2019-2020 Undergraduate Calendar

The information published in this Undergraduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2019-2020 academic year, including the Summer Semester 2019, the Fall Semester 2019 and the Winter Semester 2020.

For your convenience the Undergraduate Calendar is available in PDF format.

If you wish to link to the Undergraduate Calendar please refer to the Linking Guidelines.

The University is a full member of:

• Universities Canada

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University of Guelph
Guelph, Ontario, Canada
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519-824-4120
https://www.uoguelph.ca

Revision Information:

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Disclaimer

University of Guelph 2019

The information published in this Undergraduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2019-2020 academic year, including the Summer Semester 2019, the Fall Semester 2019 and the Winter Semester 2020.

The University reserves the right to change without notice any information contained in this calendar, including fees, any rule or regulation pertaining to the standards for admission to, the requirements for the continuation of study in, and the requirements for the granting of degrees or diplomas in any or all of its programs. The publication of information in this calendar does not bind the University to the provision of courses, programs, schedules of studies, or facilities as listed herein.

The University will not be liable for any interruption in, or cancellation of, any academic activities as set forth in this calendar and related information where such interruption is caused by fire, strike, lock-out, inability to procure materials or trades, restrictive laws or governmental regulations, actions taken by faculty, staff or students of the University or by others, civil unrest or disobedience, public health emergencies, or any other cause of any kind beyond the reasonable control of the University.

In the event of a discrepancy between a print version (downloaded) and the Web version, the Web version will apply.

Published by: Enrolment Services
Introduction

Collection, Use and Disclosure of Personal Information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) http://www.e-laws.gov.on.ca/index.html. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes. Certain personal information is disclosed to external agencies, including the Ontario Universities Application Centre, the Ministry of Training, Colleges and Universities, and Statistics Canada, for statistical and planning purposes, and is disclosed to other individuals or organizations in accordance with the Office of Registrarial Services Departmental Policy on the Release of Student Information. For details on the use and disclosure of this information call the Office of Registrarial Services at the University at (519) 824-4120 or see http://www.uoguelph.ca/registrar/registrar/index.cfm?index.

Disclosure of Personal Information to the Ontario Ministry of Training, Colleges and Universities

The University of Guelph is required to disclose personal information such as characteristics and educational outcomes to the Minister of Training, Colleges and Universities under s. 15 of the Ministry of Training, Colleges and Universities Act, R.S.O. 1990, Chapter M.19, as amended. The Ministry collects this data for purposes including but not limited to planning, allocating and administering public funding to colleges, universities and other post-secondary educational and training institutions.

Amendments made to the Ministry of Training, Colleges and Universities Act, authorizing the collection and use of personal information from colleges and universities by the Minister which were set out in Schedule 5 of the Childcare Modernization Act, 2014, came into force on March 31, 2015. The amendments strengthen the ability of the Minister to directly or indirectly collect and use personal information about students as required to conduct research and analysis, including longitudinal studies, and statistical activities conducted by or on behalf of the Ministry for purposes that relate to post-secondary education and training, including,

i. understanding the transition of students from secondary school to post-secondary education and training,
ii. understanding student participation and progress, mobility and learning and employment outcomes,
iii. understanding linkages among universities, colleges, secondary schools and other educational and training institutions prescribed by regulation,
iv. understanding trends in post-secondary education or training program choices made by students,
v. understanding sources and patterns of student financial resources, including financial assistance and supports provided by government and post-secondary educational and training institutions,
vi. planning to enhance the affordability and accessibility of post-secondary education and training and the quality and effectiveness of the post-secondary sector,
vii. identifying conditions or barriers that inhibit student participation, progress, completion and transition to employment or future post-secondary educational or training opportunities, and
viii. developing key performance indicators.

Information that the University is required to provide includes but is not limited to: first, middle and last name, Ontario Educational Number, citizenship, date of birth, gender, first three digits of a student’s postal code, mother tongue, degree program and major(s) in which the student is enrolled, year of study and whether the student has transferred from another institution.

Further information on the collection and use of student-level enrolment-related data can be obtained from the Ministry of Training, Colleges and Universities website: https://www.ontario.ca/page/ministry-advanced-education-and-skills-development (English) or https://www.ontario.ca/fr/page/ministere-de-lenseignement-supieur-et-de-la-formation-professionnelle (French) or by writing to the Director, Postsecondary Finance and Information Management Branch, Postsecondary Education Division, 7th Floor, Mowat Block, 900 Bay Street, Toronto, ON M7A 1L2.

An update on Institutional and Ministry of Training, Colleges and Universities Act Notice of Disclosure Activities is posted at https://www.ontario.ca/page/ministry-advanced-education-and-skills-development

Frequently Asked Questions related to the Ministry’s enrolment and OEN data activities are also posted at: http://www.tcu.gov.on.ca/pepg/publications/NoticeOfCollection.pdf

Authority to Disclose Personal Information to Statistics Canada

The Ministry of Training, Colleges and Universities discloses student-level enrolment-related data it collects from the colleges and universities as required by Statistics Canada in accordance with Section 13 of the Federal Statistics Act. This gives the Ministry authority to disclose personal information in accordance with s. 42(1) (e) of FIPPA.

Notification of Disclosure of Personal Information to Statistics Canada

For further information, please see the Statistics Canada's web site at http://www.statcan.ca and Section XIV Statistics Canada.

Address for University Communication

Depending on the nature and timing of the communication, the University may use one of these addresses to communicate with students. Students are, therefore, responsible for checking all of the following on a regular basis:

Email Address

The University issued email address is considered an official means of communication with the student and will be used for correspondence from the University. Students are responsible for monitoring their University-issued email account regularly. See Section I--Statement of Students' Academic Responsibilities for more information.

Home Address

Students are responsible for maintaining a current mailing address with the University. Address changes can be made, in writing, through Enrolment Services.

Name Changes

The University of Guelph is committed to the integrity of its student records, therefore, each student is required to provide either on application for admission or on personal data forms required for registration, his/her complete, legal name. Any requests to change a name, by means of alteration, deletion, substitution or addition, must be accompanied by appropriate supporting documentation.

Student Confidentiality and Release of Student Information Policy Excerpt

The University undertakes to protect the privacy of each student and the confidentiality of his or her record. To this end the University shall refuse to disclose personal information to any person other than the individual to whom the information relates where disclosure would constitute an unjustified invasion of the personal privacy of that person or of any other individual. All members of the University community must respect the confidential nature of the student information which they acquire in the course of their work.

Learning Outcomes

On December 5, 2012, the University of Guelph Senate approved five University-wide Learning Outcomes as the basis from which to guide the development of undergraduate degree programs, specializations and courses:

1. Critical and Creative Thinking
2. Literacy
3. Global Understanding
4. Communicating
5. Professional and Ethical Behaviour

These learning outcomes are also intended to serve as a framework through which our educational expectations are clear to students and the broader public; and to inform the process of outcomes assessment through the quality assurance process (regular reviews) of programs and departments.

An on-line guide to the learning outcomes, links to the associated skills, and detailed rubrics designed to support the development and assessment of additional program and discipline-specific outcomes, are available for reference on the Learning Outcomes website.

1. Critical and Creative Thinking

Critical and creative thinking is a concept in which one applies logical principles, after much inquiry and analysis, to solve problems with a high degree of innovation, divergent thinking and risk taking. Those mastering this outcome show evidence of integrating knowledge and applying this knowledge across disciplinary boundaries. Depth and breadth of understanding of disciplines is essential to this outcome.

In addition, Critical and Creative Thinking includes, but is not limited to, the following outcomes: Inquiry and Analysis; Problem Solving; Creativity; and Depth and Breadth of Understanding.

2. Literacy

Literacy is the ability to extract information from a variety of resources, assess the quality and validity of the material, and use it to discover new knowledge. The comfort in using quantitative literacy also exists in this definition, as does using technology effectively and developing visual literacy.

In addition, Literacy includes, but is not limited to, the following outcomes: Information Literacy, Quantitative Literacy, Technological Literacy, and Visual Literacy.

3. Global Understanding:

Global understanding encompasses the knowledge of cultural similarities and differences, the context (historical, geographical, political and environmental) from which these arise, and how they are manifest in modern society. Global understanding is exercised as civic engagement, intercultural competence and the ability to understand an academic discipline outside of the domestic context.

In addition, Global Understanding includes, but is not limited to, the following outcomes: Global Understanding, Sense of Historical Development, Civic Knowledge and Engagement, and Intercultural Competence.

4. Communicating

Communicating is the ability to interact effectively with a variety of individuals and groups, and convey information successfully in a variety of formats including oral and written communication. Communicating also comprises attentiveness and listening, as well as reading comprehension. It includes the ability to communicate and synthesize information, arguments, and analyses accurately and reliably.

In addition, Communicating includes, but is not limited to, the following outcomes: Oral Communication, Written Communication, Reading Comprehension, and Integrative Communication.

5. Professional and Ethical Behaviour

Professional and ethical behaviour requires the ability to accomplish the tasks at hand with proficient skills in teamwork and leadership, while remembering ethical reasoning behind all decisions. The ability for organizational and time management skills is essential in bringing together all aspects of managing self and others. Academic integrity is central to mastery in this outcome.

In addition, Professional and Ethical Behaviour includes, but is not limited to, the following outcomes: Teamwork, Ethical Reasoning, Leadership, and Personal Organization and Time Management.
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Last Revision: July 4, 2019

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Bachelor of Applied Science (B.A.Sc.)

Program Information

The University of Guelph offers an 8 semester (20.00 credits) honours program leading to a Bachelor of Applied Science (B.A.Sc.) degree. Students must select one of the 3 following major areas of study:

- Adult Development (ADEV)
- Applied Human Nutrition (AHN)
- Child, Youth and Family (CYF)

Co-operative Education is available in the following programs:

- Adult Development (Co-op) (ADEV:C)
- Child, Youth and Family (Co-op) (CYF:C)

Elective offerings enable students to select courses which support or complement their primary field of study.

The program is interdisciplinary and provides a distinctive and integrated focus of applied social science in each of the 3 majors. Courses from the traditional disciplines in other departments in the University are coupled with courses offered by faculty members in the Department of Family Relations and Applied Nutrition whose own backgrounds reflect the interdisciplinary nature of the program.

Laboratory, practicum and field experiences enhance the students' opportunities to grasp the contributions of the social, physical and biological sciences to significant facets of human behaviour and experience, whether in family, community, or in educational settings.

Academic Counselling

Program Counselling

A B.A.Sc. program counsellor is available to assist prospective students in the selection of their major and initial courses, and to respond to questions regarding any other aspects of their anticipated program. The program counsellor will also assist in-course students who need information or advice about their program or other academic regulations, who seek information on services and resources available to students or who are contemplating transfer into or out of their current major or degree program.

Academic Advising

On entering the program all students are assigned to a departmental advisor by major. Co-operative Education students in all majors are also assigned to an advisor. This advisor is thoroughly familiar with the academic requirements of the program and is also knowledgeable about career opportunities which relate to a student's specific major. Students are strongly encouraged to attend all meetings called by their departmental advisors, and to set up individual meetings with them when they have questions or concerns about their major, or their performance in the program.

Continuation of Study

Students are advised to consult the regulations for Continuation of Study which are outlined in detail in Section VIII—Undergraduate Degree Regulations & Procedures.

Conditions for Graduation

To qualify for the degree Bachelor of Applied Science, the student must satisfy the following conditions:

- the student must have successfully completed the schedule of studies requirements for the specified major
- the student must have a cumulative average of 60% or higher
- the student must have a term academic standing of Eligible to Continue

Schedule of Studies

Courses specified in the Schedule of Studies are required courses and must be completed successfully. A full course load normally includes 2.50 credits (normally 5 courses). The requirements for each major are set out below.

Special Expenses

Expenses for field trips can range from $20 to $30 per semester in the first 4 semesters and from $25 to $50 in each of the last 4 semesters. In certain course modest expenses will be incurred for supplies and where appropriate for laboratory costs. According to recent Ontario legislation, agencies licensed by the Ministry of Community and Social Services which care for, or provide service to, children or vulnerable adults are required to do criminal reference checks on all their employees. Students enrolled in practica or field placement courses may be required to submit to the agency with which they are placed, personal information about any criminal convictions and pending criminal charges. The cost of acquiring this criminal reference check (Canadian Police Information Check) will be the responsibility of each student.

Adult Development (ADEV)

Department of Family Relations and Applied Nutrition, College of Social and Applied Human Sciences

The Adult Development major focuses on health and well-being from young adulthood to old age within the context of changing family relationships and diverse social and cultural influences. Courses focus on current research and theory in adult development and aging, family relationships, human sexuality, social policy and community services. Field placements and community service learning opportunities enable students to gain knowledge, skills and values appropriate for work with individuals and groups in a variety of settings.

Graduates of this program are pursuing careers in a variety of settings including family and community service agencies; government policy-making, administration, and health promotion divisions; support services delivery for seniors and their families; health care agencies; employee and family assistance programs; and local social planning councils. This program provides a solid foundation for the pursuit of graduate studies in fields such as: family relations and human development, social work, human sexuality, gerontology, physical, occupational and recreation therapy programs, family law and mediation, couple and family therapy, education, health promotion, social policy and human resource management (business).

This interdisciplinary program is designed to provide students with an understanding of the influence of psychological, social, biological and economic factors on individual development, capabilities, health and relationships across the lifespan. It is one of several majors in the Department that share an overarching goal of applying knowledge to promote individual and family well-being. This major offers a high degree of flexibility for students, who may choose to deepen their studies in one or more of the core content areas in the major (adulthood and aging, family and social relationships, human sexuality, or health and well-being) and/or to choose electives in a related or complementary field.

Program Requirements

All students in the Adult Development major must successfully complete a minimum of 20.00 credits, including the core of 10.50 required credits as outlined in the Schedule of Studies.

Some students may wish to select courses that provide a broad background appropriate for careers in teaching, social work, health promotion, couple and family relationships, physical, occupational and recreation therapy, nursing, business, public service management or other areas of work. Students interested in pursuing graduate education are encouraged to complete an undergraduate thesis in their senior year and to participate in faculty research projects.

In addition to the core requirements and options, there are courses in various departments throughout the University which may be taken as electives. Lists of suggested electives that relate to particular careers or areas of interest and requirements for admission to various graduate programs, including Faculties of Education, are available from the B.A.Sc. Program Counsellor.

Students must meet the continuation of study requirements at the time of graduation and have a minimum 60.00% cumulative average.

Students may take one minor in addition to the Adult Development major. See the University of Guelph Calendar, Section X, Degree Programs, Specialization and Their Degrees for list of minors: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c10/index.shtml. The 60.00% requirement applies to each major and minor.

Double Counting of Courses

A maximum of 50 percent of the courses applied to a minor may be courses taken in fulfillment of the major where required courses are the same.

Counselling on Minors

The B.A.Sc. program counsellor assists students in the selection of minors, interpreting program and academic regulations.

Academic departments offer the minors and assign faculty advisors to assist students with academic planning (e.g., a faculty advisor in the Psychology department handles queries about a minor in Psychology). Students should consult the appropriate faculty advisor, along with the B.A.Sc. Program Counsellor, when declaring a minor or requiring advice on the completion of specialization requirements. The list of faculty advisors is available on the Undergraduate Academic Information Centre website: https://www.uoguelph.ca/uac/facultyadvisors or contact the B.A.Sc. Program Counsellor for further information.

Major

Semester 1

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Department of Family Relations and Applied Nutrition, College of Social and Applied Human Sciences

Last Revision: July 4, 2019
Semester 3
FRHD*2060 [0.50] Adult Development and Aging
FRHD*2100 [0.50] Development of Human Sexuality
STAT*2080 [0.50] Introductory Applied Statistics I
1.00 electives

Semester 4
FRHD*2400 [0.50] Introduction to Human Services
FRHD*3150 [0.50] Strategies for Behaviour Change
STAT*2090 [0.50] Introductory Applied Statistics II
1.00 electives

Semester 5
FRHD*3070 [0.50] Research Methods: Family Studies
FRHD*3400 [0.50] Communication and Counselling Skills
1.50 electives

Semester 6
FRHD*3040 [0.50] Parenting and Intergenerational Relationships
FRHD*3290 [1.00] Practicum I: Adult Development
1.00 electives

Note: FRHD*3290 may be taken in Semester 5 or Semester 6

Semester 7
FRHD*4310 [0.50] Professional Issues *
2.00 electives

Semester 8
FRHD*4250 [0.50] Aging and Health
One of:
FRHD*4260 [0.50] Social Policy and Gerontology
FRHD*4320 [0.50] Social Policies for Children, Youth and Families
1.50 electives

Electives - Recommended and Program Options
Students planning to pursue graduate studies are encouraged to take FRHD*4810 and FRHD*4910 (undergraduate thesis courses). Students entering into human services after graduation are encouraged to take FRHD*4290 (4th year practicum course). Students who intend to pursue studies or careers in the following areas, Adult Development and Aging, Family and Social Relations, Human Sexuality and Health or Research may wish to include electives from the following list:

Adult Development and Aging Interest
FRHD*3060 [0.50] Principles of Social Gerontology
FRHD*4190 [0.50] Assessment in Gerontology
FRHD*4290 [1.00] Practicum II: Adult Development
NUTR*3150 [0.50] Aging and Nutrition

Family and Social Relations Interest
FRHD*3090 [0.50] Poverty and Health
FRHD*4020 [0.50] Family Theory
FRHD*4290 [1.00] Practicum II: Adult Development

Human Sexuality and Health Interest
FRHD*4200 [0.50] Issues in Human Sexuality
FRHD*4290 [1.00] Practicum II: Adult Development

Research Interest
FRHD*4810 [0.50] Thesis I
FRHD*4910 [1.00] Thesis II

Graduate and Professional Studies
Students have successfully used the B.A.Sc. degree to gain admission into graduate programs in human development/family science, couple and family therapy, social work, education, applied psychology, sociology, anthropology, occupational therapy, physiotherapy, speech and language, and social policy. If you plan to enter a graduate program after completing the Adult Development major of the B.A.Sc. degree program you will need to select certain courses as part of your undergraduate program to meet graduate program admission requirements. Sometimes these requirements are quite particular which means that you must plan your course selections early and carefully.

Although graduate programs differ in their entrance requirements, most graduate programs require that you have taken (at least): one course in research methods; two undergraduate statistics courses; and have completed an undergraduate thesis.

For many of the programs you will be required to take Graduate Record Exams (GREs) in the specific field of study. You are strongly advised to contact the graduate programs that interest you early in your program to determine the specific entrance requirements of each program.

* Exchange/Study Abroad Opportunities
Students interested in study abroad experience could consider this in either Semester 5 or 7. If it is in Semester 5, then students could defer FRHD*3400 to Winter Semester 6 with the Practicum FRHD*3290 (with permission). If the study abroad experience is preferred in Semester 7, the Professional Issues course (FRHD*4310) could be taken in Semester 5 (with permission).
Introduction to Co-operative Education

Co-op Work Term III

Introduction to Nutrition

Social Policy and Gerontology

Introduction to Nutrition

Introductory Applied Statistics I

Practicum I: Adult Development

Life: Health and Well-Being

Thesis I

Development of Human Sexuality

Assessment in Gerontology

Principles of Social Gerontology

Thesis II

X. Degree Programs, Bachelor of Applied Science (B.A.Sc.)

The Applied Human Nutrition major recognizes both the biological and the social facets of human nutrition. It focuses on nutrition from a preventive, maintenance and therapeutic perspective, all of which require a thorough understanding of the related biological sciences and of selected aspects of the behavioral sciences. Students learn about nutrition and its application to the maintenance of health and the prevention and treatment of disease. They also learn about individual and social behaviour, particularly in family settings, and the implications of behavioral factors in the establishment of good nutrition status from conception through to old age. Through the effective use of elective courses, the core requirements in the Major can be supplemented to create a program of study which will prepare graduates for a variety of health and education careers in the government or private sectors, or with the food industry. Others may proceed to graduate study in fields such as nutrition, public health nutrition, medicine or education.

