study, reflect and communicate their understanding of how school cultures and learner diversity affect learning and then shape teacher practices through observation, case studies and other instructional material. This course includes a two-week field study in an elementary school at the end of the academic year. In preparation for this field study, students will be introduced to the Ontario Curriculum and Assessment and Evaluation Policy documents. They will be initiated in the key elements of teacher practice: lesson plans, assessment and evaluation, classroom management and communication with parents. They will collaborate with each other through the establishment of an on-line learning community as they discuss issues and assignments that arise from class and as they as they go out in the field in their practicum, they will share curriculum resources and the use of technology that will serve to integrate curriculum expectations with teaching practice. 3 cr, 2 lec, 1 oth (online tutorial).

EDUC 2901U Field Experience II. The second field study is designed to provide teacher candidates with an experience in secondary schools at the end of the academic year. This will help them to develop an understanding of and appreciation for the school culture and the professional community of which they will be a part. Under the guidance of professional associate teachers in the field and faculty advisors, teacher candidates will engage in guided observations and interactions with students. A weekly field experience seminar will prepare teacher candidates for these field experiences. Weekly Seminar: 1 hr.

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. 3 cr, 3 lec, 1 oth (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. 3 cr, 3 lec, 1 oth (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. 3 cr, 3 lec, 1 oth.

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. 3 cr, 3 lec, 1 oth (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. 1.5 cr, 2 lec, 1 oth (online).

EDUC 4240U Understanding Educational Research, Theory and 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. 3 cr, 3 lec, 1 oth (online).

EDUC 4250U Education and Schooling: The Historical and Social Context for Ontario Catholic Schools. This course is designed to enhance the professional knowledge, understanding and skills of teacher candidates whose employment preference is that of Ontario Catholic Schools. Through readings, dialogue, observation, research, seminars and reflection, teacher candidates learn the historical, philosophical, and sociological foundations of education. Implications for understanding the multifaceted nature of contemporary schooling in Ontario, the role of Catholic schools and teachers within it, the legal/legislative foundation of public education, and the relation between educational principles and everyday classroom practices are emphasized and explored. The intent of the course is thus to offer materials and experiences through which an adequate foundation for professional teaching in Ontario Catholic schools can be developed. 3 cr, 3 lec.

EDUC 4260U Independent Study. This course is intended to provide students with the opportunity to pursue topics that are of academic interest to them personally under the supervision of a qualified faculty member who is willing to support the work. Students wishing to take advantage of this option must present a potential faculty supervisor with a proposal for the study that includes a statement of the intended learning outcomes, a listing of the planned learning activities (e.g., a list of readings, media sources to be consulted, plans for acquiring new data (if appropriate), and proposed writing assignments. Together, the student and faculty member must agree on due dates and criteria for the marking of assignments for the independent study. A letter of agreement between the student and the faculty member must be submitted with the proposal to the dean of the faculty (or designee) for approval. Independent study courses may not be used in lieu of existing courses as program requirements. In some circumstances, independent studies may be used in lieu of elective courses (e.g., if the student already has ample background in the electives available). Independent study courses will be available only to students who are currently enrolled in an academic program at the University of Ontario Institute of Technology.

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. 3 cr, 2 lec, 1 oth.

EDUC 4590U Assessment and Evaluation. This 18-hour course will focus on issues in assessment and evaluation. The course will introduce traditional assessment concepts of reliability, validity and item analysis, along with opportunities to plan and construct test items. Students will learn how to interpret test data and to exhibit a critical attitude toward the misuse and misinterpretation of test results. Contemporary approaches to authentic assessment will form a significant part of the course, including holistic and criterion-referenced assessment. A variety of assessment strategies will be explored along with appropriate examples of use. Evaluation concepts and methodologies will also be part of the course, with students being exposed to reporting techniques and issues. 1.5 cr, 1 lec, 1 tut.

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. 3 cr, 3 lec, 1 oth (online).

EDUC 4900U Field Experience I (Practicum). Placements in schools are designed to provide teacher candidates with opportunities for growth as successful teachers and learners under the guidance of professional associate teachers in the field and faculty advisors. This involves observation periods, practice teaching opportunities and a weekly field experience seminar to prepare teacher candidates for these field experiences. Weekly Seminar: 2 hrs.

EDUC 4901U Field Experience II (Practicum). Placements in schools are designed to provide teacher candidates with opportunities for growth as successful teachers and learners under the guidance of professional associate teachers in the field and faculty advisors. This involves observation periods, practice teaching opportunities and a weekly field experience seminar to prepare teacher candidates for these field experiences. Weekly Seminar: 1 hr.

EDUC 4902U Field Experience III (Practicum). Placements in schools are designed to provide teacher candidates with opportunities for growth as successful teachers and learners under the guidance of professional associate teachers in the field and faculty advisors. This involves observation periods, practice teaching opportunities and a weekly field experience seminar to prepare teacher candidates for these field experiences. Weekly Seminar: 1 hr.

EDUC 4903U Field Experience IV (Practicum). Placements in schools are designed to provide teacher candidates with opportunities for growth as successful teachers and learners under the guidance of professional associate teachers in the field and faculty advisors. This involves observation periods, practice teaching opportunities and a weekly field experience seminar to prepare teacher candidates for these field experiences. Weekly Seminar: 1 hr.

EDUC 4904U Field Experience V (Practicum). Placements in schools are designed to provide teacher candidates with opportunities for growth as successful teachers and learners under the guidance of professional associate teachers in the field and faculty advisors. This involves observation periods, practice teaching opportunities and a weekly field experience seminar to prepare teacher candidates for these field experiences. Weekly Seminar: 1 hr.

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; principles of object oriented programming; programming in 'C': data declaration, arithmetic and logic operations, input and output. 3 cr, 3 lec, 2 oth.

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. 3 cr, 3 lec, 2 lab (biweekly), 1 oth.

ENGR 2020U Statics and Dynamics. This course provides fundamental engineering knowledge of static and dynamic force/moment equilibrium and time-varying performance of different systems. It also examines the work, energy, impact, force, and kinematics and dynamics of systems of particles and rigid bodies. The course description consists of: Resultant and equilibrium of force systems; distributed loads; hydrostatics; conditions of equilibrium and application to particles and rigid bodies; analysis of statically determinate structures including beams, trusses and arches; friction; centroid; principle of virtual work; Cartesian, normal-tangential, and polar components of velocity and acceleration in two and three dimensions; rotating frames; kinematics of particles and rigid bodies; force/acceleration; work/energy; impulse/momentum; conservative and non-conservative systems; systems of streams of particles and rigid bodies; introduction to three dimensional problems of particles and rigid body dynamics. 3 cr, 4 lec, 2 tut. Prerequisites: MATH 1020U, MATH 1850U, and PHY 1010U.

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. 3 cr, 2 lec, 2 oth. Prerequisites: MATH 1020U, PHY 1020U, ENGR 1200U. Co-requisite: MATH 2860.

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. 3 cr, 3 lec. Prerequisite: CHEM 1800U or CHEM 1020U.