An Area of Emphasis in Dietetics is also offered for those interested in becoming Registered Dietitians. Successful completion of the additional required and restricted elective courses will allow students to compete for a limited number of dietetic internship positions after graduation. Graduates who complete dietetic internships are eligible to write national registration examination and become Registered Dietitians, a regulated health profession. The Area of Emphasis in this dietetic education program is accredited under the Partnership for Dietetic Education and Practice (PDEP) and prepares students for eligibility for registration with a provincial dietetics regulatory body. Most graduates completing dietetic internships are employed in hospitals and other health care agencies such as community health centres and long-term care facilities where the credential of Registered Dietitian is required for practice. Some Registered Dietitians also find employment in a wide range of careers in health and education, and in the private sector.

Still others proceed to graduate study in fields such as nutrition, public health nutrition, medicine or education.

Program Requirements

Students in the Applied Human Nutrition Major must include the core of 13.50 required credits in the minimum of 20.00 credits. Students in the Area of Emphasis in Dietetics take an additional 2.00 required credits plus 1.50 restricted electives for 17.00 required credits in the minimum 20.00 credits. Discussion with a departmental advisor regarding the various choices possible from within the Major is strongly recommended. Students will normally register for courses according to the semesters indicated below for Fall and Winter sequencing.

Students taking the Area of Emphasis in Dietetics are strongly encouraged to seek help from departmental advisors to ensure they have selected all the required courses to be eligible to apply for internships.

Minors

Students may take one minor in addition to the Applied Human Nutrition Major. See the University of Guelph Calendar, Section X, Degree Programs, Specialization and Their Degrees for list of minors: [https://www.uoguelph.ca/calendar/calendars/undergraduate/current/cur10/index.shtml]

Counselling on Minors

The B.A.Sc. program counsellor assists students in the selection of minors, interpreting program and academic regulations. Academic departments offer the minors and assign faculty advisors to assist students with academic planning (e.g., a faculty advisor in the Psychology department handles queries about a minor in Psychology). Students should consult the appropriate faculty advisor, along with the B.A.Sc. Program Counsellor, when declaring a minor or requiring advice on the completion of specialization requirements.

The list of faculty advisors is available on the Undergraduate Academic Information Centre website: [https://www.uoguelph.ca/uaic/facultyadvisors] or contact the B.A.Sc. Program Counsellor for further information.

Double Counting of Courses

A maximum of 50 percent of the courses applied to a minor may be courses taken in fulfillment of the major where required courses are the same.

Major

Semester 1

CHEM*1040 [0.50] General Chemistry I
FRHD*1100 [0.50] Life: Health and Well-Being
PSYC*1000 [0.50] Introduction to Psychology

One of:
HTM*2700 [0.50] Understanding Foods
NUTR*1010 [0.50] Introduction to Nutrition

0.50 electives

Note: HTM*2700 is recommended for Semester 1 if capacity allows, but may also be taken in Semester 2 by choosing NUTR*1010 in Semester 1

Semester 2

CHEM*1050 [0.50] General Chemistry II
NUTR*1020 [0.50] Professional Practice in Applied Nutrition

One of:
HTM*2700 [0.50] Understanding Foods
NUTR*1010 [0.50] Introduction to Nutrition

One of:

Department of Family Relations and Applied Nutrition, College of Social and Applied Human Sciences
### Child, Youth and Family (CYF)

**Department of Family Relations and Applied Nutrition, College of Social and Applied Human Sciences**

The Child, Youth and Family major, administered by the Department of Family Relations and Applied Nutrition, examines the psychological, social and physical conditions which influence the growth and development of children and adolescents. While the primary focus of the major is on children and youth, the program regards the family as a primary context of development and as the key to successful interventions for children with developmental, behavioural, or socio-emotional difficulties. Through the effective use of elective courses, the core requirements in the major can be supplemented to create a program of study which will prepare graduates for a variety of careers in child and youth services. Graduates are pursuing child and youth-related careers in a variety of settings including child and youth treatment facilities, elementary schools, paediatric wards in hospitals, family and community service agencies, and child care centres. Students interested in working with children ten years of age and younger may apply for membership in the College of Early Childhood Educators; see further details on required courses below. Further academic preparation may be required for certain careers. Many graduates go on to pursue graduate education in fields such as family studies, human development, psychology, counselling psychology, social work, speech pathology, and occupational therapy.

### Articulation Agreements

The University of Guelph is a partner in several Articulation Agreements concerning the Child, Youth and Family major. Students who enter the B.A.Sc. Child, Youth and Family major with advanced standing through an articulation agreement should identify themselves to the B.A.Sc. Program Counsellor for specific guidance around their Schedule of Studies (see Section IV of this calendar).

Students in the Child, Youth and Family major who are interested in proceeding to teachers college should refer to Section IV—Admissions Information, Articulation Agreements for information about admission to the Bachelor of Education program at Nipissing University.

### Program Requirements

All students in the Child, Youth and Family major must include the following core of 11.50 required credits and 0.50 restricted electives to a minimum of 20.00 credits. Students are encouraged to plan their use of electives carefully in order to focus their program on one or a combination of the career options open to graduates. Discussion with a faculty advisor regarding the various choices possible from within the major is strongly recommended. Students will normally register for courses according to the semesters indicated below for Fall and Winter sequencing. Students who register for Summer semesters and other students for whom the semester offerings present difficulty may, where they have the approval of their faculty advisor, take some courses in alternative semesters.

### Minors

Students may take one minor in addition to the Child, Youth and Family major. See the University of Guelph Calendar, Section X, Degree Programs, Specialization and Their Degrees for list of minors: [http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c10/index.shtml]. The 60.00% requirement applies to each major and minor.

### Double Counting of Courses

A maximum of 50 percent of the courses applied to a minor may be courses taken in fulfillment of the major where required courses are the same.

### Counselling on Minors

The B.A.sc. program counsellor assists students in the selection of minors, interpreting program and academic regulations. Academic departments offer the minors and assign faculty advisors to assist students with academic planning (e.g., a faculty advisor in the Psychology department handles queries about a minor in Psychology). Students should consult the appropriate faculty advisor, along with the B.A.sc. Program Counsellor, when declaring a minor or requiring advice on the completion of specialization requirements. The list of faculty advisors is available on the Undergraduate Academic Information Centre website: [https://www.uoguelph.ca/uaic/facultadv/ or contact the B.A.sc. Program Counsellor for further information.](http://www.uoguelph.ca/uaic/facultadv/)

### Program Information

#### Major

**Semester 1**

- FRHD*1100 [0.50] Life: Health and Well-Being
- NUTR*1010 [0.50] Introduction to Nutrition
- PSYC*1000 [0.50] Introduction to Psychology
  - One of:
    - ANTH*1110 [0.50] Introduction to Anthropology
    - SOC*1100 [0.50] Sociology
  - 0.50 electives

**Semester 2**

- BIOM*2000 [0.50] Concepts in Human Physiology
- FRHD*1020 [0.50] Couple and Family Relationships
- MBG*1000 [0.50] Genetics and Society
  - One of:
    - FRHD*2260 [0.50] Infant Development

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**Semester 3**

- BIOC*2580 [0.50] Introduction to Biochemistry
- HTM*2030 [0.50] Control Systems in the Hospitality Industry
- NUTR*2050 [0.50] Nutrition Through the Life Cycle
- STAT*2080 [0.50] Introductory Applied Statistics I

#### Semester 4

- BIOM*3200 [1.00] Biomedical Physiology
- HROB*2090 [0.50] Individuals and Groups in Organizations
- MICR*2420 [0.50] Introduction to Microbiology
- STAT*2090 [0.50] Introductory Applied Statistics II

#### Semester 5

- FRHD*3070 [0.50] Research Methods: Family Studies
- NUTR*3210 [0.50] Fundamentals of Nutrition

1.50 electives or restricted electives

#### Semester 6

- FRHD*3400 [0.50] Communication and Counselling Skills
- HROB*2290 [0.50] Human Resources Management
- NUTR*3070 [0.50] Nutrition and Physical Activity Interventions
- NUTR*3090 [1.00] Clinical Nutrition I

#### Semester 7

- NUTR*4010 [0.50] Nutritional Assessment
- NUTR*4070 [0.50] Nutrition Education

1.50 electives or restricted electives

#### Semester 8

- NUTR*4900 [0.50] Selected Topics in Human Nutrition

2.00 electives or restricted electives

Note: With approval from the instructor, students may substitute NUTR*4810 and NUTR*4910 for NUTR*4900.

### Area of Emphasis in Dietetics Additional Courses Required

**Additional Courses Required (2.00 credits)**

- HTM*3090 [1.00] Restaurant Operations Management
- NUTR*4040 [0.50] Clinical Nutrition II

One of:

- CIS*1200 [0.50] Introduction to Computing
- MCS*2020 [0.50] Information Management

### Restricted Electives

Students must take 1.50 restricted electives, including one 3000 level course, from the following list:

- FOOD*2010 [0.50] Principles of Food Science
- FOOD*3430 [0.50] Introduction to Food Analysis
- FOOD*3700 [0.50] Sensory Evaluation of Foods
- HTM*2740 [0.50] Cultural Aspects of Food
- HTM*3780 [0.50] Managing Food in Canada
- NUTR*3110 [0.50] Food Security
- NUTR*3150 [0.50] Aging and Nutrition

One of:

- FOOD*2400 [0.50] Introduction to Food Chemistry
- FOOD*3030 [0.50] Food Chemistry I
- FOOD*3050 [0.50] Food Chemistry I

One of:

- FOOD*2410 [0.50] Introduction to Food Processing
- FOOD*3160 [0.75] Food Processing I

One of:

- FOOD*2420 [0.50] Introduction to Food Microbiology
- FOOD*3230 [0.75] Food Microbiology
- FOOD*3240 [0.50] Food Microbiology

Note: Some of the restricted electives require prerequisites that are not included in the major.

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**Notes:**

- Students completing an Area of Emphasis in Dietetics must take HTM*3090. HTM*3090 is recommended in Semester 5 in place of elective or restricted elective if capacity allows, but it may also be taken in Semester 6. If taken in Semester 6 take FRHD*3400 and HROB*2290 in Semester 5.

- Students completing an Area of Emphasis in Dietetics must take NUTR*4040 for NUTR*4900.

See note in Semester 1.

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**Last Revision: July 4, 2019**
Students who intend to pursue a career in early childhood education may wish to choose electives from the following list:

- ENGL*2740 [0.50] Children's Literature
- FRHD*3090 [0.50] Poverty and Health
- FRHD*4810 [0.50] Thesis I
- FRHD*4910 [1.00] Thesis II
- NUTR*2050 [0.50] Nutrition Through the Life Cycle
- PSYC*3850 [0.50] Intellectual Disabilities
- SOAN*2290 [0.50] Identities and Cultural Diversity

**Education - Primary / Junior / Intermediate**

Graduates interested in elementary school teaching need additional study at a Faculty of Education. For those who wish to teach primary (junior kindergarten to grade 3) or junior (grades 4 to 6), each faculty of education may have certain required courses for admission. Often recommended are courses in visual or performing arts, mathematics, languages, physical or natural sciences, history or geography. Students interested in middle grade teaching (grades 7 to 10) level teaching need to acquire a teachable subject in a specific discipline. Normally, this requirement consists of six semester courses in an area of concentration.

Students are strongly advised to contact the faculties of Education that interest them early in their programs to determine the specific requirements.

**Graduate and Professional Studies**

Students have successfully used the B.A.Sc. degree to gain admission into graduate programs in social work, applied psychology, sociology, anthropology, occupational therapy, speech and language, and social policy. If you plan to enter a graduate program after completing the Child, Youth and Family major of the B.A.Sc. degree program you will need to select certain courses as part of your undergraduate program to meet graduate program admission requirements. Sometimes these requirements are quite particular which means that you must plan your course selections early and carefully. In our program you would include FRHD*4810 and FRHD*4910.

Although graduate programs differ in their entrance requirements, most graduate programs require that you have taken (at least): one course in research methods; two undergraduate statistics courses; and have completed an undergraduate thesis.

For many of the programs you will be required to take Graduate Record Exams (GREs) in the specific field of study. You are strongly advised to contact the graduate programs that interest you early in your program to determine the specific entrance requirements of each program.

**Child, Youth and Family (Co-op) (CYF/C)**

**Department of Family Relations and Applied Nutrition, College of Social and Applied Human Sciences**

The Child, Youth and Family major, administered by the Department of Family Relations and Applied Nutrition, examines the psychological, social and physical conditions which influence the growth and development of children and adolescents. While the primary focus of the major is on children and youth, the program regards the family as a primary context of development and as the key to successful interventions for children with developmental, behavioural, or socio-emotional difficulties. Through the effective use of elective courses, the core requirements in the major can be supplemented to create a program of study which will prepare graduates for a variety of careers in child and youth services. Graduates are pursuing child and youth-related careers in a variety of settings including child and youth treatment facilities, elementary schools, paediatric wards in hospitals, family and community service agencies, and child care centres. Students interested in working with children ten years of age and younger may apply for membership in the College of Early Childhood Educators; see further details on required courses below.

Further academic preparation may be required for certain careers. Many graduates go on to pursue graduate education in fields such as family studies, human development, psychology, counselling psychology, social work, speech pathology, and occupational therapy.

**Program Requirements**

The Co-op program in Adult Development is a four year program, including three work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitquebec.ca/ecec/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

**Child, Youth and Family Academic and Co-op Work Term Schedule**

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**Early Childhood Education**

Students planning to apply for membership in the College of Early Childhood Educators (CECE) need to complete the following Child stream courses:

- FRHD*2040 [0.50] Principles of Program Design for Children
- FRHD*2260 [0.50] Infant Development
- FRHD*2270 [0.50] Development in Early and Middle Childhood
- FRHD*3190 [0.50] Administration of Programs for Children
- FRHD*3200 [0.50] Practicum I: Child
- FRHD*4210 [0.50] Senior Seminar in Early Education and Care
- FRHD*4330 [1.00] Practicum II: Child
- FRHD*4350 [1.00] Practicum III: Child

**Electives - Recommended and Program Options**

**Child and Youth Services**

It is highly recommended that students planning to work in child and youth services complete the following Youth stream courses:

- FRHD*2270 [0.50] Development in Early and Middle Childhood
- FRHD*2280 [0.50] Adolescent Development
- FRHD*3250 [1.00] Practicum I: Youth
- FRHD*4340 [0.50] Practicum II: Youth
- FRHD*4400 [0.50] Youth, Risk and Resilience

Students who intend to pursue a career in child and youth services may wish to choose electives from the following list:

- EDR*3120 [0.50] Educational Communication
- FRHD*3090 [0.50] Poverty and Health
- FRHD*3190 [0.50] Administration of Programs for Children
- FRHD*4020 [0.50] Family Theory
- FRHD*4200 [0.50] Issues in Human Sexuality
- FRHD*4810 [0.50] Thesis I
- FRHD*4910 [1.00] Thesis II
- NUTR*2050 [0.50] Nutrition Through the Life Cycle
- PSYC*3450 [0.50] Social and Personality Development
- PSYC*3850 [0.50] Intellectual Disabilities
- SOAN*2290 [0.50] Identities and Cultural Diversity
- SOC*1500 [0.50] Crime and Criminal Justice
- SOC*3040 [0.50] Sociology of Social Welfare

**Restricted Electives**

In addition to the 11.50 required credits, 0.50 must be taken from the Department of Family Relations and Applied Nutrition at the 4000 level. (excluding FRHD*4330, FRHD*4340 or FRHD*4350).

**Academic Semester 3**

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</tr>
</tbody>
</table>

**Electives - Recommended and Program Options**

**Child and Youth Services**

It is highly recommended that students planning to work in child and youth services complete the following Youth stream courses:

- FRHD*2270 [0.50] Development in Early and Middle Childhood
- FRHD*2280 [0.50] Adolescent Development
- FRHD*3250 [1.00] Practicum I: Youth
- FRHD*4340 [1.00] Practicum II: Youth
- FRHD*4400 [0.50] Youth, Risk and Resilience

Students who intend to pursue a career in child and youth services may wish to choose electives from the following list:

- EDR*3120 [0.50] Educational Communication
- FRHD*3090 [0.50] Poverty and Health
- FRHD*3190 [0.50] Administration of Programs for Children
- FRHD*4020 [0.50] Family Theory
- FRHD*4200 [0.50] Issues in Human Sexuality
- FRHD*4810 [0.50] Thesis I
- FRHD*4910 [1.00] Thesis II
- NUTR*2050 [0.50] Nutrition Through the Life Cycle
- PSYC*3450 [0.50] Social and Personality Development
- PSYC*3850 [0.50] Intellectual Disabilities
- SOAN*2290 [0.50] Identities and Cultural Diversity
- SOC*1500 [0.50] Crime and Criminal Justice
- SOC*3040 [0.50] Sociology of Social Welfare

**Early Childhood Education**

Students planning to apply for membership in the College of Early Childhood Educators (CECE) need to complete the following Child stream courses:

- FRHD*2040 [0.50] Principles of Program Design for Children
- FRHD*2260 [0.50] Infant Development
- FRHD*2270 [0.50] Development in Early and Middle Childhood
- FRHD*3190 [0.50] Administration of Programs for Children
- FRHD*3200 [1.00] Practicum I: Child
- FRHD*4210 [0.50] Senior Seminar in Early Education and Care
- FRHD*4330 [1.00] Practicum II: Child
- FRHD*4350 [1.00] Practicum III: Child
To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

**Credit Summary (21.50 Total Credits)**

11.50 - Required Core Courses
0.50 - Restricted Electives (from lists)
8.00 – Free Electives
1.50 - Co-op Work Terms

**Note:** Three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement.

The recommended program work sequence is outlined below.

### Major

#### Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
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<tr>
<td>FRHD*1100</td>
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<tr>
<td>NUTR*1010</td>
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<td>PSYC*1000</td>
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<td>ANTH*1150</td>
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#### Semester 2

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#### Semester 3

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<td>FRHD*2110</td>
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<td>FRHD*3070</td>
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#### Semester 4

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<td>STAT*2090</td>
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#### Summer Semester

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<tr>
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#### Fall Semester

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#### Semester 5 - Winter

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<tr>
<td>FRHD*3250</td>
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#### Semester 6 - Summer

2.50 electives

#### Semester 7 - Fall

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1.50 electives or restricted electives

#### Winter Semester

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<tbody>
<tr>
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#### Semester 8 - Summer

2.50 electives

### Restricted Electives

0.50 restricted electives from the Department of Family Relations and Applied Nutrition at the 4000 level (excluding FRHD*4330, FRHD*4340 or FRHD*4350).

### Education - Primary / Junior / Intermediate

Graduates interested in elementary school teaching need additional study at a Faculty of Education. For those who wish to teach primary (junior kindergarten to grade 3) or junior (grades 4 to 6), each faculty of education may have certain required courses for admission. Often recommended are courses in visual or performing arts, mathematics, languages, physical or natural sciences, history or geography. Students interested in intermediate (grades 7 to 10) level teaching need to acquire a teachable subject in a specific discipline. Normally, this requirement consists of six semester courses in an area of concentration. Students are strongly advised to contact the Faculties of Education that interest them early in their programs to determine the specific requirements.

### Graduate and Professional Studies

Students have successfully used the B.A.Sc. degree to gain admission into graduate programs in social work, applied psychology, sociology, anthropology, occupational therapy, speech and language, and social policy. If you plan to enter a graduate program after completing the Child, Youth and Family major of the B.A.Sc. degree program you will need to select certain courses as part of your undergraduate program to meet graduate program admission requirements. Sometimes these requirements are quite particular which means that you must plan your course selections early and carefully. In our program you would include FRHD*4810 and FRHD*4910.

Although graduate programs differ in their entrance requirements, most graduate programs require that you have taken (at least): one course in research methods; two undergraduate statistics courses; and have completed an undergraduate thesis.

For many of the programs you will be required to take Graduate Record Exams (GREs) in the specific field of study. You are strongly advised to contact the graduate programs that interest you early in your program to determine the specific entrance requirements of each program.
Bachelor of Arts (B.A.)

The University of Guelph offers general and honours programs leading to the B.A. degree. The General Program consists of a minimum of 15.00 credits requiring the equivalent of 6 semesters of successful full time study. The Honours Program consists of a minimum of 20.00 credits requiring the equivalent of 8 semesters of successful full time study. A student may register in Summer, Fall and Winter semesters. The normal course load is 2.50 credits per semester for a full time student on regular status. Students may register for 0.50 credit more at their own discretion. Part time study consists of 1.50 credits or fewer per semester.

Program Information

A student’s selection of courses must follow the B.A. Program Regulations (including Distribution Requirements), a pattern of study for either the General or Honours degree (below), and the detailed schedule(s) of studies which follow for any special subject(s) studied.

Academic Counselling

Program Counselling

Students are urged to seek the assistance of the counsellors in the B.A. Counselling Office regarding their program and academic regulations, selecting courses, services and resources available on campus, and when they are experiencing difficulties that affect their academic progress.

Departmental Advising

Every academic department has advisors available to assist students in their course selection planning. Students should seek the advice of the faculty advisor when declaring a major, area of concentration, or minor regarding course scheduling and completing the requirements for the specializations.

Students encountering difficulties within a course should first consult the instructor of the course. Co-operative education students in Economics and Psychology will also have a departmental Co-op Academic Advisor and Coordinator, and should consult Co-operative Education Services regarding scheduling work terms and the COOP*1000 course.

Academic Residence Requirements

1. At least 5.00 of the credits required for graduation by the student’s program must be taken at the University of Guelph.
2. At least 60% of the 3000 and 4000 level courses required for graduation must be taken at the University of Guelph.

University of Guelph courses include courses taken on exchange and on study abroad programs. Letter of Permission courses are not included.

Continuation of Study

Students are advised to consult the regulations for continuation of study within the program which are outlined in detail in Section VIII–Undergraduate Degree Regulations and Procedures of this calendar.

Conditions for Graduation

In addition to meeting the general and honours degree requirements listed below under Program Regulations, students will not normally be eligible to graduate while on probationary or required-to-withdraw status.

Distribution Requirements

The distribution requirements are designed to provide the student with exposure to and some understanding of a range of disciplines in the arts, social sciences, mathematics and natural sciences. Courses taken to satisfy the distribution requirements may also be counted toward a specialization in the general or honours program.

The B.A. Distribution Requirements (requirements 1, 2, and 3) need not be completed immediately but are a graduation requirement.

The distribution requirement of 8 courses (minimum 4.00 credits) is as follows:

1. A minimum of 1.50 credits over at least 2 different subject areas in the humanities:
   - ARTH Art History
   - CHIN Mandarin
   - CLAS Classical Studies
   - ENGL English
   - EURO European Studies
   - FREN French Studies
   - GERK German Studies
   - GREK Greek
   - HIST History
   - HUMN Humanities
   - ITAL Italian Studies
   - LAT Latin
   - LING Linguistics
   - MUSC Music

2. A minimum of 1.50 credits over at least two of the following subject areas in the social sciences:
   - ANTH Anthropology
   - ECON Economics
   - GEOG Geography
   - IDEV International Development
   - ISS Interdisciplinary Social Science
   - POLS Political Science
   - PSYC Psychology
   - SOAN Sociology and Anthropology
   - SOC Sociology
   - WMST Women’s Studies

3. 1.00 credits in natural and/or mathematical sciences from the list below.

   1. A maximum of 1.50 credits in natural and/or mathematical science courses to fulfill the B.A. science requirements. Students should choose their courses from the list below or any course for which those listed serve as prerequisites. Students are advised to fulfill this requirement before their final semester. Any problems related to this requirement should be discussed with a B.A. Program Counsellor.

   Courses recommended for students with limited preparation (e.g., lacking 4U credit in a specific area):
   - AGR*2150 [0.50] Plant Agriculture for International Development
   - BIOL*1020 [0.50] Introduction to Biology
   - BIOL*1500 [0.50] Humans in the Natural World
   - BIOM*2000 [0.50] Concepts in Human Physiology
   - BOT*1200 [0.50] Plants and Human Use
   - CHEM*1060 [0.50] Introductory Chemistry
   - CHEM*1100 [0.50] Chemistry Today
   - CIS*1000 [0.50] Introduction to Computer Applications
   - ENVS*1060 [0.50] Principles of Geology
   - ENVS*2060 [0.50] Soil Science
   - ENVS*2130 [0.50] Eating Sustainably in Ontario
   - ENVS*2210 [0.50] Apiculture and Honey Bee Biology
   - ENVS*2270 [0.50] Impacts of Climate Change
   - FOOD*2010 [0.50] Principles of Food Science
   - GEOG*1300 [0.50] Introduction to the Biophysical Environment
   - GEOG*1350 [0.50] Earth: Hazards and Global Change
   - HORT*1120 [0.50] Grape and Wine Science
   - HORT*1130 [0.50] Science of Gardening
   - MBG*1000 [0.50] Genetics and Society
   - MUSC*1090 [0.50] Physics of Music
   - NUTR*1010 [0.50] Introduction to Nutrition
   - PHYS*1600 [0.50] Contemporary Astronomy
   - PHYS*1810 [0.50] Physics of Music

   Other acceptable courses which require 4U or university preparation:
   - BIOL*1XXX [0.00] Any BIOL course at the 1000 level
   - CHEM*1XXX [0.00] Any CHEM course at the 1000 level
   - CIS*1XXX [0.00] Any CIS course at the 1000 level
   - ENVS*2030 [0.50] Meteorology and Climatology
   - ENVS*2250 [0.50] Geology of Natural Disasters
   - MATH*1XXX [0.00] Any MATH course at the 1000 level
   - PHYS*1XXX [0.00] Any PHYS course at the 1000 level
   - STAT*2XXX [0.00] Any STAT course at the 2000 level

Double Counting of Courses

A maximum of 50 percent of the courses in a second specialization may be courses taken in fulfillment of the first specialization where required courses are the same. (Specializations can include majors, minors, areas of concentrations and certificates.)

Program Regulations

The General Degree Program provides the opportunity for a sound general education in the arts and social sciences, mathematics and sciences, while allowing for concentration of studies in one or more subjects.

The Honours Degree Program provides depth of study in one specialization, strengthening written and oral communication skills, research and analytical abilities, as well as ensuring a breadth of study in the arts, social sciences, mathematics and sciences.
General Degree Requirements (BAG)

To graduate from a general program a student must:

1. earn 15.00 credits. These must include courses that fulfill the distribution requirements (see B.A. Distribution Requirements). At least 4.00 credits must be at the 3000 level or above. Not more than 6.00 credits at the introductory (1000) level may be counted towards the 15.00 credits requirement.

2. 9.00 of the required 15.00 credits must be in courses offered by the College of Arts, the departments of Economics, Geography, Political Science, Psychology, Sociology and Anthropology (in the College of Social and Applied Human Sciences and the Gordon S. Lang School of Business and Economics), School of Computer Science, or the Department of Mathematics and Statistics.

3. no more than 11.00 credits in any one subject or discipline, as indicated by the course prefix code, can be counted towards a general degree.

While students are encouraged to complete the requirements of one or more areas of concentration, this is not a graduation requirement.

The requirements for each area of concentration are set out separately in the pages following the list of Honours and General Specializations Available in the B.A. Degree.

Honours Degree Requirements (BAH)

To graduate from an honours program a student must:

1. earn 20.00 credits. These must include courses that fulfill the distribution requirements (see B.A. Distribution Requirements), and courses that fulfill the requirements of at least 1 major. At least 7.00 credits must be at the 3000 level or above. Not more than 6.00 credits from courses at the introductory (1000) level may be counted towards the 20.00 credits requirement.

2. Honours B.A. students, except those completing a major in Food, Agricultural, and Resource Economics, must take a minimum of 12.00 credits in courses offered by the College of Arts or the departments of Economics, Geography, Political Science, Psychology, Sociology and Anthropology (in the College of Social and Applied Human Sciences and the Gordon S. Lang School of Business and Economics), the School of Computer Science or the Department of Mathematics and Statistics.

3. no more than 14.00 credits in any one subject or discipline, as indicated by the course prefix code, can be counted towards an Honours Degree.

4. fulfill the course and credit requirements of at least one major with a cumulative average of at least 70% in all course attempts at the University of Guelph in that major. Grades in all courses in the discipline area of the major are included in the cumulative average. Grades from those courses in other disciplines listed as options toward the major are also included in the average. (This condition does not apply to majors in the interdisciplinary programs of International Development and European Studies, where only courses in the core and chosen area of emphasis will be counted toward the specialization average.) Students may take more than one major. They may also take one or more minors. The 70% requirement applies to each major and minor.

The requirements for each major and minor are set out separately in the pages following the list of Honours and General Specializations Available in the B.A. Degree. University recognition that a student has graduated with a particular major or minor requires a cumulative average of 70% for all course attempts at this University in that major or minor.

Students failing to meet the graduation requirements of the Honours Program may apply to graduate with a General Degree if the requirements for the General Degree are met. Students should note that a specialization is not required to graduate with a General Degree.

Semester One Requirements

It is recommended that students select 1000 level courses as follows:

- Required courses for a chosen or intended specialization (major, minor, area of concentration).
- Electives (this could include arts/humanities, social sciences, natural/mathematical sciences, or electives from another area).

For more information on course selection, students can access the New Student Registration Handbook at: https://www.uoguelph.ca/Registrar/Undergraduate/RegistrationHandbook/index

Special Study Options

Study at Other Universities

Students contemplating study at another university for credit towards a Bachelor of Arts degree at the University of Guelph should refer to the general regulations governing Letters of Permission in Section VIII–Degree Regulations & Procedures in this calendar. Students must obtain approval for the Letter of Permission prior to undertaking studies at another institution. Approval of the request depends on good standing in the program with a minimum average of 60%.

The normal limit of credits taken on a Letter of Permission is 2.50 based on Guelph credits. Students with a specialization in languages who want to undertake a program of study in Quebec or abroad should consult the appropriate faculty advisor or the Director of the School of Languages and Literatures.

Study Abroad

The University of Guelph offers many other Study Abroad and Exchange opportunities for students to enrich their learning experience. Bachelor of Arts students are encouraged to participate in any of the diverse options available. Courses taken while on exchange or study abroad can be used as electives or core requirements. For further information on the programs available, please refer to Section V - International Study. Students are advised to meet with a B.A. Program Counsellor to discuss the feasibility of participating in an exchange or semester abroad.

Honours and General Specializations Available in the B.A. Degree

General Program Areas of Concentration

Anthropology
English
French Studies
Geography
History
International Development
Mathematics
Music
Philosophy
Political Science
Psychology
Sociology
Spanish and Hispanic Studies
Statistics
Theatre Studies

The schedule of studies for each area of concentration is given on the following pages under its subject heading.

Honours Program Majors

Anthropology
Art History
Classical Studies
Criminal Justice and Public Policy
Economics*
English
Environmental Governance
European Studies
Food, Agricultural and Resource Economics
French Studies
Geography
History
Individual Studies
International Development
Mathematical Economics*
Mathematical Science
Music
Philosophy
Political Science
Psychology*
Sociology
Spanish and Hispanic Studies
Studio Art
Theatre Studies

Subjects marked with an asterisk (*) may be available as Co-operative Education programs. The schedule of studies for each major is given on the following pages under its subject heading.

Honours Program Minors

Anthropology
Art History
Arts, Culture and Heritage Management
Business
Business Economics
Classical Studies
Computing and Information Science
Creative Writing
Criminal Justice and Public Policy
Economics
English
European Culture and Civilization
Family and Child Studies
French Studies
Geography
German
History
International Development
Italian
Marketing
Mathematics
Media and Cinema Studies
Music
Philosophy
Political Science
Psychology
Sociology
Statistics
Studio Art
Spanish and Hispanic Studies
Theatre Studies

The schedule of studies for each minor is given on the following pages under its subject heading.

Anthropology (ANTH)

Department of Sociology and Anthropology, College of Social and Applied Human Sciences

The Department of Sociology and Anthropology offers three types of courses: sociology courses with the prefix SOC*; anthropology courses with the prefix ANTH*; and departmental courses with the prefix SOAN*. The departmental category of courses recognizes the fact that the disciplines of sociology and sociocultural anthropology have developed in tandem and it is possible to identify large areas of overlap and convergence in the work of practitioners both historically and in the present. Departmental courses include most of the core theory and methods courses as well as many elective courses. They contribute equally to the subject matter of sociology as well as the subject matter of sociocultural anthropology for purposes of the undergraduate programs of study in both disciplines. Please see the listings for all courses required for the Anthropology program.

Courses will normally be offered in the semesters designated. Please check with the department for information about additional semester offerings. In addition to regularly scheduled courses, students may elect to do independent study. A student who wishes to do a reading course should first consult the professor with whom he/she wishes to work.

Please note, a student is allowed a total of 1.00 credits only for reading courses.

SOAN courses will be used towards the Anthropology specialization.

Area of Concentration (General Program)

A minimum of 5.00 credits is required, including:

- ANTH*1150 [0.50] Introduction to Anthropology
- ANTH*2160 [0.50] Social Anthropology
- ANTH*2230 [0.50] Regional Ethnography
- ANTH*3690 [0.50] Engaging Anthropological Theory
- ANTH*3770 [0.50] Kinship, Family, and Power
- SOAN*2120 [0.50] Introductory Methods
- One of:
  - MUSC*2270 [0.50] World Music
  - PHIL*2100 [0.50] Critical Thinking

1.00 additional credits in ANTH
0.50 additional credits in SOAN

Note: 1.00 credits of these additional credits must be completed at the 3000 level or above.

Major (Honours Program)

A minimum of 9.00 credits is required, including:

- ANTH*1150 [0.50] Introduction to Anthropology
- ANTH*2160 [0.50] Social Anthropology
- ANTH*2230 [0.50] Regional Ethnography
- ANTH*3690 [0.50] Engaging Anthropological Theory
- ANTH*3770 [0.50] Kinship, Family, and Power
- ANTH*4700 [0.50] Issues in Contemporary Anthropological Theory
- SOAN*2120 [0.50] Introductory Methods
- SOAN*3070 [0.50] Qualitative and Observational Methods
- Two of:
  - LING*1000 [0.50] Introduction to Linguistics
  - MUSC*2270 [0.50] World Music

PHIL*2100 [0.50] Critical Thinking
2.00 additional credits in ANTH
2.00 additional credits in SOAN

Note: 1.00 of these additional credits must be completed at the 4000 level.

Note: SOAN*3120 is recommended, especially for students planning to enter graduate programs.

Minor (Honours Program)

A minimum of 5.00 credits is required, including:

- ANTH*1150 [0.50] Introduction to Anthropology
- ANTH*2160 [0.50] Social Anthropology
- ANTH*2230 [0.50] Regional Ethnography
- ANTH*3690 [0.50] Engaging Anthropological Theory
- ANTH*3770 [0.50] Kinship, Family, and Power
- SOAN*2120 [0.50] Introductory Methods
- One of:
  - MUSC*2270 [0.50] World Music
  - PHIL*2100 [0.50] Critical Thinking

1.00 additional credits in ANTH
0.50 additional credits in SOAN

Note: 1.00 of these additional credits must be completed at the 3000 level or above.

Art History (ARTH)

School of Fine Art and Music, College of Arts

The School provides for concentrated study in Art History or Studio Arts, or for a more balanced study combining the two disciplines. Both Studio Art and Art History degree programs require some work in both the programs. Many Art History courses are also open to non-specialized students.

The Art History program covers historical perspectives on the visual arts, study of the methodologies of art history and critical theory, and consideration of contemporary issues in the practice and display of art. Students pursuing a Major or Minor in Art History are required to take a minimum number of courses at the 2000, 3000 and 4000 level.

Students majoring in other programs who are also interested in the study of Art History are encouraged to consider the Minor offered in Museum Studies. Specific requirements for the Art History Honours Major and Minor are listed below.

Student Counselling

The students who elect to take a substantial number of courses in Art History with the objective of graduate work are advised to obtain counselling from faculty regarding their choices. It is important to know that graduate studies in Art History will usually require a reading knowledge of at least 2 languages other than English. German, French, Italian and Latin are among the most useful choices. Cognate electives in other disciplines in the College of Arts (such as History) will almost certainly prove an asset.

Major (Honours Program)

A minimum of 9.00 credits is required, including:

- ARTH*1510 [0.50] Art Historical Studies I
- ARTH*1520 [0.50] Art Historical Studies II
- ARTH*2220 [0.50] The Visual Arts Today
- ARTH*2480 [0.50] Introduction to Art Theory and Criticism
- ARTH*2540 [0.50] Medieval Art
- ARTH*2550 [0.50] The Italian Renaissance
- ARTH*2600 [0.50] Early Modern Art

1.50 credits from:

- ARTH*2050 [0.50] Modern Latin American Art
- ARTH*2060 [0.50] Aboriginal Arts in the Americas
- ARTH*2070 [0.50] Art of the USA
- ARTH*2120 [0.50] Introduction to Museology
- ARTH*2150 [0.50] Art and Archaeology of Greece
- ARTH*2280 [0.50] Modern Architecture
- ARTH*2290 [0.50] History of Photographic Media
- ARTH*2490 [0.50] History of Canadian Art
- ARTH*2580 [0.50] Late Modern Art; 1900-1950
- ARTH*2950 [0.50] Baroque Art

2.00 credits from:

- ARTH*3010 [0.50] Contemporary Canadian Art
- ARTH*3060 [0.50] Public Art
- ARTH*3150 [0.50] Space: Roman Art and Urbanism
- ARTH*3200 [0.50] Colour: Practice & Meanings in Western Art
- ARTH*3210 [0.50] Critical Issues in Art History
- ARTH*3220 [0.50] Nationalism & Identity in Art
- ARTH*3320 [0.50] Lives: Aspects of Western Art
- ARTH*3330 [0.50] Display: Visual Culture in Western Europe
- ARTH*3340 [0.50] Studies in Renaissance and Baroque Art
- ARTH*3520 [0.50] Idea: Art Since 1950
- ARTH*3600 [0.50] Topics in the Long Eighteenth Century
- ARTH*3620 [0.50] Museum Studies
- ARTH*3780 [0.50] Gender and Art
2.00 credits from 4000-level seminar courses:

**ARTH*4310** [0.50] Topics in Art & Visual Culture I
**ARTH*4320** [0.50] Topics in Art & Visual Culture II
**ARTH*4330** [0.50] Topics in Art & Visual Culture III
**ARTH*4340** [0.50] Topics in Art & Visual Culture IV
**ARTH*4350** [0.50] Topics in Art & Visual Culture V

Students may count either ARTH*4600 "Individual Study: Art History" or ARTH*4800 "Experiential Learning" towards their major. Neither of these courses meets the requirement of 2.00 credits from seminar courses.