ENGR 2310U Concurrent Engineering and Design. This course covers the modern integrated product development process. Unlike the traditional product development approach, concurrent (simultaneous) engineering and design reunites technical and non-technical disciplines and brings forward a philosophy of cross-functional cooperation in order to create products which meet pre-determined objectives, and are better, less expensive, and more quickly brought to market. It is a process in which appropriate disciplines are committed to work interactively to analyze market and customer requirements in order to improve the end-to-end process by which products are conceived, designed, manufactured, assembled, sold to the customer, serviced, and finally disposed of. The concept of design is presented. Brainstorming, creativity methods, design for manufacturing, design for assembly, design for cost, and design for quality, life cycle design, reverse engineering, and rapid prototyping are addressed. Teamwork and communication skills are developed. 3 cr, 3 lec, 2 lab. Prerequisite: ENGR 3200U.

ENGR 2320U Thermodynamics. Introductory concepts and definitions; energy, work and heat; the nature of thermodynamics; the First Law of Thermodynamics; the 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; irreversible and reversible processes; the Carnot cycle; entropy; Clausius inequality; entropy change in open and closed systems; isentropic processes. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisite: PHY 1010U.

ENGR 2330U Mechanical Equipment and Systems. Heating, cooling and refrigeration systems; fluid systems; pumps, compressors, turbines; valves; piping design; pressure vessels; gear and flexible drive systems; bolted and welded joints; heat exchangers and shields; measurements in mechanical systems of solids and fluids; free and forced vibration, single-plane and two plane balancing of rotating machines, mechanism balancing; preventive, predictive and corrective maintenance; life-cycle aspects of mechanical equipment and systems. 3 cr, 3 lec, 2 lab (biweekly). Prerequisite: ENGR 2640U.

ENGR 2340U Engineering Operations and Project Management I. This course introduces students to the functional area of production and operations management as practiced in engineering and manufacturing industries and the services sector. It includes decision-making, engineering project management, facility layout in engineering, manufacturing and services industries, waiting lines, quality control, just-in-time systems, forecasting, aggregate planning, inventory management, materials requirements planning and operations scheduling. 3 cr, 3 lec.

ENGR 2350U Engineering Operations and Project Management II. This second level course continues to study the functional area of production and operations management as practiced in engineering and manufacturing industries and the services sector. It includes decision-making, engineering project management, facility layout in engineering, manufacturing and services industries, waiting lines, quality control, just-in-time systems, forecasting, aggre-

gate planning, inventory management, materials requirements planning and operations scheduling. 3 cr, 3 lec. Prerequisite: ENGR 2340U.

ENGR 2360U Electric Power Systems. Power system overview: generation, transmission, and distribution; elements of power systems: inductors, transformers, generators, circuit breakers, transmission lines, DC machines, AC machines, synchronous machines; single- and three-phase systems; equivalent circuits, operating modes; network calculations: power flow, active and reactive power, fault analysis and protection, power system stability. 3 cr, 3 lec, 2 oth (biweekly). Prerequisite: ENGR 2790U.

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. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisite: ENGR 2020U.

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. 3 cr, 3 lec. 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. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisite: PHY 1010U.

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 electro-mechanical energy conversion; elementary rotating machines; single and three phase circuits. 3 cr, 3 lec, 2 lab, 1 oth. Prerequisite: PHY 1020U, MATH 1020U.

ENGR 2860U Fluid Mechanics. Properties of fluids and their units; fluid static. 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. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisite: 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; safe working with radiation. 3 cr, 2 lec, 2 lab. Prerequisite: ENGR 2500U.

ENGR 3030U Computer-Aided Design. Geometric/solid modelling, computer graphics and feature modelling. Finite element analysis, discretization and modelling, selection of elements, treatment of boundary con-

ditions, 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. 3 cr, 4 lec, 2 lab. Prerequisites: ENGR 2420U, ENGR 2310U.

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. 3 cr, 3 lec, 3 lab (biweekly). Prerequisites: ENGR 2220U, ENGR 2310U.

ENGR 3200U Engineering Graphics and Design. Engineering drawing techniques, dimensions and geometric tolerances, standard viewpoints and section planes, orthographic projections, use of SolidWorks 3-D solid modelling and CAD software (and possibly other design 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. 3 cr, 3 lec, 1.5 lab, 1.5 oth.

ENGR 3210U Mechanical Vibrations. Fundamental concepts of vibrations of mechanical systems; free vibrations of single degree of freedom systems; various types of damping and vibration absorption; forced vibrations; vibration measuring instruments; steady state and transient vibrations; vibrations of multi-degree of freedom systems; vibration isolation; modal analysis; vibrations of continuous systems; introduction to non-linear vibrations, including non-linear springs and non-linear damping. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisite: ENGR 2020U.

ENGR 3220U Machine Design. Theory and methodology related to conceptual design; review of the methods used in stress analysis; simple design factor approach; variable loads; stress concentrations; bolts and bolted joints; welded joints; springs; shaft and bearing design; brakes and braking systems; design for recycling; reliability, maintenance and cost considerations. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisites: ENGR 3270U, ENGR 2310U, ENGR 2420U.

ENGR 3260U Introduction to Energy Systems. Energy systems, resources and use; energy classifications and terminology; energy sources and currencies; energy supply and demand; energy conversion and utilization technologies; energy storage and distribution; energy use in countries and sectors of economies; energy intensity; global energy flows and utilization patterns; principal fuels; fuel science and technology: origins of fuels, classifications and physical and chemical properties of fuels, fuel handling and fire hazards, non-conventional fuels; sustainability, sustainable development and energy; clean energy systems. 3 cr, 3 lec. Prerequisite: ENGR 2320U or ENGR 2010U.

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. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisite: ENGR 2020U.

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. 3 cr, 3 lec, 1 oth. Prerequisites: ENGR 3030U, ENGR 3190U.

ENGR 3320U Fluid Power Systems. The course reviews relevant fluid mechanics principles and proceeds with treatments of individual components. Components analysed include: pumps, actuators, lines, valves and other related components. Discussions of individual components include: principles of operation, mathematical models, and design considerations. Analysis and design of fluid power systems used in industrial and processing equip-

ment. Selected topics to include: positive displacement components, control devices, actuators, fluid transmission and system dynamics. 3 cr, 3 lec, 2 lab (biweekly). Prerequisites: ENGR 2860U, ENGR 3350U.

ENGR 3330U Circuit Design. The focus of this course is on electric and electronic circuit design. Frequency response, transfer function, feedback, oscillation and stability; low-pass, high-pass, and band-pass filters, quality factor and Bode plots; passive and active filters; circuit analysis and network synthesis; power electronic circuits: amplifiers and switches. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisite: ENGR 2790U. Co-requisite: ENGR 3390U.

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. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisites: MATH 2860U, 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. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisites: PHY 1010U, ENGR 2220U.

ENGR 3390U Mechatronics. This course provides students with the tools required to design, model, analyse and control mechatronic systems; i.e. smart systems comprising electronic, mechanical, fluid and thermal components. The techniques for modelling 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. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisites: ENGR 3270U, ENGR 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. A special requirement for students in engineering and management programs is that, because of the dual orientation of such programs, some of the design projects must be of an engineering-management type and involve business and/or management factors. 3 cr, 3 lec, 2 oth. Prerequisite: successful completion of all non-elective courses in year three.