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**Minor (Honours Program)**

A minimum of 5.00 credits is required, including:

**ARTH*1510** [0.50] Art Historical Studies I
**ARTH*1520** [0.50] Art Historical Studies II

4.00 additional credits in Art History including at least 2.00 credits at the 3000 or 4000 level.

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**Arts, Culture and Heritage Management (ACHM)**

This minor prepares students for careers in the management of the artistic and cultural sectors. By examining arts, culture and heritage institutions, business models and consumer trends, students develop and demonstrate an understanding of the relationship between culture and society, cultural economies and the arts both globally and in the Canadian context. Attention is given to visual culture, film and theatre, sound/ music, heritage, management, law, marketing, communications and ethics. The experiential component allows students to gain practical experience in the field of their choice. The minor in Arts, Culture and Heritage Management guides students to an understanding of the pertinent questions at stake in today’s entrepreneurial and diverse cultural environments.

**Minor (Honours Program)**

A minimum of 5.00 credits is required including:

**HUMN*1300** [0.50] Fundamentals of Arts Management I
**HUMN*2300** [0.50] Fundamentals of Arts Management II
**HROB*2010** [0.50] Foundations of Leadership
**MGMT*2150** [0.50] Introduction to Canadian Business Management

**Note:** Both of the students interested in this minor must substitute MGMT*2150 with 0.50 additional credits from the Arts and Culture list below.

1.00 credit from Arts and Culture

**ANTH*2660** [0.50] Contemporary Indigenous Peoples in Canada
**ANTH*3650** [0.50] The Anthropology of Indigenous Peoples Before Canada
**ARTH*2060** [0.50] Aboriginal Arts in the Americas
**ARTH*2120** [0.50] Introduction to Museology
**ARTH*2220** [0.50] The Visual Arts Today
**ARTH*2229** [0.50] History of Photographic Media
**ARTH*3010** [0.50] Contemporary Canadian Art
**ARTH*3060** [0.50] Public Art
**ARTH*3520** [0.50] Idea: Art Since 1950
**ARTH*3620** [0.50] Museum Studies
**ENGL*3380** [0.50] Studies in the History of Literary Production
**EURO*1100** [0.50] European Cinema
**FREN*3140** [0.50] Women in Literature, Art and Film
**FREN*3160** [0.50] Songs, Lyrics and Poetry in French
**HIST*3260** [0.50] Cinema and the Moving Image
**HIST*3450** [0.50] The Uses of History
**MUSC*2030** [0.50] Music in Canada
**MUSC*2150** [0.50] Music and Popular Culture
**MUSC*2270** [0.50] World Music
**SART*1150** [0.50] Contemporary Artistic Practice
**THST*2500** [0.50] Contemporary Cinema
**THST*3530** [0.50] Canadian Cinema
**THST*4240** [0.50] Theatrical Organization and Culture
**WMST*2000** [0.50] Women and Representation

1.00 credit from Organizational Management

**ACCT*1220** [0.50] Introductory Financial Accounting
**ACCT*2230** [0.50] Management Accounting
**EDRD*4120** [0.50] Leadership Development in Small Organizations
**HROB*2090** [0.50] Individuals and Groups in Organizations
**HROB*3010** [0.50] Compensation Systems
**HROB*3050** [0.50] Employment Law
**HROB*3070** [0.50] Recruitment and Selection
**HROB*3090** [0.50] Training and Development
**HROB*3100** [0.50] Developing Management and Leadership Competencies
**HROB*4060** [0.50] Human Resource Planning
**HTM*1700** [0.50] Foodservice Management
**HTM*2070** [0.50] Event Management
**MCS*1000** [0.50] Introductory Marketing
**MCS*2100** [0.50] Personal Financial Management
**MCS*3000** [0.50] Advanced Marketing

0.50 additional credits from Ethics and Communication.

**EDRD*2020** [0.50] Interpersonal Communication
**EDRD*3140** [0.50] Organizational Communication
**EDRD*3160** [0.50] International Communication
**MGMT*3020** [0.50] Corporate Social Responsibility
**PHIL*2100** [0.50] Critical Thinking
**PHIL*2120** [0.50] Ethics
**PHIL*2600** [0.50] Business and Professional Ethics

0.50 additional credits from Experiential Learning.

**ARTH*4800** [0.50] Experiential Learning
**CLAS*3700** [0.50] Experiential Learning and Language
**EURO*3700** [0.50] Experiential Learning and Language
**FREN*3700** [0.50] Experiential Learning and Language
**GERM*3700** [0.50] Experiential Learning and Language
**HIST*3480** [0.50] Workplace Learning
**ITAL*3700** [0.50] Experiential Learning and Language
**SART*3800** [0.50] Experiential Learning I
**SPAN*3700** [0.50] Experiential Learning and Language
**THST*3800** [0.50] Experiential Learning
**THST*3900** [0.50] Experiential Learning

Note: Some courses may also have prerequisites, identified in course descriptions in the academic calendar.

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**Business (BUS)**

**Department of Management, Gordon S. Lang School of Business and Economics**

The study of business is complementary to virtually any career or professional endeavour. The minor in Business is intended to enhance the business literacy of non-business students. Through a combination of core and elective courses, students form different disciplines will develop foundational knowledge and understanding of the core functional areas of business, and be invited to explore and apply this in relation to their primary area of study.

**Note:** The minor in Business is not open to students enrolled in the Bachelor of Commerce program.

**Minor (Honours Program)**

A minimum of 5.00 credits is required (all 3.00 required credits, plus 2.00 credits of restricted electives of which at least 1.00 credits must be at the 3000 level or above).

Required courses (3.00 credits):

**ACCT*1220** [0.50] Introductory Financial Accounting
**ACCT*2230** [0.50] Management Accounting
**ECON*1100** [0.50] Introductory Microeconomics
**HROB*2090** [0.50] Individuals and Groups in Organizations
**MCS*1000** [0.50] Introductory Marketing
**MGMT*2150** [0.50] Introduction to Canadian Business Management
**MGMT*3020** [0.50] Corporate Social Responsibility

Restricted Electives (2.00 credits of which at least 1.00 credits are at the 3000 level or above):

**ACCT*2230** [0.50] Management Accounting
**ECON*1100** [0.50] Introductory Microeconomics
**ECON*2720** [0.50] Business History
**EDRD*3140** [0.50] Organizational Communication
**EDRD*3160** [0.50] International Communication
**EDRD*4120** [0.50] Leadership Development in Small Organizations
**ENG*3240** [0.50] Engineering Economics
**ENG*4050** [0.50] Quality Control
**ENG*4070** [0.50] Life Cycle Assessment for Sustainable Design
**ENGG*4510** [0.50] Assessment & Management of Risk
**FARE*3030** [0.50] The Firm and Markets
**FARE*3310** [0.50] Operations Management
**FARE*4360** [0.50] Marketing Research
**FARE*4370** [0.50] Food & Agri Marketing Management
**HROB*2010** [0.50] Foundations of Leadership
**HROB*2200** [0.50] Labour Relations
**HROB*2290** [0.50] Human Resources Management
**HTM*3120** [0.50] Service Operations Analysis
**MCS*2020** [0.50] Information Management
**MCS*2100** [0.50] Personal Financial Management
**MCS*2600** [0.50] Fundamentals of Consumer Behaviour
**MCS*3000** [0.50] Advanced Marketing
**MCS*3040** [0.50] Business and Consumer Law
**MGMT*3320** [0.50] Financial Management
**MGMT*4050** [0.50] Business Consulting
**MGMT*4060** [0.50] Business Consulting
**PHIL*2600** [0.50] Business and Professional Ethics
**POLS*2250** [0.50] Public Administration and Governance

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*Last Revision: July 4, 2019*
Minor (Honours Program)
A minimum of 5.00 credits is required, including:

- a. the Classical Studies Core
- b. two of CLAS*4000, CLAS*4150, CLAS*4400

Computing and Information Science (CIS)

School of Computer Science, College of Engineering and Physical Sciences

A knowledge of Computing is a complement to most areas of study. The Minor in Computing and Information Science is directed towards students who wish to supplement their studies in another area with some experience in Computing. Students interested in pursuing a Major in Computing can do so through the Bachelor of Computing Degree Program.

Minor (Honours Program)
A minimum of 5.00 credits is required, including:
- CIS*1300 [0.50] Programming
- CIS*1910 [0.50] Discrete Structures in Computing I
- CIS*2170 [0.75] User Interface Design
- CIS*2430 [0.50] Object Oriented Programming
- CIS*2500 [0.50] Intermediate Programming
- CIS*2520 [0.50] Data Structures
- CIS*2750 [0.75] Software Systems Development and Integration

Creative Writing (CW)

The Creative Writing minor reflects the significant role that creative writing plays in our cultural life, from travel writing and blogs, gaming and journalism, to poems, novels and films. The minor honours students’ skills in expressive writing, and teaches students to situate their work within a broader context of local, global and historical creative texts. Workshops and a capstone seminar provide students with the opportunity to revise their work and develop a creative portfolio.

Minor (Honours Program)
A minimum of 5.00 credits is required including:
- ENGL*1080 [0.50] Literatures in English I: Reading the Past
- ENGL*2920 [0.50] Elements of Creative Writing
- ENGL*4720 [1.00] Creative Writing: Prose/Poetry

1.00 credit from the following:
- ENGL*3050 [0.50] Intermediate Fiction Writing Workshop
- ENGL*3060 [0.50] Intermediate Poetry Writing Workshop
- ENGL*3070 [0.50] Intermediate Screenwriting Workshop
- ENGL*3090 [0.50] Special Topics in Creative Writing Workshop
- THST*2120 [0.50] Writing for Performance

2.00 credits from the following:
- CLAS*2000 [0.50] Classical Mythology
- CLAS*3030 [0.50] Epic Heroes and Poems
- ENGL*2040 [0.50] Latin/o Literature and Cultural Production: Introduction
- ENGL*2080 [0.50] Literatures in English II: Finding a Critical Voice
- ENGL*2090 [0.50] Studies in Shakespeare
- ENGL*2120 [0.50] Seminar: Creative Practices
- ENGL*2130 [0.50] Seminar: Literature and Social Change
- ENGL*2190 [0.50] Queer Literatures and Cultures
- ENGL*2200 [0.50] Postcolonial Literatures, Film, and Other Media
- ENGL*2260 [0.50] Law and Literature
- ENGL*2270 [0.50] Fairy, Trickster, and Mythical Hero
- ENGL*2280 [0.50] Sporting Bodies
- ENGL*2290 [0.50] Outlaws
- ENGL*2310 [0.50] Vampires, Ghosts, and Mummies: Literature and the Supernatural
- ENGL*2330 [0.50] Print Culture and Cinema
- ENGL*2360 [0.50] Medieval Literature
- ENGL*2550 [0.50] North American Native Literatures
- ENGL*2640 [0.50] Culture, Location, Identity: Minoritized Literatures in Canada and Beyond
- ENGL*2740 [0.50] Children’s Literature
- ENGL*2880 [0.50] Women in Literature
- ENGL*3080 [0.50] History and Linguistics of the English Language
- ENGL*3240 [0.50] Studies in Early Modern Literature and Culture
- ENGL*3380 [0.50] Studies in the History of Literary Production
- ENGL*3420 [0.50] 20th- & 21st-Century Drama
- ENGL*3460 [0.50] Literature in London
- ENGL*3470 [0.50] Twentieth-Century British Literature I
- ENGL*3480 [0.50] Twentieth-Century British Literature II
- ENGL*3540 [0.50] Writing the United States
- PHIL*1000 [0.50] Introduction to Linguistics
- PHIL*3060 [0.50] Medieval Philosophy
- LING*1000 [0.50] Introduction to Linguistics
- LING*3060 [0.50] Medieval Philosophy
ENGL*3550 [0.50] Modern United States Literatures
ENGL*3680 [0.50] 20th- & 21st-Century Canadian Literature and Criticism
ENGL*3750 [0.50] Studies in Postcolonial Literatures
ENGL*3760 [0.50] The Atlantic World
ENGL*3870 [0.50] Topics in Literary and Cultural Studies
ENGL*3880 [0.50] Topics in Literary and Cultural Studies
FREN*2020 [0.50] France: Literature and Society
FREN*2060 [0.50] Quebec: Literature and Society
FREN*3050 [0.50] Good and Evil
FREN*3090 [0.50] Classics of French Literature
FREN*3110 [0.50] Storytelling in the Francophone World
FREN*3130 [0.50] Representing the Self
FREN*3140 [0.50] Women in Literature, Art and Film
FREN*3160 [0.50] Songs, Lyrics and Poetry in French
FREN*3170 [0.50] Fictions of Childhood
GERM*3020 [0.50] Myth and Fairy Tales in Germany
GERM*3470 [0.50] Holocaust & WWII in German Lit. & Film
HUMN*1030 [0.50] What Makes a Literary Classic?
HUMN*3000 [0.50] Narratives of Migration
HUMN*3020 [0.50] Myth and Fairy Tales in Germany
HUMN*3400 [0.50] Renaissance Lovers and Lovers
ITAL*3400 [0.50] Renaissance Lovers and Lovers
SPAN*2990 [0.50] Hispanic Literary Studies
SPAN*3220 [0.50] Literature and Arts I: Spain
SPAN*3230 [0.50] Literature and Arts II: Latin America
SOC*3750 [0.50] Police in Society
POL*3130 [0.50] Law, Politics and Judicial Process
POL*3140 [0.50] Canadian Charter of Rights and Freedoms
POL*3210 [0.50] The Constitution and Canadian Federalism
POL*3250 [0.50] Public Policy: Challenges and Prospects
POL*3300 [0.50] Governing Criminal Justice
POL*3340 [0.50] Corruption, Scandal and Political Ethics
POL*3670 [0.50] Comparative Public Policy and Administration
HIST*3130 [0.50] Popular Culture and Punishment, 1700-1900
PHIL*3040 [0.50] Philosophy of Law
PHIL*3230 [0.50] Theories of Justice
PSYC*3020 [0.50] Psychology of Law
POL*4050 [1.00] Advanced Topics in Law and Politics
POL*4060 [0.50] Advanced Topics Lecture in Law and Politics
POL*4070 [1.00] Courts and Parliament
POL*4100 [1.00] Women, Justice and Public Policy
POL*4160 [1.00] Multi-Level Governance in Canada
POL*4250 [1.00] Topics in Public Management
POL*4260 [1.00] Topics in Public Policy
POL*4270 [0.50] Advanced Lecture in Public Management
POL*4280 [0.50] Advanced Lecture in Public Policy
POL*4310 [0.50] Advanced Lecture in Women, Justice and Public Policy
POL*4740 [1.00] Advanced Topics in Rights and Liberties
POL*4780 [0.50] Advanced Lecture in Rights and Liberties
POL*4970 [0.50] Honours Political Science Research I
POL*4980 [0.50] Honours Political Science Research II
SOC*4010 [0.50] Violence and Society
SOC*4030 [0.50] Advanced Topics in Criminology
SOC*4200 [0.50] Advanced Topics in Criminal Justice
SOC*4900 [0.50] Honours Sociology Thesis I
SOC*4910 [0.50] Honours Sociology Thesis II
PHIL*1010 [0.50] Introductory Philosophy: Social and Political Issues
POLS*1400 [0.50] Issues in Canadian Politics
POLS*2250 or POLS*2300 [1.00] 1.50 credits from the following:
POLS*2350 [0.50] Law from a Political Science Perspective
SOAN*2120 [0.50] Introductory Methods
SOC*1500 [0.50] Crime and Criminal Justice
SOC*2700 [0.50] Criminological Theory
SOC*2740 [0.50] Corrections and Penology
SOC*3750 [0.50] Police in Society
SOC*4200 [0.50] Advanced Topics in Criminal Justice
SOC*4900 [0.50] Honours Sociology Thesis I
SOC*4910 [0.50] Honours Sociology Thesis II
PHIL*1010 [0.50] Introductory Philosophy: Social and Political Issues
POLS*1400 [0.50] Issues in Canadian Politics
POLS*2250 or POLS*2300 [1.00] 1.50 credits from the following:
POLS*2350 [0.50] Law from a Political Science Perspective
SOAN*2120 [0.50] Introductory Methods
SOC*1500 [0.50] Crime and Criminal Justice
SOC*2700 [0.50] Criminological Theory
SOC*2740 [0.50] Corrections and Penology
SOC*3750 [0.50] Police in Society
PHIL*1010 [0.50] Introductory Philosophy: Social and Political Issues
POLS*1400 [0.50] Issues in Canadian Politics
POLS*2250 or POLS*2300 [1.00] 1.50 credits from the following:
POLS*2350 [0.50] Law from a Political Science Perspective
SOAN*2120 [0.50] Introductory Methods
SOC*1500 [0.50] Crime and Criminal Justice
SOC*2700 [0.50] Criminological Theory
SOC*2740 [0.50] Corrections and Penology
SOC*3750 [0.50] Police in Society

Criminal Justice and Public Policy (CJPP)

Department of Sociology and Anthropology, and the Department of Political Science, College of Social and Applied Human Sciences

Criminal Justice and Public Policy is offered as a minor in the honours program and as a major in the honours program. It is designed to provide students seeking a career in the criminal justice system, or planning to pursue an advanced degree with a knowledge base that will enable them to pursue their career objectives. The program offers a unique blend of sociological courses dealing with the criminal justice system as well as courses in Political Science dealing with public policy formation and implementation. It also provides students with the conceptual and methodological tools needed for further study.

Students who are not admitted directly into the CJPP major and subsequently wish to declare the specialization must apply directly to the department. In order to be eligible, applicants must have a cumulative average of 70% or better in the following foundation courses:

- POLS*1400 [0.50] Issues in Canadian Politics
- POLS*2250 or POLS*2300 [0.50] Introductory Methods
- POLS*2350 [0.50] Law from a Political Science Perspective
- SOAN*2120 [0.50] Introductory Methods
- SOC*1500 [0.50] Crime and Criminal Justice
- SOC*2700 [0.50] Criminological Theory

Students wishing to declare the CJPP minor must also meet the above requirement.

Students from other institutions who transfer to the University of Guelph and wish to declare the CJPP major or minor must also meet the above requirement. If an external transfer student is granted credit for one or more of the foundation courses listed above, then he or she must attain a cumulative average of 70% or better in the remaining required CJPP foundation courses.

Major (Honours Program)

A minimum of 9.00 credits is required, including:

- PHIL*1010 [0.50] Introductory Philosophy: Social and Political Issues
- POLS*1400 [0.50] Issues in Canadian Politics
- POLS*2250 or POLS*2300 [0.50] Introductory Methods
- POLS*2350 [0.50] Law from a Political Science Perspective
- SOAN*2120 [0.50] Introductory Methods
- SOC*1500 [0.50] Crime and Criminal Justice
- SOC*2700 [0.50] Criminological Theory

0.50 credits from the following:

- POLS*3650 [0.50] Quantitative Methods of Data Analysis
- SOAN*3120 [0.50] Quantitative Methods

1.50 credits from the following:

- SOC*2070 [0.50] Social Deviance
- SOC*2760 [0.50] Homicide
- SOC*3490 [0.50] Law and Society
- SOC*3710 [0.50] Youth Justice
- SOC*3730 [0.50] Courts and Society
- SOC*3740 [0.50] Corrections and Penology

Minor (Honours Program)

A minimum of 5.00 credits is required, including:

- PHIL*1010 [0.50] Introductory Philosophy: Social and Political Issues
- POLS*1400 [0.50] Issues in Canadian Politics
- POLS*2250 or POLS*2300 [1.00] 1.50 credits from the following:
- POLS*2350 [0.50] Law from a Political Science Perspective
- SOAN*2120 [0.50] Introductory Methods
- SOC*1500 [0.50] Crime and Criminal Justice

Economics (ECON)

Department of Economics and Finance, Gordon S. Lang School of Business and Economics

The Department of Economics and Finance offers courses in economic theory, applied economics and quantitative methods. Students may take courses leading to a B.A. in the honours. It is possible to combine Economics with various other disciplines such as mathematics and statistics, business administration, political science, geography and history. Students are urged to consult the department's program planning guide and the department's advisors for detailed information about courses and programs and about the course of study most appropriate as preparation for graduate work in economics or business administration, for professional degrees such as the Bachelor's degree in Law, and for careers in business and government.