ENGR 3410U Electromechanical Energy Conversion. This course provides an understanding of the principles of electromechanical energy conversion and introduces some common devices employed in the process. Specific topics covered include the principles of electromechanical energy conversion; ferromagnetic materials and their properties; basic operating concepts and steady state models for transformers, dc machines, and ac machines; electromechanical test and measurement procedures; characteristics and behaviour of machines. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisites: ENGR 2790U, ENGR 2320U or ENGR 2640U.

ENGR 3420 Energy and Environmental Impact. Environmental impact of energy systems such as power generation, industrial processes and transportation. Air, soil and water pollution. Pollutants from power production and engines and their effects on the environment, generation mechanisms of chemical pollutants, photochemical pollutants and smog, fluid mechanics of jets, plumes, thermals and turbulent diffusion in the atmosphere. Design for environment methods, including pollution prevention techniques, life cycle assessment, pollution abatement devices and control methods, including exhaust gas treatment, absorption, filtration, scrubbers. Industrial ecology.

Environmental legislation. Design of sustainable energy systems. 3 cr, 3 lec, 1 tut. Prerequisites: ENGR 3260U, ENVS 1000U.

ENGR 3450U Combustion and Engines. Combustion fundamentals, including flame stoichiometry, chemical kinetics, flame temperature, pre-mixed and diffusion flames. Applications to engineered combustion systems such as furnaces and fossil-fuelled engines. Continuous and unsteady combustion systems. Internal combustion engines, including cycles, fuels and lubricants, supercharging, carburetion, valving, manifolding, combustion chamber ignition and fuel injection; engine performance and testing. Design of combustors and engines. Methods for increasing combustion efficiency and reducing pollutant formation. Pollution reduction techniques. Safety issues. 3 cr, 3 lec, 2 lab (biweekly), 1 tut. Prerequisites: CHEM 1800U, ENGR 2320U.

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. 3 cr, 3 lec, 1 oth.

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 offline control of process chemistry; metallurgical problems in nuclear power plants; metallurgical techniques for irradiated materials. 3 cr, 3 lec. 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. 3 cr, 3 lec.

ENGR 3540U Nuclear Steam Supply Systems. Introduction to thermal and fast reactors and reactor cooling systems; 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. 3 cr, 3 lec. Prerequisite: ENGR 2500U.

ENGR 3550U Nuclear Plant Steam Utilization Systems. Main design and operating features of nuclear power plant steam utilization systems using pressurized and boiling light water, pressurized heavy water and gas cooled reactors; steam utilization systems for small, medium and large reactors; unit control schemes; steam generator design and operating features, steam generator level and pressure control; turbine and generator operation; condenser and feedheating systems. 3 cr, 3 lec. Prerequisite: ENGR 3540U.

ENGR 3560U Radioactive Waste Management. 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. 3 cr, 3 lec. Prerequisite: ENGR 2500U.

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. 3 cr, 3 lec, 2 lab. Prerequisite: 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 kinetics; aqueous corrosion kinetics; practical applications. 3 cr, 3 lec. 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. 3 cr, 3 lec, 1 oth. Prerequisites: ENGR 3570U, ENGR 3930. Co-requisite: 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. 3 cr, 3 lec, 2 lab. Prerequisite: ENGR 2950U. Note: Elective for Nuclear Engineering or Radiation Science programs.

ENGR 3730U Solar Energy Technologies. Incidence, absorption, reflection and re-radiation of sunlight; spectral characteristics and material properties for absorption and radiation of sunlight; fundamentals of photovoltaic generation, typical materials used in solar cells; design, operation and maintenance of photovoltaic systems; design of solar cells, current conversion and conditioning, storage and distribution of electricity in solar systems; concentrating solar systems; design and operation of solar hot water and space heating systems, including energy storage devices for these systems. 3 cr, 3 lec, 2 lab (biweekly). Prerequisite: ENGR 3260U.

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. 3 cr, 2 lec, 2 lab.

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. 3 cr, 3 lec, 1 oth. 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. 3 cr, 3 lec. Prerequisites: ENGR 2500U, MATH 2820U.

ENGR 3830U Wind Energy Systems. Availability and characteristics of wind energy; location of individual generators and wind farms; wind turbine designs for maximum range of wind speeds and electrical outputs; design of associated mechanical and electrical systems; characteristics of energy storage devices for wind energy systems; operation and maintenance of wind generators; design aspects to minimize environmental impact, construction and operating costs; wind turbine and system designs to meet the needs of the bulk electric system. 3 cr, 3 lec, 1 oth. Prerequisite: ENGR 3260U.

ENGR 3840U Fuel Cell Design. Principles and current state of fuel cell technologies; fuel cell thermodynamics; transport processes; electrochemistry; reliability and efficiency; fuel cell systems and areas of applications; design of various fuel cell types, including Phosphoric Acid Fuel Cells, Alkaline Fuel Cells, Proton Exchange Membrane, Molten Carbonate Fuel Cells, Solid Oxide Fuel Cells, Direct Methanol Fuel Cells. 3 cr, 3 lec, 2 lab (biweekly). Prerequisite: ENGR 3260U.

ENGR 3860U Introduction to Nuclear Technology. This course is designed to provide the radiation science student a working background in nuclear reactor technology, so that they may be prepared to work in and around nuclear fission (or fusion) reactors. The emphasis of the course is on health physics and radiation protection aspects of the nuclear fuel cycle. Elementary reactor operation will be covered in sufficient detail to allow the student to have a working knowledge of where radiation hazards are produced, and what controls can be used to minimize the hazards. Nuclear reactor safety and control systems will be covered, and the inherent safety of the CANDU design will be described, and compared with other common designs such as PWR, BWR, RBMK etc. 3 cr, 3 lec, 2 oth (biweekly). Prerequisites: ENGR 2500U, PHY 1020U.

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. 3 cr, 3 lec. Prerequisites: ENGR 2950U, ENGR 2220U. Note: Elective for Nuclear Engineering or Radiation 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. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisite: ENGR 2320U or ENGR 2010U.

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. 3 cr, 3 lec, 1 oth. Prerequisite: ENGR 4045U.

ENGR 4045 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. 3 cr, 3 lec, 1 oth. Prerequisite: STAT 2800U.

ENGR 4160U Artificial Intelligence in Engineering. 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 engineering, design and manufacturing. 3 cr, 3 lec, 1 oth. Prerequisites: ENGR 3350U, MATH 2070U.

ENGR 4210U Advanced Solid Mechanics and Stress Analysis. Three-dimensional stress analysis; strain energy; energy methods; finite element method; asymmetric and curved beams, superposition of beam solutions, beams on elastic foundations; plate bending; buckling, including Euler's formulae for buckling; eccentric loading; fracture mechanics; fatigue. 3 cr, 4 lec, 2 lab (biweekly), 1 oth. Prerequisite: ENGR 2420U.

ENGR 4220U Mechanical Systems Design. This course covers the science and morphology of design for a range of mechanical engineering devices, processes and systems, as well as the impact of design on society. Students work in small groups of three or four and complete a series of projects in which they integrate efficient production methods, cost effectiveness, modern materials utilization, etc. The "best" solutions are chosen from a group of solutions presented to them, based on specified criteria. A special requirement for students in engineering and management programs is that, because of the dual orientation of such programs, some of the design projects must be of an engineering-management type and involve business and/or management factors. 3 cr, 3 lec, 2 oth. Prerequisite: Successful completion of all non-elective courses in year three.

ENGR 4230U Thermofluids and Energy Systems Design. This course covers the science and morphology of design as applied to thermal, fluids and energy processes and systems. Students work in small groups of three or four and complete a series of projects in which they integrate the principles of fluid mechanics, thermodynamics and heat transfer into designs. Design criteria include energy efficiency, environmental impact, economics, etc. A special requirement for students in engineering and management programs is that, because of the dual orientation of such programs, some of the design projects must be of an engineering-management type and involve business and/or management factors. 3 cr, 3 lec, 2 oth. Prerequisite: Successful completion of all non-elective courses in year three.

ENGR 4240U Applied Thermal and Fluids Engineering. This course incorporates the fundamental principles of thermodynamics and fluid mechanics to engineering applications. Topics covered include refrigeration; heating, ventilating and air conditioning; heat engine cycles, including the Rankine cycle; combustion; pipe networks; flow transients, including water hammer; open channel and free surface flows; flow machines including pumps, turbines and propellers. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisites: ENGR 2320U, ENGR 2860U.

ENGR 4250U Advanced Materials Engineering. Methodology of materials selection; evaluation of property data; materials testing; tensile properties, hardness, impact properties, fatigue, creep; failure and modes of fracture; interrelationships of structure, properties and processing; structural modifications in metals, ceramics and composite materials; strengthening mechanisms; heat treatment; processing and applications of engineering materials; introduction to electron microscopy, x-ray diffraction, and mass spectrometry. 3 cr, 3 lec, 1 oth. Prerequisites: ENGR 2220U, ENGR 2420U.

ENGR 4260U Automotive Engineering. This course covers technical systems and related engineering activities of vehicles with respect to vehicle design, analysis, and performance development. Topics covered are: Introduction to automotive engineering and fundamentals of vehicle dynamics; Design layout of different parts of powertrain; Engine and Traction; Static and dynamic weight of vehicles and dynamic load transfer; Cornering, skidding, and overturning; Traveling uphill, downhill, and on banked road; Lane change performance, accelerating, and braking of road vehicles; Air, gradient, and rolling resistances; determination of the center of mass; Suspension systems; Steering systems; Ride quality; Handling performance; Vibrations of parts and total vehicle; Active and semi-active suspensions; Tires and wheels; Articulated heavy vehicles including log-hauling and fluid tanker trucks; Issues involved in the design and proving ground testing of vehicles. 3 cr, 3 lec, 1 oth. Prerequisites: ENGR 2020U, ENGR 3350U.

ENGR 4280U Robotics and Automation. 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. 3 cr, 3 lec, 2 lab (biweekly), 1 oth. Prerequisite: ENGR 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. 3 cr, 4 lec, 2 lab (biweekly), 1 oth. Prerequisites: ENGR 3300U, ENGR 4390U.

ENGR 4310U Electronics. The focus of this course is the analysis and design of electronic circuits. Semiconductors, fundamental characteristics, modes of operation, and types of diodes, bipolar junction transistors, field-effect transistors; non-linear circuit applications: small-signals and rectifiers; transistor biasing and amplifiers; integrated circuits: fabrication and characteristics. 3 cr, 3 lec, 2 lab (biweekly), 1 tut. Prerequisites: ENGR 3330U, ENGR 3390U.

ENGR 4320U Advanced Mechatronics. The focus of this course is to provide the tools required to design, model, analyze and control mechatronics systems. Modeling of various system components into a unified approach and tools for the simulation of the performance of these systems; characteristics of typical mechatronics systems in terms of their impacts on enhancement of performance, speed of operation, and physical size; applications of mechatronics to robotics and automation industry, and other intelligent systems. 3 cr, 4 lec, 2 lab (biweekly), 1 tut. Prerequisites: ENGR 3330U, ENGR 3390U.

ENGR 4330U Mechatronic Systems Design. This course covers design considerations for systems that incorporate mechatronic components. Topics covered include the principles of mechatronic control, including single and two-degree of freedom systems; linear feedback; disturbance rejection; state estimation, and filtering. Students work in small groups of three or four and complete in a series of projects in which they integrate efficient production methods, cost effectiveness, modern materials utilization, etc. A special requirement for students in engineering and management programs is that, because of the dual orientation of such programs, some of the design projects must be of an engineering-management type and involve business and/or management factors. 3 cr, 3 lec, 2 oth. Prerequisite: Successful completion of all non-elective courses in year three.

ENGR 4350U Microprocessors. Number systems, architecture, instructions, and subroutines; algorithms; memory; PIA; interrupts and timers; transistors; binary inter-

faces; conversion of A/D and D/A; stepper motors; dc motors; z-transform; breadboard integration; steady state analysis and component ratings; control loop design and control loop modelling. 3 cr, 3 lec, 2 lab (biweekly), 1 tut. Prerequisites: ENGR 3350U, ENGR 3390U.

ENGR 4360U Nuclear Plant Electric and Auxiliary Systems. Nuclear plant unit electrical distribution systems, plant emergency electric power systems; condenser cooling systems; water and air cooling systems; low-pressure, high-pressure and recirculating service water systems; demineralized water systems; heavy water management and upgrading; instrument and breathing air systems; other auxiliary plant systems. 3 cr, 3 lec. Prerequisite: ENGR 3550U.

ENGR 4370U Nuclear Plant Safety. 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; examples of nuclear accidents. 3 cr, 2 lec, 2 tut (biweekly). Prerequisite: ENGR 4640U.

ENGR 4380U Life Cycle Engineering. The course introduces the fundamentals of both product and process engineering with an emphasis on life cycle models. A mixture of practical and theoretical topics, methodologies, principles, and techniques of life-cycle engineering are covered such as design reviews, re-engineering, mass customization, product modularity, cost/benefit analysis, value engineering, and life-cycle design [e.g., Design for Assembly (DFA), Design for Manufacturing (DFM), Design for Serviceability (DFS), Reliability design etc.]. Students develop an understanding of the performance, cost, and environmental implications of both product design and manufacture and become capable of translating these into engineering "cradle-to-grave" responsibility requirements, goals, and specifications in order to maximize the values of products and the effectiveness of supply chain management while containing the costs to the manufacturer, the user, and society. 3 cr, 3 lec, 1 oth (biweekly). Prerequisite: ENGR 2310U.

ENGR 4390U Modelling Manufacturing Systems. Queuing theory; production scheduling; modelling of production systems; discrete event simulation languages and programming; discrete event simulation software for manufacturing; production process scheduling; capacity planning; analytic rapid modelling; facility simulation. 3 cr, 4 lec, 2 lab. Prerequisite: ENGR 3300U.