Core Requirements

- ECON*1050 [0.50] Introductory Microeconomics
- ECON*1100 [0.50] Introductory Macroeconomics
- ECON*2310 [0.50] Intermediate Microeconomics
- ECON*2410 [0.50] Intermediate Macroeconomics

One of:

- SOAN*3120 [0.50] Quantitative Methods

2019-2020 Undergraduate Calendar

Last Revision: July 4, 2019
Major (Honours Program)

A minimum of 9.50 credits in Economics is required, including:

The Economics core requirements
ECON*2740 [0.50] Economic Statistics
ECON*2770 [0.50] Introductory Mathematical Economics
ECON*3710 [0.50] Advanced Microeconomics
ECON*3740 [0.50] Introduction to Econometrics
ECON*3810 [0.50] Advanced Macroeconomics
ECON*4710 [0.50] Advanced Topics in Microeconomics
ECON*4810 [0.50] Advanced Topics in Macroeconomics

One of:
ECON*2720 [0.50] Business History
ECON*3730 [0.50] The Origins of International Inequality
ECON*4720 [0.50] Topics in Economic History

3.00 additional credits in Economics at the 3000 or 4000 level, at least 1.50 of which must be at the 4000 level

Note: Students contemplating graduate studies in Economics should take ECON*4640, Advanced Econometrics and ECON*4840, Financial Econometrics.

Minor (Honours Program)

A minimum of 5.00 credits in Economics is required, including:

a. The Economics core
b. One of:
   ECON*2560 [0.50] Introduction to Finance
   ECON*2740 [0.50] Economic Statistics
   ECON*2770 [0.50] Introductory Mathematical Economics
c. 2.00 other credits in Economics at the 3000 or 4000 level

Notes:
1. ECON*3740 is recommended.
2. Students wishing to pursue a more structured Economics minor should take ECON*3710 as well as ECON*3740.

Economics (Co-op) (ECON:C)

Department of Economics and Finance, Gordon S. Lang School of Business and Economics

The Economics Co-op program provides an integrated academic/work experience for students with co-operating employer organizations. Students in the program complete 4-5 work terms while fulfilling the requirements of their honours Economics program.

All co-op students must complete the Economics core plus an introductory computer science course (CIS*), ECON*2770 and ECON*3740 in their first 4 semesters. Admission to the co-op program is limited to students of high academic standing and will be considered only at semester 1 entry or at the end of semester 2. The first 2 work terms normally follow completion of the first 4 semesters of academic study. Students will only be permitted to take these work terms if they are eligible to continue in the Honours Economics program, have completed the required courses and are maintaining a satisfactory standing in their Economic program. The 3rd and 4th work terms will normally follow the 6th academic semester. For further information on the Economics Co-op program students are urged to consult the department's Program Guide and Co-operative Education Programs in Section X-degree Programs in this calendar.

Students should review the Economics section in the schedule of studies for additional program information.

Program Requirements

The Co-op program in Economics is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Economics Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall Semester</th>
<th>Winter Semester</th>
<th>Summer Semester</th>
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<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
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<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td>COOP*1000 Work Term I</td>
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<td>COOP*4000 Work Term IV</td>
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<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
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</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (22.00 Total Credits)*

9.50 - Required Core Courses
1.50 - Humanities credits from at least two subject areas (BA distribution requirement)
0.50 - Social Science credit outside of ECON (BA distribution requirement)
8.50 – Electives
2.00 - Co-op Work Terms

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. A fifth Co-op work term is optional and if completed, the total number of credits will equal 22.50

The recommended program sequence is outlined below.

Major (Honours Program)

Semester 1
ECON*1050 [0.50] Introductory Macroeconomics
One of:
   MATH*1000 0.50 Introductory Calculus
   MATH*1030 0.50 Business Mathematics
   MATH*1080 0.50 Elements of Calculus I
   MATH*1200 0.50 Calculus I
1.50 electives

Semester 2 (Winter)
ECON*1100 [0.50] Introduction to Finance
One computer science course
1.50 electives

Summer Semester
Optional -- at the discretion of the student.

Semester 3 (Fall)
COOP*1000 [0.50] Co-op Work Term I
Fall Semester
COOP*2000 [0.50] Co-op Work Term II
Semester 5 (Winter)
ECON*3810 [0.50] Advanced Macroeconomics
1.00 credits in Economics at the 3000 level
1.00 electives

Summer Semester
COOP*3000 [0.50] Co-op Work Term III

Semester 6 (Fall)
ECON*3710 [0.50] Advanced Microeconomics
0.50 credits in Economics at the 4000 level (ECON*4640 is recommended)
1.50 electives

Winter Semester
COOP*4000 [0.50] Co-op Work Term IV

Summer Semester
COOP*5000 [0.50] Co-op Work Term V
Semester 7 (Fall)
ECON*4710 [0.50] Advanced Topics in Microeconomics
0.50 credits in Economics at the 4000 level
1.00 electives
0.50 restricted electives

Summer Semester
ECON*4810 [0.50] Advanced Topics in Macroeconomics
0.50 credits in Economics at the 4000 level
1.50 electives
the economic history course may be taken in any semester

**English (ENGL)**

**School of English and Theatre Studies, College of Arts**

The School of English and Theatre Studies offers courses in the B.A. Program in English that focus on the study of literature and related texts across a broad range of theoretical, historical, and geographical sites. The School also welcomes non-majors into its courses at the 1000, 2000, and 3000 levels, suitable to other majors within the College of Arts and beyond. Certain courses in Theatre Studies (THST) and in Literature in Translation (CLAS, GERM, HUMN, SPAN) may be counted towards a degree in English. Consult the School of English and Theatre Studies for details.

First-year students registered in or considering one of the programs in English should register for ENGL*1080 in the first semester and ENGL*2080 in the second semester.

**Area of Concentration (General Program)**

A minimum of 5.00 English credits is required in the English core and the English electives. English elective courses must be chosen to fulfill the Distribution Requirements for the Area of Concentration.

**English core - 2.00 credits as follows:**
1. ENGL*1080, ENGL*2080, ENGL*2120
2. one additional core seminar (variable content): ENGL*2130, ENGL*3940, ENGL*3960

English electives - 3.00 credits to include:
1. 1.00 credits from the following list of courses:
   - ENGL*2090 [0.50] Studies in Shakespeare
   - ENGL*2360 [0.50] Medieval Literature
   - ENGL*3080 [0.50] History and Linguistics of the English Language
   - ENGL*3220 [0.50] Representing Britain: 18th- & 19th-Century Literature
   - ENGL*3240 [0.50] Studies in Early Modern Literature and Culture
   - ENGL*3300 [0.50] Restoration to Romanticism: Forging the Nation
   - ENGL*3320 [0.50] Romanticism to Victorianism: Culture and Conformity
   - ENGL*3340 [0.50] British Imperial Culture
   - ENGL*3380 [0.50] Studies in the History of Literary Production
   - ENGL*3540 [0.50] Writing the United States
   - ENGL*3570 [0.50] Chaucer in Context
   - ENGL*3630 [0.50] Writing Canada: Forging the Nation
2. 2.00 credits from any other ENGL lecture or seminar course. At least 1.00 credits in ENGL must be at the 3000 level.

**Major (Honours Program)**

A minimum of 8.50 English credits is required in the English core and the English electives. English elective courses must be chosen to fulfill the Distribution Requirements for the Major.

**English core - 3.00 credits as follows:**
1. ENGL*1080, ENGL*2080
2. four core seminars (variable content): ENGL*2120, ENGL*2130, ENGL*3940, ENGL*3960

English electives - 5.50 credits to include:
1. 2.00 credits from the following list of courses:
   - ENGL*2090 [0.50] Studies in Shakespeare
   - ENGL*2360 [0.50] Medieval Literature
   - ENGL*3080 [0.50] History and Linguistics of the English Language
   - ENGL*3220 [0.50] Representing Britain: 18th- & 19th-Century Literature
   - ENGL*3240 [0.50] Studies in Early Modern Literature and Culture
   - ENGL*3300 [0.50] Restoration to Romanticism: Forging the Nation
   - ENGL*3320 [0.50] Romanticism to Victorianism: Culture and Conformity
   - ENGL*3340 [0.50] British Imperial Culture
   - ENGL*3380 [0.50] Studies in the History of Literary Production
   - ENGL*3540 [0.50] Writing the United States
   - ENGL*3570 [0.50] Chaucer in Context
   - ENGL*3630 [0.50] Writing Canada: Forging the Nation
2. 1.00 credits from ENGL 4000 level courses
3. 2.50 credits from any other ENGL lecture or seminar courses

A maximum of 2.00 credits at the 4000 level may be counted towards a major in English.

Honours students interested in a more concentrated program or contemplating graduate work in English are strongly advised to:
- attain a good reading knowledge of another language, such as French
- take ENGL*3380 (Studies in the History of Literary Production), ENGL*3690 (History of Literary Criticism), ENGL*4890 (Contemporary Literary Theory)
- take 2.00 credits from 4000-level seminars (2 seminars at 1.00 credits each)
- The M.A. program in English at Guelph gives preference to qualified applicants with a broad experience in literary and cultural studies and related disciplines.

**Minor (Honours Program)**

The program of study and requirements are the same as for the Area of Concentration in the General Program.

**Environmental Governance (EGOV)**

**Department of Geography, Environment and Geomatics, College of Social and Applied Human Sciences**

Environmental governance refers to the processes through which societies make decisions that affect the environment. Governments have long been dominant players in this context. However, in Canada and around the world, the ability of governments alone to address environmental problems is being called into question. As a result, contemporary environmental governance increasingly involves citizens, non-government organizations, and businesses.

The Major in Environmental Governance introduces students to the challenges of environmental governance. Through completing courses from the disciplines of geography, political science, agricultural economics, and economics, students will receive a solid foundation in the processes and mechanisms of environmental governance in Canada and elsewhere; an understanding of geographical, political, and economic factors that shape governance in Canada and around the world; and exposure to innovative approaches to environmental governance that address persistent and emerging societal concerns. Students completing the major will have the skills and experiences needed to participate effectively in environmental governance in a variety of settings. Hence, they will find careers in the public sector, in environmental non-government organizations, and, increasingly, in the private sector.

Completion of required courses, and careful selection from among optional courses, will facilitate students completing a minor in Geography, Political Science, or Economics. Minors in other programs also may complement the Major in Environmental Governance.

**Major (Honours Program)**

A minimum of 11.50 credits, consisting of 11.00 credits from the courses specified below, plus 0.50 credits from other 4000 level courses in Geography; Political Science; Food, Agricultural and Resource Economics (Agricultural Economics); or Economics:

- ECON*1050 [0.50] Introductory Microeconomics
- EDRD*2650 [0.50] Introduction to Planning and Environmental Law
- ENGL*1220 [0.50] Human Impact on the Environment
- ENGL*1350 [0.50] Earth: Hazards and Global Change
- ENGL*2110 [0.50] Climate and the Biophysical Environment
- ENGL*2210 [0.50] Environment and Resources
- ENGL*3020 [0.50] Global Environmental Change
- ENGL*3210 [0.50] Management of the Biophysical Environment
- ENGL*4210 [0.50] Environmental Governance
- ENGL*4220 [0.50] Local Environmental Management
- ENGL*4230 [0.50] Environmental Impact Assessment
- MGMT*3020 [0.50] Corporate Social Responsibility
- POLS*1150 [0.50] Understanding Politics
- POLS*2250 [0.50] Public Administration and Governance
- POLS*3250 [0.50] Public Policy: Challenges and Prospects
- POLS*3370 [0.50] Environmental Politics and Governance

One of:
- GEOF*2030 [0.50] Environment and Development
- GEOF*2230 [0.50] Commodity Chains and Cultures of Consumption

One of:
- ECON*2100 [0.50] Economic Growth and Environmental Quality
- FARE*2700 [0.50] Survey of Natural Resource Economics

One of:
- HIST*2250 [0.50] Environment and History
- PHIL*2070 [0.50] Philosophy of the Environment
- SOC*3380 [0.50] Society and Nature

One of:
- ECON*2740 [0.50] Economic Statistics
- GEOF*2460 [0.50] Analysis in Geography
- STAT*2040 [0.50] Statistics I

One of:
- FARE*3170 [0.50] Cost-Benefit Analysis
- POLS*3210 [0.50] The Constitution and Canadian Federalism
- POLS*3270 [0.50] Local Government in Ontario
- POLS*3470 [0.50] Business-Government Relations in Canada
- POLS*3790 [0.50] International Political Economy

One of:
- FARE*4290 [0.50] Land Economics
- FARE*4310 [0.50] Resource Economics

At least 0.50 additional credits at the 4000 level from Geography; Political Science; Food, Agricultural and Resource Economics (FARE); or Economics. Students are advised to contact an Environmental Governance Faculty Advisor for a list of recommended 4000 level courses.
European Culture and Civilization (ECC)

The minor in European Culture and Civilization is designed for students interested in the interdisciplinary study of European culture and history. It offers a combination of languages, history of European culture, literature, the arts, philosophy, history and political science.

Note: the minor is not open to European Studies majors.

Minor (Honours Program)

Note: some of the courses below (the language courses, some 3000 and 4000 level courses in lists A, B, C, D) have prerequisites not included in the minor.

A minimum of 5.00 credits, at least 1.00 of which must be at the 3000 level or above, is required, including:

1. EURO*1100 [0.50] European Cinema
   EURO*2200 [0.50] Towards European Modernism
   EURO*3300 [0.50] Violence and Culture

2. 2.00 credits in one language chosen from the following list:
   FREN*1200 [0.50] French Language I
   FREN*1300 [0.50] French Language II
   FREN*2020 [0.50] France: Literature and Society
   FREN*2500 [0.50] French Translation I
   FREN*2520 [0.50] French Composition I
   FREN*2530 [0.50] Contemporary France
   FREN*3090 [0.50] Classics of French Literature
   FREN*3500 [0.50] French Translation II
   FREN*3520 [0.50] French Composition II
   OR
   GERM*1100 [0.50] Introductory German I
   GERM*1110 [0.50] Introductory German II
   GERM*2010 [0.50] Intermediate Language Practice
   GERM*2490 [0.50] Intermediate German
   GERM*3150 [0.50] Interactive German Language and Culture
   OR
   HUMN*2020 [0.50] The Criminal Mind in Italian Cinema
   ITAL*1060 [0.50] Introductory Italian I
   ITAL*1070 [0.50] Introductory Italian II
   ITAL*2090 [0.50] Intermediate Italian
   ITAL*3400 [0.50] Renaissance Lovers and Fools
   ITAL*3700 [0.50] Experiential Learning and Language
   OR
   SPAN*1100 [0.50] Introductory Spanish I
   SPAN*1110 [0.50] Introductory Spanish II
   SPAN*2000 [0.50] Intermediate Spanish I
   SPAN*2010 [0.50] Intermediate Spanish II
   SPAN*2040 [0.50] Culture of Spain
   SPAN*2990 [0.50] Hispanic Literary Studies
   SPAN*3220 [0.50] Literature and Arts I: Spain
   SPAN*3500 [0.50] Advanced Spanish I

3. 1.50 credits; 0.50 credits from three of the following Groups A, B, C and D from the following list:

   **Group A**
   HIST*1010 [0.50] Early Modern Europe
   HIST*2200 [0.50] The Medieval World
   HIST*2510 [0.50] Modern Europe Since 1789
   HIST*2820 [0.50] Modern France Since 1750
   HIST*3230 [0.50] Spain and Portugal, 1085 to 1668
   HIST*3350 [0.50] Modern Germany
   HIST*3570 [0.50] Women in Modern Europe
   HIST*3750 [0.50] The Reformation
   HIST*3820 [0.50] Early Modern France
   HIST*4090 [1.00] Modern European History
   HIST*4470 [0.50] Special History Project Seminar I
   HIST*4580 [1.00] The French Revolution

   **Group B**
   PHIL*2140 [0.50] Ancient Greek Philosophy
   PHIL*2160 [0.50] Early Modern Philosophy: Reason vs. Experience
   PHIL*3060 [0.50] Medieval Philosophy
   PHIL*3100 [0.50] Kant and His Legacy
   PHIL*3200 [0.50] Continental Philosophy
   PHIL*3360 [0.50] Nineteenth Century Philosophy
   POLS*2000 [0.50] Political Theory
   POLS*2100 [0.50] Comparative Politics
   POLS*2200 [0.50] International Relations
   POLS*3450 [0.50] European Governments and Politics
   POLS*3500 [0.50] Political Institutions
   PHIL*3100 [0.50] Ancient Greek Philosophy
   PHIL*3160 [0.50] Early Modern Philosophy: Reason vs. Experience
   PHIL*3200 [0.50] Continental Philosophy
   PHIL*3300 [0.50] Nineteenth Century Philosophy
   POLS*2000 [0.50] Political Theory
   POLS*2100 [0.50] Comparative Politics
   POLS*2200 [0.50] International Relations
   POLS*3450 [0.50] European Governments and Politics
   POLS*4200 [0.50] European Politics
   POLS*4210 [0.50] International Relations

   **Group C**
   CLAS*1000 [0.50] Introduction to Classical Culture
   CLAS*2000 [0.50] Classical Mythology
   CLAS*2350 [0.50] The Classical Tradition
   EURO*3000 [0.50] Revolution and the Fantastic in European Culture
   EURO*4050 [0.50] Contemporary Europe. New Landscapes in the Post-Cold War Era
   FREN*3030 [0.50] Good and Evil
   FREN*3110 [0.50] Storytelling in the Francophone World
   FREN*3140 [0.50] Women in Literature, Art and Film
   FREN*3160 [0.50] Songs, Lyrics and Poetry in French
   FREN*3170 [0.50] Fictions of Childhood
   HIST*2850 [0.50] Ancient Greece and Rome
   HUMN*1030 [0.50] What Makes a Literary Classic?
   HUMN*3000 [0.50] Narratives of Migration
   HUMN*3020 [0.50] Myth and Fairy Tales in Germany
   HUMN*3400 [0.50] Renaissance Lovers and Fools
   HUMN*3470 [0.50] Holocaust & WWII in German Lit. & Film

Note: Other Spanish literature courses may be counted in this section provided the course-content is European-centered. Please see the ESP coordinator for further information.

   **Group D**
   ARTH*1510 [0.50] Art Historical Studies I
   ARTH*1520 [0.50] Art Historical Studies II
   ARTH*2550 [0.50] The Italian Renaissance
   ARTH*2580 [0.50] Late Modern Art: 1900-1950
   ARTH*2600 [0.50] Early Modern Art
   ARTH*3320 [0.50] Lives: Aspects of Western Art
   ARTH*3330 [0.50] Display: Visual Culture in Western Europe
   ARTH*3340 [0.50] Studies in Renaissance and Baroque Art
   MUSC*1060 [0.50] Amadeus to Zeppelin: Music and Culture I
   MUSC*2010 [0.50] The Musical Avant-Garde

Note: other Music history courses may be counted if students with knowledge of music are granted waivers by instructor. The substitution(s) must also be approved by the ESP coordinator.