ENGR 4410U Fossil Fuel Energy Conversion. Electrical systems loads, peaks, reliability. Types of fossil fueled power plants. Complex Rankine and Brayton cycles. Combined-cycle power plants. Cogeneration and trigeneration. Efficiencies, irreversibilities and losses. Steam supply systems: coal firing systems; steam generator types; steam plant efficiencies; heat transfer and thermal transport in fossil fuel fired steam generators. Steam turbines: impulse and reaction blading; mechanical design of turbine components and operational considerations; efficiencies. Gas turbines: gas path design; heat balance and efficiency determination; performance analysis of actual power plant turbines; design aspects. Fans, centrifugal and axial-flow compressors, and their design. Auxiliary power plant equipment: heat exchangers, fuel preparation, water treatment, cooling equipment. 3 cr, 3 lec, 2 lab (biweekly), 1 tut. Prerequisite: ENGR 3260U.

ENGR 4430U Sustainable and Alternative Energy Technologies. Descriptions of systems and design issues and parameters, including performance, operating characteristics, reliability. Small-scale hydraulic energy. Tidal and wave energy. Solar energy systems, including photovoltaics and thermal systems. Wind energy systems. Biomass energy. District energy. Hydrogen energy systems, including production, storage, transport and utilization technologies. Fuel cells: fundamentals such as fuel cell thermodynamics, electrode kinetics; and types, including proton exchange membrane and solid oxide fuel cells. Energy storage, including thermal, compressed air and battery storage. Geothermal energy systems. Magnetohydrodynamics, thermoelectrics, thermionics. Future directions. 3 cr, 4 lec, 2 lab (biweekly), 1 tut. Prerequisite: ENGR 4240U.

ENGR 4440U Advanced Power Generation. Fundamental and applied aspects of nuclear engineering: structure of the nucleus; nuclear stability and radioactive decay; interaction of radiation with matter includ-

ing radiological health hazards; interaction of neutrons including cross-sections, flux, moderation, fission, neutron diffusion and criticality; engineering of nuclear reactors; reactor start-up, shut down and refuelling; reactor systems including CANDU and U.S. reactors, and gas-cooled and breeder reactors; reactor accidents, fuel cycles and waste disposal. Fusion. Hydroelectric power generation: turbines and other components, water reservoirs, pumped energy storage. Aircraft gas turbine engines, including turbojets and turbofans; intakes, nozzles; aero-derivative gas turbines for terrestrial applications. 3 cr, 4 lec, 1 tut. Prerequisite: ENGR 4240U.

ENGR 4450U Thermal Environmental Engineering. Heating, ventilating, air conditioning and refrigeration. Psychrometrics and psychrometric processes. Sensible heating and cooling, cooling and dehumidification, mixing and humidification. Ventilation and room air distribution. Human comfort. Indoor air quality. Refrigeration and refrigeration systems. Design of air conditioning and heating systems. Equipment selection. Duct and fan design. Pump and piping design. Energy management in buildings. 3 cr, 3 lec, 2 lab (biweekly), 1 tut. Prerequisite: ENGR 4240U.

ENGR 4460U Nuclear Power Systems. Principles of fission; nuclear fuels; thermal and fast reactors; converters and breeders; light water reactors; heavy water reactors, gas cooled reactors; direct and indirect cycle nuclear plants; unit control strategies; nuclear plant safety; fuel cycles; plant decommissioning; waste management; environmental effects; life-cycle costs. Principles of fusion reactors; experimental fusion facilities. 3 cr, 3 lec. Prerequisites: ENGR 2360U, ENGR 3260U.

ENGR 4470U Hydrogen Power Systems. Potential benefits of the hydrogen economy; hydrogen production by reforming and by electrolysis; storage methods, including compressed gas, liquid hydrogen, metal hydride, graphite, iron sponge; minimizing combustion and explosion hazards; applications in transportation, small and large scale stationary power applications; integrated energy systems using hydrogen as the key energy carrier. 3 cr, 3 lec. Prerequisite: ENGR 3840U.

ENGR 4480U Emerging Energy Systems. This course will examine recent advances in energy systems, including fossil, nuclear, solar, wind, biomass, municipal waste, geothermal, tidal and wave energy; new energy sources, methods of conversion, transportation, storage and disposal will be examined from a systems point of view, and include environmental, economic and political aspects; feasibility of new technologies and significant advances in existing technologies will be examined. 3 cr, 3 lec. Prerequisite: ENGR 3260U.

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. 3 cr, 2 lec, 1 oth. Prerequisites: ENGR 4640U, ENGR 4660U, ENGR 4700U.

ENGR 4530U Hydroelectric Power Systems. Principles of hydroelectric energy conversion; design of dams and reservoirs; run-of-river plants; design of hydroelectric turbine-generators; AC and DC generators; mini- and micro-hydro generators; operating and maintenance aspects; special uses as spinning reserves and for frequency control of the bulk electric system; pumped-storage; environmental impacts. 3 cr, 3 lec. Prerequisites: ENGR 2360U, ENGR 3260U.

ENGR 4540U Energy Efficiency, Management and Simulation. Exergy analysis and other second-law analysis methodologies: theoretical foundations, exergy efficiencies and losses, applications to devices and systems; use in efficiency improvement and design. Energy management: energy control and usage strategies, energy economics, energy audits, energy

conservation strategies, design for energy improved management. Simulation and computational methods for energy and thermofluids systems: Conservation and energy equations; finite difference and element methods; one- and two-dimensional steady and unsteady problems; computational fluid dynamics; use of simulation in energy systems design. 3 cr, 3 lec, 1 oth. Prerequisite: ENGR 4240U.

ENGR 4550U 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 students having clearly defined roles, objectives and outcomes. The requirements include a written paper and a group presentation of the project outcomes. 3 cr, 1 lec, 4 lab, 1 oth. Prerequisite: Professor's permission.

ENGR 4560U 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. 3 cr, 6 lab. Prerequisite: ENGR 4550U.

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. 3 cr, 3 lec, 2 oth. Prerequisites: ENGR 3780U, ENGR 3820U. Co-requisite: 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. 3 cr, 3 lec, 1 oth. 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. 3 cr, 3 lec, 1 oth. Prerequisites: ENGR 2010U, ENGR 3780U. 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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec. Prerequisites: ENGR 3610U, ENGR 3780U.

ENGR 4880U Principles of Fusion Energy. This course 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. 3 cr, 3 lec. Prerequisites: ENGR 2500U, ENGR 3930U.

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. 3 cr, 1 lec, 4 lab, 1 oth. Prerequisite: 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. 3 cr, 3 lec, 4 lab, 1 oth. 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. Prerequisite: Successful completion of all third year non-elective courses. A special requirement for students in engineering and management programs is that, because of the dual orientation of such programs, the thesis topic be selected so as to allow the student to investigate, integrate and apply engineering and management principles, objectives, and practices. 3 cr, 6 oth.

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. 3 cr, 3 lec, 2 tut.

ENVS 2010U Introductory Environment Science. This course will introduce the scientific framework associated with the Earth's environment system. Topics include Earth's energy budget, structure and circulation of the atmosphere and oceans, hydrologic cycle, mass budget, cloud formation, precipitation, and surface run-off. Particular attention will be focused on the science of important environmental issues including climate change, ozone layer depletion, pollutant transport, impact of mercury, PCB and other contaminates, and land-use influence on precipitation run-off and flooding. Whenever possible, case studies of actual environmental problems will be used to highlight the importance of the scientific issues. 3 cr, 3 lec, 2 tut. Prerequisites: CHEM 1020U, PHY 1020U.

ENVS 2020U Introductory Energy Science. This course introduces the basic sources of energy available on Earth, the primary uses and economic aspects of energy, and the means by which energy is delivered from source to use. The course will begin with basic concepts of thermodynamics including the first and second laws and entropy. The Earth's energy balance will be studied. The principal sources and uses of energy will be examined. Energy delivery through conventional liquid and gaseous fuels, electricity and novel systems such as hydrogen and fuel cells will be described. The economic aspects of energy utilization will be discussed. 3 cr, 3 lec, 2 tut. Prerequisites: CHEM 1020U, PHY 1020U.

ENVS 4010U Economics and Politics of the Environment. This course provides an overview of the social aspects of energy and the environment, with particular focus on economic, political, and management dimensions. The course will emphasize practical applications of theory to contemporary issues. Examples and discussion in the course will focus on matters of energy and the environment. 3 cr, 3 lec, 1 tut. Prerequisites: BUSI 1600U, ENVS 2010U, ENVS 2020U.

HLSC 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. 3 cr, 2 lec, 1.5 tut.

HLSC 1201U Anatomy & Physiology II. This course is a continuation of Anatomy & Physiology I: 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. 3 cr, 2 lec, 1.5 tut. Prerequisite: HLSC 1200U.

HLSC 2030U Interpersonal Communication. An interdisciplinary course designed to provide students with theory and practice in core individual and group communication principles that will prepared them for professional relationships with clients, colleagues, team members and supervisors in the environment. 3 cr, 3 lec. Prerequisite: 30 credit hours.

HLSC 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. 3 cr, 2 lec, 1.5 tut. Prerequisite: HLSC 1201U.

HLSC 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. 3 cr, 2 lec, 1.5 tut. Prerequisite: HLSC 2460U.

HLSC 3710U 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. 3 cr, 3 lec.

HLSC 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, 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. 3 cr, 3 lec. Prerequisite: STAT 3800U.

HLSC 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 influences 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. 3 cr, 3 lec. Prerequisite: 60 credit hours.

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 the 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 the criminal law, and theories of crime causation. 3 cr, 3 lec.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec.

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 postmodern theories. The selected paradigms are studied with regard to their explanatory domain, role in examining social and criminological problems and the development of policies. 3 cr, 3 lec. 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. 3 cr, 3 lec.

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. 3 cr, 3 lec. Prerequisites: JSTS 1420U, PSYC 1000U, SOCI 2000U.

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. 3 cr, 3 lec.

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. 3 cr, 2 lec, 1 lab. 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. 3 cr, 3 lec. Prerequisites: JSTS 1000U, JSTS 1260U, JSTS 1600U, SOCI 1000U.

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. 3 cr, 2 lec, 1 lab. Prerequisite: SOCI 1000U.

JSTS 2820U Quantitative Methods. This course offers an introduction to quantitative research methods in criminology and social sciences. 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. Activities in this course are designed to build on those in the Research Methods course. 3 cr, 3 lec, 2 lab. Prerequisite: JSTS 2900U. Credit restrictions: BUSI 1450U, STAT 2010U, STAT 2020U, STAT 2800U, STAT 3800U.

JSTS 2900U Research Methods. This course is designed as an introduction to research methods in criminology and the social sciences. 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 an area of professional interest. 3 cr, 3 lec, 2 lab. Prerequisites: PSYC 1000U, SOCI 1000U.

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. 3 cr, 3 lec. Prerequisites: JSTS 2040U, JSTS 2550U, JSTS 2710U, JSTS 2820U, JSTS 2900U

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. 3 cr, 3 lec. 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). 3 cr, 3 lec. 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 analysed in relation to conflict in Canadian society. 3 cr, 3 lec. 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. 3 cr, 3 lec. Prerequisites: JSTS 2040U, JSTS 2550U, JSTS 2710U, JSTS 2820U, JSTS 2900U.

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. 3 cr, 3 lec. Prerequisites: JSTS 2040U, JSTS 2550U, JSTS 2710U, JSTS 2820U, JSTS 2900U.

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. 3 cr, 3 lec. Prerequisites: JSTS 2040U, JSTS 2550U, JSTS 2710U, JSTS 2820U, JSTS 2900U.

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 analyse the problems of decision-making and implementation of government initiatives. 3 cr, 3 lec. 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 field work practicum will enhance the integrated approach, as students will have the opportunity to have experience in several organizations within the justice field. 3 cr, 3 lec. Prerequisites: JSTS 2040U, JSTS 2190U, JSTS 2370U, JSTS 2550U, JSTS 2640U, JSTS 2710U, JSTS 2820U, JSTS 2900U.

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. 3 cr, 3 lec. 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. 3 cr, 3 lec. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3650U, JSTS 3670U, JSTS 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. 3 cr, 3 lec.

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. 3 cr, 3 lec. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3650U, JSTS 3670U, JSTS 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. 3 cr, 3 lec. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3650U, JSTS 3670U, JSTS 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. 3 cr, 3 lec. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3650U, JSTS 3670U, JSTS 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 analyse the theoretical and treatment effectiveness. 3 cr, 3 lec. Prerequisites: JSTS 3020U, JSTS 3210U, JSTS 3520U, JSTS 3650U, JSTS 3670U, JSTS 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 field work 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 Field Work Practicum I if this addresses their learning experience goals. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec.

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. 3 cr, 3 lec, 2 tut. Prerequisite: OAC Calculus or 12U Advanced Functions and Introductory Calculus. Credit restriction: MATH 1880U.

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. 3 cr, 3 lec, 2 tut. Prerequisite: MATH 1010U. Credit restriction: MATH 1880U.

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. 3 cr, 3 lec, 2 tut. Credit restriction: MATH 2050U.

MATH 1880U Mathematical Modelling for Health Science. This course enables the student to gain an understanding of the use of mathematical modelling as a tool in the health sciences, and to be able to carry out such modelling at an elementary level. This will enable the student to better understand current and future developments in medical practice that are based upon the use of mathematical models. Topics and their applications will include: functions and graphs, sequences and series, difference equations, differentiation and integration. 3 cr, 3 lec, 2 tut. Credit restrictions: MATH 1010U, MATH 1020U. Note: Not for credit in a Science or Engineering program.

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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 1020U. Credit restriction: 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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 2010U. Credit restriction: 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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 1020U.

MATH 2050U Linear Algebra I. This course is designed to develop the fundamental ideas of linear algebra, and to demonstrate some applications of linear algebra to other areas. Topics include the algebra of matrices; qualitative and quantitative solutions of systems of linear equations; determinants and matrix inverses; real and complex vector spaces, and subspaces, linear

independence, bases, dimension and coordinates; inner product spaces and the Gram-Schmidt process; inconsistent (overdetermined) systems of equations, least squares solutions and regression; linear maps and matrices, change of basis and similar matrices; eigenvalues, eigenvectors and matrix diagonalisation; diagonalization of real symmetric matrices and quadratic forms. 3 cr, 3 lec. Prerequisite: MATH 1010U.