European Studies (EURS)

Interdisciplinary Program

The European Studies program is designed for students who seek a career in International Relations - especially in International Business and Administration - between Canada and Europe. It offers a combination of languages, specially designed courses in European thought, letters and history and specialization in either European Business or European Culture and Civilization.

Successful completion of the European Studies Major requires proficiency in one of the following languages (French, German, Italian or Spanish). In order to demonstrate language proficiency, students have two options: they may study for a year at a European University, in the country where their chosen core language is spoken, or they may write a final research paper in the chosen core language within a required fourth year European Studies course (see EURO*4740). It is highly recommended that students spend their third year studying at a European university, in the country where their chosen core language is spoken. The benefits of such an experience are considerable, both academically and personally. One specific academic outcome of a successful year abroad will be recognition that the student has fulfilled the program’s core language requirement. For students who have spent one year studying at a European university in a country where their chosen core language is spoken, a course taken in that year involving a major academic paper or exam in the core language will, upon approval of the Co-ordinator of European Studies, be substituted for EURO*4740. See the Coordinator for the European Studies program for more information. See also the course description for EURO*4740.

Major (Honours Program)

A minimum of 12.00 credits is required, including:

5.00 credits in the three components of the European Studies core, 2.50 credits in one language, and 4.50 credits in either the European Culture and Civilization or the European Business Studies area of emphasis

Core Requirements

1. EURO*1100 [0.50] European Cinema
   EURO*2200 [0.50] Towards European Modernism
   EURO*3000 [0.50] Revolution and the Fantastic in European Culture
   EURO*3300 [0.50] Violence and Culture
   EURO*4050 [0.50] Contemporary Europe. New Landscapes in the Post-Cold War Era
   EURO*4740 [0.50] Research Project in European Studies
   HIST*2510 [0.50] Modern Europe Since 1789
   HROB*2090 [0.50] Individuals and Groups in Organizations
   POLS*2200 [0.50] International Relations
   POLS*3450 [0.50] European Governments and Politics
Note: in order to demonstrate language proficiency, students must write a research paper (EURO*4740) in their core language unless they have spent one year studying at a European university, in the country where their chosen core language is spoken. Where that is the case, a course taken in that year involving a major academic paper of exam in the core language will, upon approval of the Co-ordinator for European Studies, EURO*4740.

2. 2.50 credits in one language:

- FREN*1200 [0.50] French Language I
- FREN*1300 [0.50] French Language II
- FREN*2020 [0.50] French: Literature and Society
- FREN*2500 [0.50] French Translation I
- FREN*2520 [0.50] French Composition I
- FREN*2550 [0.50] Contemporary France
- FREN*3090 [0.50] Classics of French Literature
- FREN*3500 [0.50] French Translation II
- FREN*3520 [0.50] French Composition II

OR

- GERM*1100 [0.50] Introductory German I
- GERM*1110 [0.50] Introductory German II
- GERM*2010 [0.50] Intermediate Language Practice
- GERM*2490 [0.50] Intermediate German
- GERM*3000 [0.50] Narratives of Migration
- GERM*3020 [0.50] Myth and Fairy Tales in Germany
- GERM*3150 [0.50] Interactive German Language and Culture
- GERM*3470 [0.50] Holocaust & WWII in German Lit. & Film

OR

- HUMN*2020 [0.50] The Criminal Mind in Italian Cinema
- ITAL*1060 [0.50] Introductory Italian I
- ITAL*1070 [0.50] Introductory Italian II
- ITAL*2090 [0.50] Intermediate Italian
- ITAL*3700 [0.50] Experiential Learning and Language

OR

- SPAN*1100 [0.50] Introductory Spanish I
- SPAN*1110 [0.50] Introductory Spanish II
- SPAN*2000 [0.50] Intermediate Spanish I
- SPAN*2010 [0.50] Intermediate Spanish II
- SPAN*2040 [0.50] Culture of Spain
- SPAN*2990 [0.50] Hispanic Literary Studies
- SPAN*3220 [0.50] Literature and Arts I: Spain
- SPAN*3500 [0.50] Advanced Spanish I

Areas of Emphasis

European Business

Required courses:

- ACCT*1220 [0.50] Introductory Financial Accounting
- ACCT*2230 [0.50] Management Accounting
- ECON*1050 [0.50] Introductory Microeconomics
- ECON*1100 [0.50] Introductory Macroeconomics
- MGMT*3320 [0.50] Financial Management
- MGMT*4000 [0.50] Strategic Management

1.50 credits chosen from:

- ECON*2310 [0.50] Intermediate Microeconomics
- ECON*2410 [0.50] Intermediate Macroeconomics
- ECON*2560 [0.50] Introduction to Finance
- ECON*3660 [0.50] Investments
- ECON*3730 [0.50] The Origins of International Inequality
- FARE*3310 [0.50] Operations Management
- FARE*4370 [0.50] Food & Agri Marketing Management
- HROB*2200 [0.50] Labour Relations
- HROB*2290 [0.50] Human Resources Management
- HTM*1070 [0.50] Responsible Tourism Policy and Planning
- HTM*3030 [0.50] Beverage Management
- HTM*3160 [0.50] Destination Management and Marketing
- HTM*4050 [0.50] Wine and Oenology
- HTM*4170 [0.50] International Tourism
- MCS*1000 [0.50] Introductory Marketing
- MCS*2100 [0.50] Personal Financial Management
- MCS*2600 [0.50] Fundamentals of Consumer Behaviour
- MCS*3000 [0.50] Advanced Marketing
- MCS*3040 [0.50] Business and Consumer Law
- STAT*2060 [0.50] Statistics for Business Decisions

European Culture and Civilization

Students must take 4.50 credits including at least 0.50 credits from each of the following four groups. The remaining 2.50 credits may be chosen from any of the courses in the four groups.

Group A

- HIST*1010 [0.50] Early Modern Europe
- HIST*2200 [0.50] The Medieval World
- HIST*2510 [0.50] Modern Europe Since 1789
- HIST*2820 [0.50] Modern France Since 1750
- HIST*3230 [0.50] Spain and Portugal, 1085 to 1668
- HIST*3350 [0.50] Modern Germany
- HIST*3570 [0.50] Women in Modern Europe
- HIST*3750 [0.50] The Reformation
- HIST*3820 [0.50] Early Modern France
- HIST*4090 [1.00] Modern European History
- HIST*4470 [0.50] Special History Project Seminar I
- HIST*4580 [1.00] The French Revolution

Group B

- PHIL*2140 [0.50] Ancient Greek Philosophy
- PHIL*2160 [0.50] Early Modern Philosophy: Reason vs. Experience
- PHIL*3060 [0.50] Medieval Philosophy
- PHIL*3100 [0.50] Kant and His Legacy
- PHIL*3200 [0.50] Continental Philosophy
- PHIL*3360 [0.50] Nineteenth Century Philosophy
- POLS*1400 [0.50] Issues in Canadian Politics
- POLS*1500 [0.50] World Politics
- POLS*2100 [0.50] Political Theory
- POLS*2320 [0.50] Comparative Politics
- POLS*3250 [0.50] Modern Political Thought
- POLS*3370 [0.50] Environmental Politics and Governance
- POLS*3670 [0.50] Comparative Public Policy and Administration
- POLS*3790 [0.50] International Political Economy
- POLS*4340 [1.00] Nationalism, State-building and Identity

Group C

- CLAS*1000 [0.50] Introduction to Classical Culture
- CLAS*2000 [0.50] Classical Mythology
- CLAS*2350 [0.50] The Classical Tradition
- FREN*3030 [0.50] Good and Evil
- FREN*3110 [0.50] Storytelling in the Francophone World
- FREN*3140 [0.50] Women in Literature, Art and Film
- FREN*3160 [0.50] Songs, Lyrics and Poetry in French
- FREN*3170 [0.50] Fictions of Childhood
- HIST*2650 [0.50] Ancient Greece and Rome
- HUMN*1030 [0.50] What Makes a Literary Classic?
- HUMN*3000 [0.50] Narratives of Migration
- HUMN*3020 [0.50] Myth and Fairy Tales in Germany
- HUMN*3400 [0.50] Renaissance Lovers and Fools
- HUMN*3470 [0.50] Holocaust & WWII in German Lit. & Film

Note: Other Spanish and Hispanic literature courses may be counted in this section provided the course-content is European-centered. Please see the ESP coordinator for further information.

Group D

- ARTH*1510 [0.50] Art Historical Studies I
- ARTH*1520 [0.50] Art Historical Studies II
- ARTH*2550 [0.50] The Italian Renaissance
- ARTH*2580 [0.50] Late Modern Art: 1900-1950
- ARTH*2600 [0.50] Early Modern Art
- ARTH*3320 [0.50] Lives: Aspects of Western Art
- ARTH*3330 [0.50] Display: Visual Culture in Western Europe
- ARTH*3340 [0.50] Studies in Renaissance and Baroque Art
- MUSC*1060 [0.50] Amadeus to Zepelin: Music and Culture I
- MUSC*2010 [0.50] The Musical Avant-Garde

Note: Other music history courses may be counted if students with knowledge of music are granted waivers by instructor. The substitution(s) must also be approved by the ESP coordinator.

Study Abroad

Year 3 or year 4 will provide students with the opportunity to continue their studies abroad. Students will select up to 6.00 credits which can be included in the area of emphasis, as electives, or both. They are subject to approval by the program coordinator and the departmental advisor. Courses taken in Europe will not count towards the specialization average.

Practicum Opportunity:

EURO*3700 is available for those students wishing to participate in a practicum experience as part of the year abroad. The practicum must be a job or volunteer experience that contributes to the student's area of study and intended career. It must be approved in advance by the Coordinator. A final report, written in the student's chosen language, is a requirement of this course.

Family and Child Studies (FCS)

Department of Family Relations and Applied Nutrition, College of Social and Applied Human Sciences

Last Revision: July 4, 2019
Family and Child Studies is offered as a minor in the honours program. It is designed to provide students with an opportunity to pursue interdisciplinary studies which have a specific focus on human development over the life span and on the applied questions which relate to the needs of children and the functioning of families. Elective courses may be chosen to emphasize the family, the child, or a combination of the two. Students seeking counselling should consult with a faculty advisor in the Department of Family Relations and Applied Nutrition.

### Minor (Honours Program)

A minimum of 5.00 credits is required, including:

- FRHD*1010 [0.50] Human Development
- FRHD*1020 [0.50] Couple and Family Relationships
- FRHD*2270 [0.50] Development in Early and Middle Childhood
- FRHD*3040 [0.50] Parenting and Intergenerational Relationships
- NURT*1010 [0.50] Introduction to Nutrition

A further 2.50 credits offered by the Department of Family Relations and Applied Nutrition (FRHD or NURT*250 or NURT*3150 or NURT*4070), of which at least 1.00 must be at the 3000 level or above.

**Note:** where students are required to complete PSYC*2450 for their program of study, FRHD*2270 will not be required in the FCS minor, PSYC*2450 will be substituted for FRHD*2270.

### Food, Agricultural and Resource Economics (FARE)

#### Department of Food, Agricultural and Resource Economics, Ontario Agricultural College

Food and Agriculture connect people with the world’s natural resource base and are at the heart of global issues. In this major, students will acquire the analytical and management skills needed to develop the capacity to effectively deal with emerging issues and challenges, such as food, security and sustainability. Building on the understanding of economic theory and applied methods in both the Canadian and world context, a variety of job opportunities arise in industry, government agencies and non-governmental organizations. Beyond the core offering, the major provides the flexibility for students to pursue thematic areas of study, as well as an opportunity to take additional liberal arts courses. In addition, this major provides excellent background for those students planning to undertake graduate work in food, agricultural or resource economics and other fields of applied economics.

### Major (Honours Program)

A minimum of 11.00 credits, consisting of the 9.50 credits specified below plus 1.50 credits of restricted electives, is required, including:

- ACCT*1220 [0.50] Introductory Financial Accounting
- AGR*1110 [1.00] Introduction to the Agri-Food Systems
- FARE*1300 [0.50] Poverty, Food & Hunger
- FARE*1400 [1.00] Economics of the Agri-Food System
- FARE*2410 [0.50] AgriFood Markets and Policy
- FARE*2700 [0.50] Survey of Natural Resource Economics
- FARE*3030 [0.50] The Firm and Markets
- FARE*4000 [0.50] Agricultural and Food Policy
- ECON*1050 [0.50] Introductory Microeconomics
- ECON*1100 [0.50] Introductory Macroeconomics
- ECON*2310 [0.50] Intermediate Microeconomics
- ECON*2410 [0.50] Intermediate Macroeconomics
- ECON*2740 [0.50] Economic Statistics
- ECON*2770 [0.50] Introductory Mathematical Economics
- ECON*3740 [0.50] Introduction to Econometrics

One of:

- FARE*3170 [0.50] Cost-Benefit Analysis
- FARE*4360 [0.50] Marketing Research
- FARE*4500 [0.50] Decision Science

One of:

- MATH*1030 [0.50] Business Mathematics
- MATH*1080 [0.50] Elements of Calculus I
- MATH*1200 [0.50] Calculus I

1.50 additional credits, at least of which 0.50 credits must be at the 4000 level, chosen from the following list of thematic streams with the Food, Agricultural and Resource Economics specializations:

#### Food and Agribusiness Management:

- FARE*4220 [0.50] Advanced Agribusiness Management
- FARE*4240 [0.50] Futures and Options Markets
- FARE*4370 [0.50] Food & Agri Marketing Management
- MGMT*3320 [0.50] Financial Management

#### International Agricultural Development Economics:

- ECON*2650 [0.50] Introductory Development Economics
- FARE*2520 [0.50] Food and International Development
- FARE*4210 [0.50] World Agriculture, Food Security and Economic Development

#### Resource Economics:

- ECON*4930 [0.50] Environmental Economics

FARE*4290 [0.50] Land Economics
FARE*4310 [0.50] Resource Economics

**Notes:** A student may obtain permission to substitute certain other courses for the ones listed if the substitute course fits with the students program. Approval from a departmental advisor is required.

Unless taken to satisfy the requirements of another program, no student may receive credit in this program for more than one of the following statistics prerequisites ECON*2740, STAT*2040, STAT*2060, or STAT*2080.

### French Studies (FREN)

#### School of Languages and Literatures, College of Arts

All language courses carry 0.50 credits. Please note that students with Ontario Grade 12 credit or its equivalent in French are not normally admitted into FREN*1090, FREN*1100 or FREN*1150. Francophone students usually start the program with second-year courses conditional upon approval by the Faculty Advisor. Students who are exempt from FREN*1100 and/or FREN*1300 will need to substitute higher level French course(s) in order to complete the required number of credits for their program. Under certain circumstances, 0.50 credits from other courses offered in the School of Languages and Literatures which contain material related to French Studies may be counted. Please see the faculty advisor for French Studies for more information. Students majoring in French are advised to take elective courses in another Romance language and in Latin.

It is also recommended that students include LING*1000 among the electives in order to derive the maximum benefit from their studies. Except where stated otherwise, literary texts are, at all levels, studied in the original language. Students registering in French courses are expected to have the appropriate academic background.

#### Area of Concentration (General Program)

A minimum of 5.00 French credits taught in French is required, including:

- FREN*1200 [0.50] French Language I
- FREN*1300 [0.50] French Language II
- FREN*2060 [0.50] Quebec: Literature and Society
- FREN*2520 [0.50] French Composition I

2.50 additional credits in French

#### Major (Honours Program)

A minimum of 8.00 French credits taught in French is required, including:

- FREN*1200 [0.50] French Language I
- FREN*1300 [0.50] French Language II
- FREN*2060 [0.50] Quebec: Literature and Society
- FREN*2520 [0.50] French Composition I

at least 1.50 credits at the 4000 level

4.00 additional credits in French

#### Minor (Honours Program)

A minimum of 5.00 French credits taught in French is required, including:

- FREN*1200 [0.50] French Language I
- FREN*1300 [0.50] French Language II
- FREN*2060 [0.50] Quebec: Literature and Society
- FREN*2520 [0.50] French Composition I

2.50 additional credits in French

**Notes:**

1. Students are strongly urged to take at least 0.50 language credits each semester and they must plan to take a 4th year course in their 3rd year.

2. Students of French are encouraged to take advantage of the French residence on this campus. Applications for accommodation in the Maison Française should be made well in advance of registration.

3. FREN*1090, FREN*1100, FREN*1150, are not counted toward a specialization in French.

4. Native speakers of French (or non-francophone equivalent) will not normally be admitted into FREN*1200 and FREN*1300. It is recommended they start their program with FREN*2020, FREN*2060, FREN*2520, or FREN*2520 with the approval of the Faculty Advisor.

#### Studies in Quebec or Abroad

The French program encourages students to spend 1 or 2 semesters in a French-speaking province or country, or to pursue their studies in an immersion program at the university level. A letter of permission is required (see Section VIII--Undergraduate Degree Regulations & Procedures). Students may also take advantage of federal-provincial programs such as the Explore program or the Ontario Rhône-Alps summer language course.
Year in Nice
A special year-long program in Nice, France, is offered to Guelph students at semester levels 5 and 6. All courses for which transfer credits have been arranged are credited at Guelph without the need for letters of permission; students pay only Guelph academic fees and are eligible for OSAP. For further information see the Head of French Studies.

Geography (GEOG)

Department of Geography, Environment and Geomatics, College of Social and Applied Human Sciences

The Department of Geography, Environment and Geomatics provides students with a broad range of courses in Human and Physical Geography which focus on the nature and evolution of the numerous and complex physical and human environment systems of the world. Students are required to select courses from both the human and physical fields. Within the program of studies it is possible for students through course selection to follow a particular line of interest in, for example, Rural Geography, Resource Management, Urban and Economic Geography, Biophysical Resources or Geomorphology. The 1000 level courses provide a foundation for the Geography programs and are prerequisites or are strongly recommended for many of the 2000 level courses. The 2000 level systematic courses are prerequisite to the corresponding advanced courses at the 3000 and 4000 level. All students should obtain a copy of the department program planning guide and consult with faculty before planning their course of studies. Students contemplating graduate or professional programs of study following completion of the honours program should consult a faculty advisor for advice on additional courses that they should take.

The department also offers a B.SC. honours Earth Surface Science program (jointly with Land Resources Science), a B.SC.(ENV) honours Environmental Geography Major program, and a B.SC. honours program Minor in Geographic Information Systems and Environmental Analysis which are described in the schedule of studies for each of the programs (Section X). Geography B.A. honours Majors are eligible to take the B.SC. Minor. All Geography students are encouraged to consult with a faculty advisor regarding course selection.

The following courses may be counted as Geography credits: ENVS*2030, ENVS*2060, ENVS*4220, GEOL*2150, MET*2030, SOIL*2010.

Area of Concentration (General Program)
A minimum of 5.00 credits in Geography is required, including:

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<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>GEOG*1200</td>
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<tr>
<td>GEOG*1220</td>
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<td>GEOG*1300</td>
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<td>GEOG*2000</td>
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<td>GEOG*2110</td>
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<td>GEOG*2210</td>
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<td>GEOG*2230</td>
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<td>GEOG*2460</td>
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<td>GEOG*2480</td>
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<td>GEOG*2520</td>
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<tr>
<td>GEOG*2540</td>
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<tr>
<td>GEOG*2560</td>
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</table>

2.00 credits at the 3000 level or above

Major (Honours Program)
A minimum of 9.00 credits in Geography is required, including:

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<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>GEOG*1200</td>
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<tr>
<td>GEOG*1220</td>
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<td>GEOG*1300</td>
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<td>GEOG*2000</td>
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<td>GEOG*2110</td>
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<td>GEOG*2210</td>
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<td>GEOG*2230</td>
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<td>GEOG*2260</td>
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<tr>
<td>GEOG*2460</td>
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<td>GEOG*2480</td>
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<td>GEOG*2500</td>
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<td>GEOG*2520</td>
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<tr>
<td>GEOG*2540</td>
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<tr>
<td>GEOG*2560</td>
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</table>

3.00 additional credits in Geography at the 3000 level or above including at least 1.50 credits at the 4000 level.