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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 1020U. Credit restrictions: 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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 1020U. Credit restrictions: MATH 2072U.

MATH 2072U Computational Science I. 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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 1020U. Credit restriction: MATH 2070U.

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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 1020U. Credit restrictions: MATH 2010U, 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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 1020U. Credit restriction: 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. 3 cr, 3 lec. 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. 3 cr, 3 lec. Prerequisites: MATH 2010U, MATH 2050U.

MATH 3040U Operations Research I.

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. 3 cr, 3 lec. 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 Laurant series; analytic continuation; the residue theorem with applications; conformal mappings with applications. 3 cr, 3 lec. 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. 3 cr, 3 lec. 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. 3 cr, 3 lec. Prerequisites: MATH 2050U, MATH 2060U, MATH 3020U.

MATH 4020U Computational Science II (formerly 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 such as Maple and MatLab will be used in assignments. 3 cr, 3 lec. Prerequisites: MATH 2010U, MATH 2050U, MATH 2072U, CSCI 3020U.

MATH 4030U Biomathematics. An introduction to mathematical modelling 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. 3 cr, 3 lec. 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. 3 cr, 3 lec. Prerequisites: MATH 3020U, MATH 3050U, MATH 3060U.

MATH 4060U 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. 3 cr, 3 lec. Prerequisites: MATH 2010U, MATH 2050U, STAT 2010U or STAT 2020U.

MATH 4400U Thesis.

MATH 4600U 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: modelling and algorithms. 3 cr, 3 lec. Prerequisites: MATH 4060U.

MLSC 1010U Introduction to Medical Laboratory Practice. A course designed to provide students with early socialization into the role of a medical laboratory scien-

tist, which will include study of the role and scope of practice, career opportunities, and exposure to practitioners and agencies in related services. 3 cr, 3 lec.

MLSC 2110U Clinical Biochemistry I.

MLSC 3110U Clinical Biochemistry II.

MLSC 3120U Clinical Hematology.

MLSC 3130U Clinical Microbiology.

MLSC 3210U Laboratory Management and Quality Assurance.

MLSC 3220U Hemostasis and Transfusion Science.

MLSC 3230U Histology.

MLSC 3300U Clinical Practicum I.

MLSC 3910U Clinical Problems and Research Seminar.

MLSC 4400U Clinical Thesis I.

MLSC 4300U Clinical Practicum II.

MLSC 4401U Clinical Thesis II.

MLSC 4301U Clinical Practicum III.

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. 3 cr, 4 lec, 4 lab.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec. Prerequisites: NURS 1005U, NURS 1100U, NURS 1420U.

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. 3 cr, 3 lec.

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. 3 cr, 4 lab. Prerequisites: NURS 1005U, NURS 1100U, NURS 1420U.

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 of 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. 3 cr. Prerequisites: NURS 1150U, NURS 1505U

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. 3 cr, 3 lec. Prerequisite: NURS 1150U.

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. 3 cr, 3 lec. Prerequisite: NURS 1150U

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. 3 cr, 1.5 lec, 2 lab. Prerequisite: HLSC 1201U.

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. 3 cr. Prerequisites: NURS 1150U, NURS 1505U.

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. 3cr. Prerequisites: NURS 2005U, NURS 2320U, NURS 2505U.

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. 3 cr, 3 lec. Prerequisites: NURS 2100U, NURS 2150U.

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. 3 cr, 3 lec. Prerequisites: NURS 2100U, NURS 2150U.

NURS 3420U Development of Self as a Nurse II. This course builds on the caring concepts introduced in year 1. 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. 3 cr, 3 lec. Prerequisite: NURS 1420U.

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 deterio-

ration in illness trajectory. Client health challenges addressed in this clinical experience are complex and have a high acuity level. 3 cr. Prerequisites: NURS 2005U, NURS 2320U, NURS 2505U.

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. 3 cr. Prerequisites: NURS 3005U, NURS 3505U.

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. 3 cr, 3 lec. Prerequisites: NURS 3100U, NURS 3150U.

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). 3 cr, 3 lec. Prerequisite: NURS 3420U.

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. 3 cr. Clinical prerequisites: NURS 4005U, NURS 4100U.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (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. Credit restrictions: PHY 1030U, PHY 1810U.

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. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisite: PHY 1010U. Credit restrictions: PHY 1040U, PHY 1810U.

PHY 1030U Physics for Biosciences I. This course introduces basic concepts of physics relevant to the biological sciences, in the areas of mechanics; vibrations and waves; properties of solids, liquids and gases; and heat. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisites: Advanced Functions and Introductory Calculus 4U or OAC Calculus (required); Physics 4U or OAC Physics (recommended). Credit restrictions: PHY 1010U, PHY 1810U. Note: 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 1040U Physics for Biosciences II. This course introduces basic concepts of physics relevant to the biological sciences, in the areas of electricity and magnetism; optics; sound and acoustics; nuclear physics and nuclear medicine. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisites: PHY 1010U or 1030U. Credit restrictions: PHY 1020U, PHY 1810U.

PHY 1810U Physics for Health Sciences. This course provides some of the basic physics needed by health scientists. The topics covered are biomechanics, fluid mechanics, optics and electricity. 3 cr, 3 lec, 2 tut. Course restrictions: PHY 1010U, PHY 1020U, PHY 1030U, PHY 1040U.

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. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (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. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisite: 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. 3 cr, 3 lec, 2 tut. Prerequisites: CSCI 1000U, MATH 1020U, PHY 1010U.

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. 3 cr, 3 lec, 2 tut. Prerequisite: 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. 3 cr, 3 lec, 1 tut. Prerequisites: MATH 1010U, PHY 1010U. Credit restriction: 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. 3 cr, 3 lec. 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. 3 cr, 3 lec. 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. 3 cr, 3 lec, 3 lab (biweekly). Prerequisite: 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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec, 3 lab (biweekly). Prerequisite: 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. 3 cr, 3 lec. Prerequisite: PHY 2040U.

PHY3070U Relativity and Nuclear Energy. After a brief introduction to Einstein's special theory of relativity, and in particular to the equivalence of mass and energy, the energy available from nuclear fission and fusion is examined in detail. Topics include radioactivity: alpha, beta and gamma decay, binding energy; nuclear fission: chain reactions, neutron density and flux; nuclear fusion: plasma reactors, temperature, density and time duration of plasmas. Different types of currently existing fission reactors, and the current state of research on fusion reactors, will be examined. 3 cr, 3 lec. Prerequisite: PHY 1020U.

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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec. 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. 3 cr, 3 lec. Prerequisites: PHY 3040U, PHY 4010U, PHY 4020U.