Minor (Honours Program)
A minimum of 5.00 credits in Geography is required, including:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>GEOG*1200</td>
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<tr>
<td>GEOG*1220</td>
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<td>GEOG*1300</td>
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<td>GEOG*2000</td>
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<td>GEOG*2110</td>
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<td>GEOG*2210</td>
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<tr>
<td>GEOG*2230</td>
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<tr>
<td>GEOG*2260</td>
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1.50 credits at the 4000 level.

German (GERM)

School of Languages and Literatures, College of Arts

All language courses carry 0.50 credits. Students with two years of high school German or equivalent may not be admitted into GERM*1110. Students with 12U German credit or its equivalent may be admitted into GERM*1110 only with the approval of the department. All language students are advised to include LING*1000 among their electives in order to derive the maximum benefit from their studies. Except where stated otherwise, literary texts are, at all levels, studied in the original language. Students registering in these courses will be expected to have the appropriate knowledge.

Study Abroad
The School of Languages and Literatures encourages students in the German program to spend 1 or 2 semesters in a German speaking country to continue their studies at the University level. Credit for programs of study successfully completed may be applied towards the University of Guelph degree requirements.). For more information, contact the Centre for International Program or the School of Languages and Literatures.

Minor (Honours Program)
A minimum of 5.00 credits in German is required from the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>GERM*1100</td>
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<tr>
<td>GERM*1110</td>
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<tr>
<td>GERM*2010</td>
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<tr>
<td>GERM*2490</td>
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<tr>
<td>GERM*3000</td>
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<tr>
<td>GERM*3150</td>
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<tr>
<td>GERM*3470</td>
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<tr>
<td>GERM*3600</td>
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<tr>
<td>GERM*3700</td>
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<tr>
<td>GERM*4940</td>
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</tbody>
</table>

Upon passing both the German designation and its Humanities co-requisites, students may count HUMN*3000, HUMN*3020 and HUMN*3470 toward the German minor. Students may also count 0.50 credit toward the German minor from:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ARTH*2950</td>
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<tr>
<td>HIST*3350</td>
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<tr>
<td>HUMN*1030</td>
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<tr>
<td>HUMN*3000</td>
<td>0.50</td>
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<tr>
<td>LING*1000</td>
<td>0.50</td>
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<tr>
<td>LINGH*3470</td>
<td>0.50</td>
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<tr>
<td>PHIL*3100</td>
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<tr>
<td>PHIL*3360</td>
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</tbody>
</table>

Students enrolled in the German program must consult the School of Languages and Literatures for an up-to-date sequence of course offerings.

History (HIST)

Department of History, College of Arts

Courses marked (H) are designed as honours courses. Students in a general program wishing to take these must obtain the permission of instructors concerned. All other courses may be taken by both general and honours students. Students wishing to take a 3000 level course must have pass standing in at least 5.00 credits in university courses.

Students wishing to take a 4000 level course must have pass standing in at least 10.00 university credits. Access to all 4000 level history courses is restricted to students in the B.A. Honours program with at least a 70% average in all history course attempts. Students should note the prerequisite requirements of upper level courses in planning their individual programs.

Students entering semester 1 are advised to choose from 1000 level courses. Second semester students wishing to take an advanced level History course should select that course from the History core.

Core Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>HIST*1050</td>
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<tr>
<td>HIST*2450</td>
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</table>

The Practising Historian

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>HIST*1010</td>
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<tr>
<td>HIST*1150</td>
<td>0.50</td>
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<tr>
<td>HIST*1250</td>
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Early Modern Europe
The Modern World
Science and Technology in a Global Context

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>HIST*2100</td>
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<tr>
<td>HIST*2600</td>
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</table>

Pre-Confederation Canada
Post-Confederation Canada

While not required to do so, students are advised to take both HIST*2100 and HIST*2600.
A minimum of 5.00 credits in History is required, including:

- HIST*1050 [0.50] Invitation to History
- HIST*2450 [0.50] The Practising Historian

**Major (Honours Program)**

A minimum of 8.50 credits in History courses is required, including:

- HIST*1050 [0.50] Invitation to History
- HIST*2450 [0.50] The Practising Historian
- HIST*1010 [0.50] Early Modern Europe
- HIST*1150 [0.50] The Modern World
- HIST*1250 [0.50] Science and Technology in a Global Context
- HIST*2100 [0.50] Pre-Confederation Canada
- HIST*2600 [0.50] Post-Confederation Canada
- HIST*2100 [0.50] Pre-Confederation Canada
- HIST*2600 [0.50] Post-Confederation Canada

Minimum additional credits in History including 2.00 at the 4000 level

**Minor (Honours Program)**

A minimum of 5.00 credits in History is required, including:

- HIST*1050 [0.50] Invitation to History
- HIST*2450 [0.50] The Practising Historian
- HIST*1010 [0.50] Early Modern Europe
- HIST*1150 [0.50] The Modern World
- HIST*1250 [0.50] Science and Technology in a Global Context
- HIST*2100 [0.50] Pre-Confederation Canada
- HIST*2600 [0.50] Post-Confederation Canada

Minimum additional credits in History including 2.00 at the 3000 level

**Human Resources (HR)**

- Compensation

The courses in the Minor in HR satisfy the course requirements for the Certified Human Resources Leader (“CHRL”) designation.

**Minor (Honours Program)**

A minimum of 5.00 credits is required, including:

- ACCT*1220 [0.50] Introductory Financial Accounting
- ACCT*2230 [0.50] Management Accounting
- HROB*2200 [0.50] Individuals and Groups in Organizations
- HROB*2290 [0.50] Human Resources Management
- HROB*3010 [0.50] Compensation Systems
- HROB*3030 [0.50] Occupational Health and Safety
- HROB*3070 [0.50] Recruitment and Selection
- HROB*3090 [0.50] Training and Development
- HROB*4060 [0.50] Human Resource Planning

**Individual Studies (IS)**

**Interdisciplinary Program**

B.A. Counselling Office, Room 130, MacKinnon Building, Ext. 52140.

Honours B.A. students have the option of doing an Individual Studies Major. Students in the Individual Studies Major have the opportunity to determine the goals and methods of their studies. Areas of study can include courses in any of the colleges and where the University of Guelph has faculty expertise to assist students. Students are encouraged to develop an interdisciplinary perspective, and to explore the methods of inquiry which provide depth of knowledge in a specific subject.

A student submitting a proposal for the Individual Studies Major must submit the complete proposal to the B.A. Program Counsellor before the third week of classes of semester four. The B.A. Program Committee will consider proposals once, and will approve, approve with revisions, or deny the proposal. Proposals cannot be resubmitted.

Proposals will not be considered unless they articulate a detailed rationale for a coherent program of studies that is significantly different from any existing major and minor combination at the University of Guelph, and unless the proposal meets the following criteria:

- a. minimum of 9.00 credits
- b. minimum of 4.00 credits at the 3000 level and above, including at least 1.00 credits at the 4000 level
- c. minimum of 1.00 credits in methods and/or theory
- d. maximum of 1.50 credits at the 1000 level
- e. a senior level Directed Readings or Special Project course must be completed. When appropriate, the Committee will identify a faculty member as the supervisor for a student's course of study.

A student wishing to submit a proposed program of studies for the Individual Studies Major must prepare a proposal that will include the following:

- a. clear statement of theme or areas of study
- b. clear statement of the contribution of the major to a post-graduation field of work or study
- c. a clearly set out rationale for inclusion of the specific courses and how they relate to or develop the theme or areas of study
- d. a list of required "core" courses and "restricted electives" following the above criteria.

When proposing core and restricted elective credits, students should keep in mind the prerequisites for their desired 3000 and 4000 level courses

**International Development Studies (IDS)**

**Interdisciplinary Program**

International Development Studies, College of Social and Applied Human Sciences

The program in International Development Studies (IDS) explores the nature and impacts of economic and social development, in Canada and across the globe, from an interdisciplinary perspective. It equips students with the theoretical understanding and analytical and practical skills needed to bring about positive and inclusive change in the world. Students completing a degree in IDS have the skills to tackle complex global problems as needed to promote social justice as citizens and in careers across the public and private sectors and in civil society organizations.

The IDS program provides students with the opportunity to engage with international development practitioners in Canada and internationally. Furthermore, they are equipped with the skills needed for effective engagement whilst as students and in their life beyond university.

Students select an area of emphasis that enables them to explore an issue of particular interest using the skills they develop in the core part of the program. This area of emphasis is selected by the end of the 4th academic semester of study.
International Development Studies students are encouraged to learn another language and to participate in relevant learning experiences beyond the IDS program, including study, work or volunteering in Canada and internationally. In addition to the required core courses and the chosen area of emphasis, students are encouraged to take electives that complement their degree and enhance their analytical and communication skills. See the GDS website for more information on these opportunities and students can get more information from their academic advisor.

Students with a minimum cumulative average of 80% in courses that constitute the IDS major may complete a thesis (IDEV*4190 and IDEV*4150) under the supervision of an ID-affiliated faculty member.

**Major (Honours Program)**

A minimum of 10.50 credits is required, including:

- 8.00 core course requirements
- 2.50 credits in one of four areas of emphasis

**Core Requirements - 8.00 credits**

| ECON*1050 | [0.50] | Introductory Microeconomics |
| ECON*1100 | [0.50] | Introductory Macroeconomics |
| IDEV*1000 | [0.50] | Understanding Development and Global Inequalities |
| IDEV*2000 | [0.50] | The Development Landscape: Actors and Institutions |
| IDEV*2100 | [0.50] | Research in International Development |
| IDEV*2300 | [0.50] | Theoretical Perspectives on Development |
| IDEV*2400 | [0.50] | Development, Social Justice and Human Rights |
| IDEV*3000 | [0.50] | Poverty and Inequality |
| IDEV*3100 | [0.50] | Achieving Sustainable Development |
| IDEV*3300 | [0.50] | Engaging in Development Practice |
| IDEV*3400 | [0.50] | Managing and Evaluating Change in Development |
| IDEV*4000 | [1.00] | Development in Action |
| IDEV*4600 | [0.50] | Advocating and Effecting Change in Development Policy and Practice |

Two of:

| ECON*2650 | [0.50] | Introductory Development Economics |
| GEOG*3050 | [0.50] | Development and the City |
| POLS*3320 | [0.50] | Politics of Aid & Development |
| POLS*3790 | [0.50] | International Political Economy |
| SOAN*3680 | [0.50] | Perspectives on Development |

**Areas of Emphasis - 2.50 credits**

Choose one of the following four Area of Emphasis:

1. Agriculture and Food Security
2. Development in the Canadian Context
3. Development in Fragile Contexts
4. Environment and Sustainable Development

**Agriculture and Food Security**

This area of emphasis focuses on the nature of food security from the local to global levels. It explores the role of agriculture and the wider agri-food system in promoting food security towards the eradication of hunger and improved nutrition and health. Throughout, this area of emphasis reflects critically on the role of diverse actors and alternative approaches through which food security can be enhanced, empowering students to bring about positive, inclusive and sustainable change in agri-food systems locally and globally.

1.50 credits from the following:

| AGR*2150 | [0.50] | Plant Agriculture for International Development |
| FARE*1300 | [0.50] | Poverty, Food & Hunger |
| FARE*2350 | [0.50] | Field Course in International Agriculture |
| ENV*4550 | [0.50] | Topics in the Anthropology of Health |
| ENV*2130 | [0.50] | Eating Sustainably in Ontario |
| FARE*3250 | [0.50] | Food and International Development |
| FARE*4210 | [0.50] | World Agriculture, Food Security and Economic Development |
| GEOG*3320 | [0.50] | Food Systems: Issues in Security and Sustainability |
| HIST*3240 | [0.50] | Food History |
| IDEV*4100 | [0.50] | Thesis in International Development Studies I |
| IDEV*4150 | [0.50] | Thesis in International Development Studies II |
| SOC*4420 | [0.50] | Sociology of Food |

**Development in the Canadian Context**

This area focuses on development predominantly through the case of Canada. Issues that might be explored include: poverty, global migration, inequality, Indigenous-settler relations and food insecurity. It reflects the fact that development problems are found in all parts of the world and solutions to them must recognize the ways in which they are interconnected and distinctive. This area of emphasis aims to empower students to bring about positive, inclusive and sustainable change within Canada, and the rest of the affluent world.

1.50 credits from the following:

| ANTH*2660 | [0.50] | Contemporary Indigenous Peoples in Canada |
| POLS*2300 | [0.50] | Canadian Government and Politics |

**Development in Fragile Contexts**

This area focuses on development in the context of institutionally weak and/or unstable countries and regions. It explores issues associated with state fragility and failure, institutional development, post-conflict rebuilding and social insecurity. It also considers issues of migration, conflict, social change, and post-colonialism. An overarching theme is the need for, and role of, distinct development strategies in fragile contexts, with the aim of empowering students to bring about positive, inclusive and sustainable change in some of the most challenging development contexts globally.

1.50 credits from the following:

| ANTH*4400 | [0.50] | Culture, Rights and Development |
| HIST*2720 | [0.50] | Revolution in the Modern World |
| IDEV*4100 | [0.50] | Thesis in International Development Studies I |
| IDEV*4150 | [0.50] | Thesis in International Development Studies II |
| POLS*3000 | [0.50] | Politics of Africa |
| POLS*3060 | [0.50] | Politics of the Middle East and North Africa |
| POLS*3080 | [0.50] | Politics of Latin America |
| POLS*4340 | [1.00] | Nationalism, State-building and Identity |
| SOAN*3130 | [0.50] | Protest, Resistance, and Collective Action |
| SOAN*4260 | [0.50] | Migration, Inequality and Social Change |

**Environment and Sustainable Development**

This area of emphasis focuses on the relations between environmental change and natural resources and sustainable development. It explores the ways in which the environment and natural resources impact development, and the development challenges posed by environmental change and natural resource use locally and globally. Topics might include urbanization, erosion, natural disasters, water, natural resource, land use and climate change. Particular focus is put on approaches to development that are sustainable and address challenges associated with environmental change and natural resource use. This area of emphasis aims to empower students to bring about positive change that promotes inclusive and sustainable development locally and globally.

1.50 credits from the following:

| ECON*2100 | [0.50] | Economic Growth and Environmental Quality |
| ENV*2120 | [0.50] | Introduction to Environmental Stewardship |
| FARE*2700 | [0.50] | Survey of Natural Resource Economics |
| GEOG*3020 | [0.50] | Global Environmental Change |
| GEOG*3090 | [0.50] | Gender and Environment |
| HIST*3460 | [0.50] | Natural Disasters in Global History |
| IDEV*4100 | [0.50] | Thesis in International Development Studies I |
| IDEV*4150 | [0.50] | Thesis in International Development Studies II |
| POLS*3370 | [0.50] | Environmental Politics and Governance |
| SOAN*4250 | [0.50] | Energy and Society |

**Area of Concentration (General Program)**

A minimum of 5.00 credits is required, including:

1.50 credits from the following:

| ECON*1050 | [0.50] | Introductory Microeconomics |
| ECON*1100 | [0.50] | Introductory Macroeconomics |
| IDEV*1000 | [0.50] | Understanding Development and Global Inequalities |
| IDEV*2000 | [0.50] | The Development Landscape: Actors and Institutions |
| IDEV*2300 | [0.50] | Theoretical Perspectives on Development |
| IDEV*2400 | [0.50] | Development, Social Justice and Human Rights |
| IDEV*3000 | [0.50] | Poverty and Inequality |
| IDEV*3100 | [0.50] | Achieving Sustainable Development |
| IDEV*3400 | [0.50] | Managing and Evaluating Change in Development |
| IDEV*4000 | [1.00] | Development in Action |
| IDEV*4600 | [0.50] | Advocating and Effecting Change in Development Policy and Practice |

Two of:

| IDEV*4100 | [0.50] | Thesis in International Development Studies I |
| IDEV*4150 | [0.50] | Thesis in International Development Studies II |
| IDEV*2300 | [0.50] | Theoretical Perspectives on Development |

One of:

| ANTH*2660 | [0.50] | Introductory Development Economics |
| GEOG*3050 | [0.50] | Development and the City |
| POLS*3320 | [0.50] | Politics of Aid & Development |
| POLS*3790 | [0.50] | International Political Economy |
| SOAN*3680 | [0.50] | Perspectives on Development |
A minimum of 1.00 credits taken from any of the four areas of emphasis of the Major, at least 0.50 being at the 3000 or 4000 levels.

Minor (Honours Program)
A minimum of 5.00 credits is required, including:

\[ \text{ECON}\*1050 [0.50] \text{ Introductory Microeconomics} \]
\[ \text{ECON}\*1100 [0.50] \text{ Introductory Macroeconomics} \]
\[ \text{IDEV}\*1000 [0.50] \text{ Understanding Development and Global Inequalities} \]
\[ \text{IDEV}\*2000 [0.50] \text{ The Development Landscape: Actors and Institutions} \]
\[ \text{IDEV}\*2300 [0.50] \text{ Theoretical Perspectives on Development} \]

Two of:

\[ \text{IDEV}\*2400 [0.50] \text{ Development, Social Justice and Human Rights} \]
\[ \text{IDEV}\*3000 [0.50] \text{ Poverty and Inequality} \]
\[ \text{IDEV}\*3100 [0.50] \text{ Achieving Sustainable Development} \]
\[ \text{IDEV}\*3400 [0.50] \text{ Managing and Evaluating Change in Development} \]
\[ \text{IDEV}\*4600 [0.50] \text{ Advocating and Effecting Change in Development} \]

One of:

\[ \text{ECON}\*2650 [0.50] \text{ Introductory Development Economics} \]
\[ \text{GEOG}\*3050 [0.50] \text{ Development and the City} \]
\[ \text{POLS}\*3320 [0.50] \text{ Politics of Aid & Development} \]
\[ \text{POLS}\*3790 [0.50] \text{ International Political Economy} \]
\[ \text{SOAN}\*3680 [0.50] \text{ Perspectives on Development} \]

A minimum of 1.00 credits taken from any of the four areas of emphasis of the Major, at least 0.50 being at the 3000 or 4000 levels.

International Development Studies (Co-op) (IDS:C)

Interdisciplinary Program

International Development Studies, College of Social and Applied Human Sciences

The program in International Development Studies (IDS) explores the nature and impacts of economic and social development, in Canada and across the globe, from an interdisciplinary perspective. It equips students with the theoretical understanding and analytical and practical skills needed to bring about positive and inclusive change in the world. Students completing a degree in IDS have the skills to tackle complex global problems as needed to promote social justice as citizens and in careers across the public and private sectors and in civil society organizations.

The IDS program provides students with the opportunity to engage with international development practitioners in Canada and internationally. Furthermore, they are equipped with the skills needed for effective engagement whilst as students and in their life beyond university.

Students select an area of emphasis that enables them to explore an issue of particular interest using the skills they develop in the core part of the program. This area of emphasis is selected by the end of the 4th academic semester of study.

International Development Studies students are encouraged to learn another language and to participate in relevant learning experiences beyond the IDS program, including study, work or volunteering in Canada and internationally. In addition to the required core courses and the chosen area of emphasis, students are encouraged to take electives that complement their degree and enhance their analytical and communication skills. See the GIDS website for more information on these opportunities or talk to your academic advisor.