PHY 4040U Solar Energy and Photovoltaics. This course describes the basic science and the practical devices for conversion of solar energy into electrical energy using the photovoltaic effect. Topics include an introduction to renewable energy and the benefits of photovoltaics; absorption of solar energy: the solar spectrum, Air Mass; band structure and optical properties of materials and principles of devices that are relevant to photovoltaics; thermodynamics of light conversion; solar cell technology; photovoltaic systems and system economics. 3 cr, 3 lec, 3 lab (biweekly), 2 tut (biweekly). Prerequisites: PHY 3010U, PHY 3020U, PHY 3030U.

PHY 4050U Terrestrial-Based Energy Systems. The course starts with a brief review of energy in the Earth system, including hydro power, tidal and wave energy, heat pumps and geothermal energy, wind energy, solar and terrestrial radiation, global energy budget, global atmosphere

and ocean structure and circulations, and the water cycle. More emphasis will be placed on wind power than other systems since wind is the most rapidly expanding renewable energy source at present. Students will study the economics, politics and social impacts of earth-based energy systems, in Canada and globally, advantages of mixed systems (wind-hydro, wind-diesel), public safety issues (dams and wind turbines), and environmental impact issues. 3 cr, 3 lec, 3 lab (biweekly). Prerequisites: PHY 2020U, PHY 3060U.

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. 3 cr. Prerequisite: Completion of three 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. 3 cr, 3 lec. Prerequisites: BIOL 1020U, PHY 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. 3 cr, 3 lec.

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. 3 cr, 3 lec.

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. 3 cr, 3 lec.

RADI 2100U Radiological and Health Physics. This course is designed to teach the fundamental principles and numerical calculation aspects of health physics. Topics include atomic and nuclear structure, radioactivity, radiation interaction with materials, radiation dosimetry, biological effects of radiation, internal and external radiation protection, health physics instrumentation, criticality safety, radiation protection guidance criteria and protective measures. In addition, the student will learn the fundamentals of non-ionizing radiation protection (for example, laser safety). By the end of the course the student will understand the differences between the various types of radiation, how to detect the various forms of radiation, their biological interactions and effects, ways to reduce exposure (shielding distance, time), the ALARA principle (and derivatives) and how to perform exposure calculations. 3 cr, 3 lec, 2 oth (biweekly). Prerequisites: ENGR 2500U, PHY1020U. Co-requisite: RADI 2110U.

RADI 2110U Health Physics Laboratory. This course is designed to complement the course entitled Radiological and Health Physics. The intent of the course is to teach students how to properly utilize various items of health physics instrumentation. Included in this list are the broad categories of radiation survey equipment, laboratory analysis equipment, radiation dosimetry, air sampling, and personal protective equipment (PPE). In addition, the

students will learn how to properly perform and record the QA associated with health physics measurements, with emphasis on medico-legal aspects of their measurements. 3 cr, 1 lec, 3 lab (biweekly), 3 oth (biweekly). Prerequisites: ENGR 2500U, PHY 1020U. Co-requisite: RADI2100U.

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. 3 cr, 3 lec. Prerequisites: BIOL 2840U, ENGR 2220U, ENGR 2500U. Co-requisite: RADI 2610U.

RADI 3220U Radiation Biophysics and Dosimetry. This course will concentrate on providing a biological basis for radiation interactions and dosimetry. The course will cover the following topics; natural and artificial environmental radiation; units and measurements; biological effects of radiation; maximum permissible radiation levels; exposure, absorbed dose, equivalent dose; radiation quality, build-up; charged particle equilibrium, physiological measurements; impact of various types and doses of radiation at the molecular, cellular, tissue and whole organism level; basic principle of radiation dosimetry for various kinds of radiation, including gamma, neutron and charged particles; low and high level radiation dosimetry; various types of radiation dosimeters; calculation of internal and external body radiation exposures and dosimetry; bioassays; regulatory requirements; safe working in radiation fields. The primary goals are to teach students the fundamental mechanisms of radiation interactions at the DNA levels, and the various end-points that can results. The concept of radiation hormesis will also be covered in this course, with emphasis on the beneficial end-points of radiation interaction. 3 cr, 3 lec, 2 oth (biweekly). Prerequisites: BIOL 2840U, ENGR 2500U, PHY 1020U, RADI 2100U, RADI 2110U.

RADI 3230U Scientific Instrumentation. This course is designed to instruct students how to select, use and analyze the appropriate sensor technology (transducers) for measurements related to nuclear technology. In the course the student will learn how to perform experimental data analysis, how various components of sensing devices inter-relate (for example, relationships between amplifiers, transformers, filters, A/D, D/A etc), the operating principles of transducers for physical measurements, including, but not limited to: ionizing radiation, displacement and area, pressure, flow, temperature, force, torque, strain, motion, vibration, and air pollution. The student will learn both analog and digital techniques for data analysis, including multiplexing, data conversion and error detection and correction. The laboratory exercises will give the student hands-on experience designing measurement systems. Proper data reporting techniques will also be emphasised. 3 cr, 3 lec, 3 lab (biweekly), 2 oth (biweekly). Prerequisites: ENGR 1200U, MATH 2860U, PHY 1020U.

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 interpret 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. 3 cr, 3 lec, 2 lab. Prerequisites: ENGR 2500U, ENGR 2950U.

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). 3 cr, 3 lec. 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. 3 cr, 3 lec, 1 lab, 1 oth. Prerequisites: BIOL 2840U, CHEM 1020U, ENGR 2500U. Co-requisite: 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. 3 cr, 3 lec, 2 lab. Prerequisites: ENGR 2220U, ENGR 4430U.

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. 3 cr, 3 lec, 2 lab. Prerequisites: BIOL 2840U, ENGR 4430U.

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. 3 cr, 3 lec, 1 lab, 1 oth. Prerequisites: RADI 3610U, RADI 3690U.

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 students having clearly defined roles, objectives and outcomes. The requirements include a written paper and a group presentation of the project outcomes. 3 cr, 1 lec, 4 lab, 1 oth. Prerequisite: 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. 3 cr, 1 lec, 4 lab, 1 oth. Prerequisite: Professor's permission.

SCIE 1900U Astronomy I. 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. 3 cr, 3 lec.

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 for non-science students and cannot be used for credit towards a science degree. 3 cr, 3 lec.

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. 3 cr, 3 lec.

STAT 2010U Statistics and Probability for Physical Science. This course introduces the concepts and techniques of statistics and probability to collect, present, analyse 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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 1020U. Credit restrictions: BUSI 1450U, JSTS 2820U, STAT 2020U, STAT 2800U, STAT 3800U.

STAT 2020U Statistics and Probability for Biological Science. This course introduces the concepts and techniques of statistics and probability to collect, present, analyse 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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 1020U. Credit restrictions: BUSI 1450U, JSTS 2820U, STAT 2010U, STAT 2800U, STAT 3800U.

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. 3 cr, 3 lec, 1 tut. Prerequisite: MATH 1020U. Credit restrictions: BUSI 1450U, JSTS 2820U, STAT 2010U, STAT 2020U, STAT 3800U.

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. 3 cr, 3 lec. Prerequisite: 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. 3 cr, 3 lec. Credit restrictions: BUSI 1450U, JSTS 2820, STAT 2010U, STAT 2020U, STAT 2800U.

Index

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