Students with a minimum cumulative average of 80% in courses that constitute the IDS major may complete a thesis (IDEV*4190 and IDEV*4150) under the supervision of an ID-affiliated faculty member.

Program Requirements

The Co-op program in International Development is a four and a half year program, including four work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

International Development Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td>COOP*1000 Work Term I</td>
</tr>
<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>Academic Semester 6</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 7</td>
<td>COOP*3000 Work Term III</td>
<td>COOP*4000 Work Term IV</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education website.

Credit Summary (21.50 Total Credits)*

8.00 - Required Core Courses
2.50 - Credits in one of four areas of emphasis
9.50 - Electives
1.50 - Co-op Work Terms

Note: A minimum of three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fourth Co-op work term is optional and if completed, the total number of credits will equal 22.00.

The recommended program sequence is outlined below.

Major (Honours Program)
A minimum of 10.50 credits is required, including:

8.00 core course requirements
2.50 credits in one of four areas of emphasis

Agriculture and Food (Area of Emphasis)

<table>
<thead>
<tr>
<th>Semester 1 - Fall</th>
<th>Semester 2 - Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON*1050 [0.50]</td>
<td>ECON*1100 [0.50]</td>
</tr>
<tr>
<td>IDEV*1000 [0.50]</td>
<td>IDEV*2000 [0.50]</td>
</tr>
<tr>
<td>IDEV*2300 [1.00]</td>
<td>IDEV*2100 [0.50]</td>
</tr>
</tbody>
</table>

1.50 electives or restricted electives

Semester 3 - Fall

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Winter Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP*1000</td>
<td>IDEV*3100</td>
</tr>
<tr>
<td>IDEV*2000</td>
<td>IDEV*3400</td>
</tr>
</tbody>
</table>

2.00 electives or restricted electives

Semester 4 - Summer

<table>
<thead>
<tr>
<th>Summer Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDEV*2300</td>
</tr>
<tr>
<td>IDEV*2400</td>
</tr>
</tbody>
</table>

1.50 electives or restricted electives

Semester 5 - Fall

<table>
<thead>
<tr>
<th>Fall Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDEV*3000</td>
</tr>
</tbody>
</table>

2.00 electives or restricted electives

Semester 6 - Summer

<table>
<thead>
<tr>
<th>Summer Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDEV*2400</td>
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<tr>
<td>IDEV*2500</td>
</tr>
</tbody>
</table>

1.50 electives or restricted electives

Semester 7 - Fall

<table>
<thead>
<tr>
<th>Winter Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDEV*3100</td>
</tr>
<tr>
<td>IDEV*3400</td>
</tr>
</tbody>
</table>

1.50 electives or restricted electives

Semester 8 - Fall

<table>
<thead>
<tr>
<th>Summer Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDEV*4000</td>
</tr>
</tbody>
</table>

1.00 electives or restricted electives

Restricted Electives

1.00 credits from the following (core):

<table>
<thead>
<tr>
<th>ECON*2650 [0.50]</th>
<th>Introductory Development Economics</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG*3050 [0.50]</td>
<td>Development and the City</td>
</tr>
<tr>
<td>POLS*3320 [0.50]</td>
<td>Politics of Aid &amp; Development</td>
</tr>
<tr>
<td>POLS*3790 [0.50]</td>
<td>International Political Economy</td>
</tr>
<tr>
<td>SOAN*3680 [0.50]</td>
<td>Perspectives on Development</td>
</tr>
</tbody>
</table>

1.50 credits from the following (Area of Emphasis):

<table>
<thead>
<tr>
<th>AGR*2500 [0.50]</th>
<th>Field Course in International Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH*4550 [0.50]</td>
<td>Topics in the Anthropology of Health</td>
</tr>
<tr>
<td>ENV*2130 [0.50]</td>
<td>Eating Sustainably in Ontario</td>
</tr>
<tr>
<td>FARE*3250 [0.50]</td>
<td>Food and International Development</td>
</tr>
</tbody>
</table>

X. Degree Programs, Bachelor of Arts (B.A.)

Last Revision: July 4, 2019

2019-2020 Undergraduate Calendar
Development in the Canadian Context (Area of Emphasis)

Semester 1 - Fall
- ECON*1050 [0.50] Introductory Microeconomics
- IDEV*1000 [0.50] Understanding Development and Global Inequalities
  1.50 electives or restricted electives

Semester 2 - Winter
- ECON*1100 [0.50] Introductory Macroeconomics
  2.00 electives or restricted electives

Summer Semester
No academic semester or work term.

Semester 3 - Fall
- COOP*1100 [0.50] Introduction to Co-operative Education
- IDEV*2000 [0.50] The Development Landscape: Actors and Institutions
- IDEV*2100 [0.50] Research in International Development
  1.50 electives or restricted electives

Semester 4 - Summer
- IDEV*2300 [0.50] Theoretical Perspectives on Development
- IDEV*2400 [0.50] Development, Social Justice and Human Rights
  1.50 electives or restricted electives

Summer Semester
- COOP*1000 [0.50] Co-op Work Term I

Fall Semester
- COOP*2000 [0.50] Co-op Work Term II

Semester 5 - Winter
- IDEV*3100 [0.50] Achieving Sustainable Development
  2.00 electives or restricted electives

Semester 6 - Summer
- ANTH*2660 [0.50] Contemporary Indigenous Peoples in Canada
- IDEV*2300 [0.50] Theoretical Perspectives on Development
- IDEV*2400 [0.50] Development, Social Justice and Human Rights
  1.00 electives or restricted electives

Summer Semester
- COOP*3000 [0.50] Co-op Work Term III

Fall Semester
- COOP*4000 [0.50] Co-op Work Term IV

Semester 8 - Fall
- IDEV*4000 [1.00] Development in Action
- IDEV*4600 [0.50] Advocating and Effecting Change in Development Policy and Practice
  1.00 electives or restricted electives

Restricted Electives

1.00 credits from the following (core):
- ECON*2650 [0.50] Introductory Development Economics
- GEOG*3050 [0.50] Development and the City
- POLS*3320 [0.50] Politics of Aid & Development
- POLS*3790 [0.50] International Political Economy
- SOAN*3680 [0.50] Perspectives on Development
- SOAN*4440 [0.50] Culture, Rights and Development
- HIST*3270 [0.50] Revolution in the Modern World
- IDEV*4100 [0.50] Thesis in International Development Studies I
- IDEV*4150 [0.50] Thesis in International Development Studies II
- POLS*3000 [0.50] Politics of Africa
- POLS*3060 [0.50] Politics of the Middle East and North Africa
- POLS*3080 [0.50] Politics of Latin America
- POLS*4340 [1.00] Nationlism, State-building and Identity
- SOAN*3130 [0.50] Protest, Resistance, and Collective Action
- SOAN*4260 [0.50] Migration, Inequality and Social Change

Environment and Sustainable Development (Area of Emphasis)

Semester 1 - Fall
- ECON*1050 [0.50] Introductory Microeconomics
- IDEV*1000 [0.50] Understanding Development and Global Inequalities
  1.50 electives or restricted electives

Semester 2 - Winter
- ECON*1100 [0.50] Introductory Macroeconomics
  2.00 electives or restricted electives

Summer Semester
No academic semester or work term.

Semester 3 - Fall
- COOP*1100 [0.00] Introduction to Co-operative Education
- GEOG*2030 [0.50] Environment and Development
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDEV*2000</td>
<td>0.50</td>
<td>The Development Landscape: Actors and Institutions</td>
</tr>
<tr>
<td>IDEV*2100</td>
<td>0.50</td>
<td>Research in International Development</td>
</tr>
<tr>
<td>SOC*2280</td>
<td>0.50</td>
<td>Society and Environment</td>
</tr>
<tr>
<td>IT*1060</td>
<td>0.50</td>
<td>Introductory Italian I</td>
</tr>
<tr>
<td>IT*1070</td>
<td>0.50</td>
<td>Introductory Italian II</td>
</tr>
</tbody>
</table>

**Summer Semester**

**Semester 4 - Summer**
- IDEV*2300 [0.50] Theoretical Perspectives on Development
- IDEV*2400 [0.50] Development, Social Justice and Human Rights

**Semester 5 - Winter**
- IDEV*3100 [0.50] Achieving Sustainable Development

**Semester 6 - Summer**
- IDEV*3300 [0.50] Engaging in Development Practice
- IDEV*3400 [0.50] Managing and Evaluating Change in Development

**Semester 7 - Fall**
- IDEV*3000 [0.50] Poverty and Inequality

**Winter Semester**
- COOP*1000 [0.50] Co-op Work Term I

**Summer Semester**
- COOP*2000 [0.50] Co-op Work Term II

**Semester 8 - Fall**
- IDEV*4000 [1.00] Development in Action
- IDEV*4600 [0.50] Advocating and Effecting Development in Policy and Practice

**Restricted Electives**
1.00 electives or restricted electives

**School of Languages and Literatures, College of Arts**

All language courses carry 0.50 credits. Students with Year 4 or grade 12 Italian or their equivalent may be admitted into ITAL*1060 or ITAL*1070 only with the approval of the department. Students advancing in a Romance language (French, Spanish, Italian) are advised to take elective courses in a second Romance language and in Latin. All language students are strongly advised to include CLAS*1000 and LING*1000 among their electives in order to derive the maximum benefit from their studies. Except where stated otherwise, literary texts are, at all levels, studied in the original language. Students registering in these courses will be expected to have the appropriate knowledge.

**Study Abroad**
The School of Languages and Literatures encourages students in modern languages to spend 1 or 2 semesters in another country to study a particular language at the university level. Credit for programs of study successfully completed may be applied towards the University of Guelph degree requirements. Requests should be addressed well in advance to either the School or a particular section of the School. A letter of permission is required (see Section VIII—Undergraduate Degree Regulations and Procedures.)

**Italian (ITAL)**

**Marketing (MKTG)**

The minor in Marketing is designed for students who wish to better understand the subject of marketing and potentially integrate this with their primary field of study. The program develops a core knowledge of contemporary theory and principles of marketing and consumer behaviour of particular relevance to the non-specialist. Note: the minor in Marketing is not open to students enrolled in the Marketing Management major in the Bachelor of Commerce degree.

**Minor (Honours Program)**

A minimum of 5.00 credits is required, including:

- ECON*1050 [0.50] Introductory Microeconomics
- HROB*2090 [0.50] Individuals and Groups in Organizations
- MCS*1000 [0.50] Introductory Marketing
- MCS*2600 [0.50] Fundamentals of Consumer Behaviour
- MCS*3000 [0.50] Advanced Marketing
- PSYC*1000 [0.50] Introduction to Psychology

**Restricted Electives**
2.00 restricted Electives:
- ECON*2740 [0.50] Economic Statistics
- MCS*3010 [0.50] Quality Management
- MCS*3030 [0.50] Research Methods
- MCS*3500 [0.50] Marketing Analytics
- MCS*3600 [0.50] Consumer Information Processes
- MCS*3620 [0.50] Marketing Communications
- MCS*4040 [0.50] Management in Product Development
- MCS*4300 [0.50] Marketing and Society
- MCS*4400 [0.50] Pricing Management
- MCS*4600 [0.50] International Marketing
- PSYC*1010 [0.50] Making Sense of Data in Psychological Research
- STAT*2060 [0.50] Statistics for Business Decisions

**Mathematical Economics (MAEC)**

The department of Economics and Finance, Gordon S. Lang School of Business and Economics

Most economic theory rests on explicit, formal, mathematical and/or statistical foundations. This specialization articulates and emphasizes these interactions. It is most suitable for students who either have, or wish to develop, a strong analytical background.

**Major (Honours Program)**

**Semester 1**
- CIS*1500 [0.50] Introduction to Programming
- ECON*1050 [0.50] Introductory Microeconomics
- MATH*1200 [0.50] Calculus I

**Semester 2**
- ECON*1100 [0.50] Introductory Macroeconomics
- MATH*1210 [0.50] Calculus II
1.50 electives

Semester 3
ECON*2310 [0.50] Intermediate Microeconomics
ECON*2410 [0.50] Intermediate Macroeconomics
STAT*2040 [0.50] Statistics I
1.00 electives

Semester 4
ECON*3740 [0.50] Introduction to Econometrics
2.00 electives or restricted electives*

Semester 5
ECON*3710 [0.50] Advanced Microeconomics
2.00 electives or restricted electives*

Semester 6
ECON*3100 [0.50] Game Theory
ECON*3810 [0.50] Advanced Macroeconomics
1.50 electives or restricted electives*

Semester 7
ECON*4640 [0.50] Advanced Econometrics
ECON*4710 [0.50] Advanced Topics in Microeconomics
ECON*4700 [0.50] Advanced Mathematical Economics
1.00 electives or restricted electives*

Semester 8
ECON*4810 [0.50] Advanced Topics in Macroeconomics
One of:
ECON*4840 [0.50] Financial Econometrics
MATH*3200 [0.50] Real Analysis
STAT*4340 [0.50] Statistical Inference
STAT*4350 [0.50] Applied Multivariate Statistical Methods
STAT*4360 [0.50] Applied Time Series Analysis
0.50 credits in Economics at the 4000 level
1.00 electives

*at least 1.00 credits of the 4.00 restricted electives credits must be from Mathematics and 1.00 credits must be from Statistics. The remaining 2.00 credits can be from either subject area. Of the 4.00 credits, at least 1.00 credits must be at the 3000 level or above and the remaining 3.00 credits must be at the 2000 level or above.

Note: Courses from MATH or STATS will be allowed with the appropriate prerequisites, or by permission of the instructor.

Mathematical Economics (Co-op) (MAEC:C)

Department of Economics and Finance, Gordon S. Lang School of Business and Economics

Most economic theory rests on explicit, formal, mathematical and/or statistical foundations. This specialization articulates and emphasizes these interactions. It is most suitable for students who either have, or wish to develop, a strong analytical background.

Program Requirements

The Co-op program in Mathematical Economics is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/eecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Mathematical Economics Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
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</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education website.

Credit Summary (22.00 Total Credits)*

13.00 – Required Core Courses
1.50 - Humanities credits from at least two subject areas (BA distribution requirement)
0.50 - Social Science credit outside of ECON (BA distribution requirement)

5.00 – Electives
2.00 - Co-op Work Terms

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 22.50.

The recommended program sequence is outlined below.

Major (Honours Program)

Semester 1 - Fall
CIS*1500 [0.50] Introduction to Programming
ECON*1050 [0.50] Introductory Microeconomics
MATH*1200 [0.50] Calculus I
1.00 electives

Semester 2 - Winter
ECON*1100 [0.50] Introductory Macroeconomics
MATH*1210 [0.50] Calculus II
1.50 electives

Semester 3 - Fall
CIS*1500 [0.50] Introduction to Co-operative Education
ECON*2310 [0.50] Intermediate Microeconomics
ECON*2410 [0.50] Intermediate Macroeconomics
STAT*2040 [0.50] Statistics I
1.00 electives

Semester 4 - Winter
ECON*3740 [0.50] Introduction to Econometrics
2.00 electives or restricted electives*

Spring/Summer
COOP*1000 [0.50] Co-op Work Term I

Fall
COOP*2000 [0.50] Co-op Work Term II

Semester 5 - Winter
ECON*3100 [0.50] Game Theory
ECON*3810 [0.50] Advanced Macroeconomics
1.50 electives or restricted electives*

Spring/Summer
COOP*3000 [0.50] Co-op Work Term III

Semester 6 - Fall
ECON*3710 [0.50] Advanced Microeconomics
2.00 electives or restricted electives*

Winter
COOP*4000 [0.50] Co-op Work Term IV

Spring/Summer
COOP*5000 [0.50] Co-op Work Term V

Semester 7 - Fall
ECON*4640 [0.50] Advanced Econometrics
ECON*4700 [0.50] Advanced Mathematical Economics
ECON*4710 [0.50] Advanced Topics in Microeconomics
1.00 electives or restricted electives*

Semester 8 - Winter
ECON*4810 [0.50] Advanced Topics in Macroeconomics
One of:
ECON*4840 [0.50] Financial Econometrics
MATH*3200 [0.50] Real Analysis
STAT*4340 [0.50] Statistical Inference
STAT*4350 [0.50] Applied Multivariate Statistical Methods
STAT*4360 [0.50] Applied Time Series Analysis
0.50 credits at the 4000 level Economics
1.00 electives

*at least 1.00 credits of the 4.00 restricted electives credits must be from Mathematics and 1.00 credits must be from Statistics. The remaining 2.00 credits can be from either subject area. Of the 4.00 credits, at least 1.00 credits must be at the 3000 level or above and the remaining 3.00 credits must be at the 2000 level or above.

Note: Courses from MATH or STATS will be allowed with the appropriate prerequisites, or by permission of the instructor.

Mathematical Science (MSCI)

Department of Mathematics and Statistics, College of Engineering and Physical Sciences

Last Revision: July 4, 2019
Major (Honours Program)

Knowledge of Mathematics and Statistics is crucial for understanding our world. This unique program provides a core of both mathematics and statistics with a choice of a Mathematics stream or a Statistics stream. This major also requires the completion of an area of emphasis as listed. Students are encouraged to speak with a Program Councillor when choosing courses for the selected stream and area of emphasis.

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major must consult the Faculty Advisor. A total of 20.00 credits is required to complete the Major which includes at least 10.00 credits in Mathematics & Statistics, 0.50 credits in Computing and Information Science, and an additional 2.50 credits in an area of emphasis. Of the total credits required, students are required to complete 2.00 Mathematics and/or Statistics credits at the 4000 level and an additional 3.00 Mathematics and/or Statistics credits must be at the 3000 or 4000 level.

Note: Students majoring in Mathematical Science cannot minor in Mathematics or Statistics.

Semester 1

MATH*1160 [0.50] Linear Algebra I
MATH*1200 [0.50] Calculus I
1.50 credits selected from the College of Arts and the College of Social and Applied Human Sciences*

Note: MATH*1080 or IPS*1500 can be taken in place of MATH*1200

Semester 2

MATH*1210 [0.50] Calculus II
STAT*2040 [0.50] Statistics I
1.50 electives*** (PHIL*2110 is recommended)

Note: MATH*1090 or IPS*1510 can be taken in place of MATH*1210

Semester 3

MATH*2200 [0.50] Advanced Calculus I
STAT*3100 [0.50] Introductory Mathematical Statistics I
One of:
CIS*1300 [0.50] Programming
CIS*1500 [0.50] Introduction to Programming
1.00 electives or restricted electives

Semester 4

MATH*2130 [0.50] Numerical Methods
STAT*2050 [0.50] Statistics II
1.50 electives or restricted electives (CIS*2500 is recommended)

Semester 5

2.50 electives or restricted electives

Semester 6

2.50 electives or restricted electives

Semester 7

2.50 electives or restricted electives

Semester 8

MATH*4440 [0.50] Case Studies in Mathematics and Statistics
2.00 electives or restricted electives

*These courses should be chosen from the list of Semester 1 requirements as listed in the Program Regulations for the BA.

**Students are reminded that they must meet the BA distribution requirements of 1.50 credits in the humanities and 1.50 credits in the social sciences.

Students are required to complete 5.50 credits from either the Mathematics Stream or the Statistics Stream as follows:

Mathematics Stream

MATH*2000 [0.50] Proofs, Sets, and Numbers
MATH*2210 [0.50] Advanced Calculus II
MATH*2270 [0.50] Applied Differential Equations
MATH*3160 [0.50] Linear Algebra II
MATH*3200 [0.50] Real Analysis
3.00 additional credits in MATH or STAT at 3000 level or above of which at least 1.50 credits must be MATH at the 4000 level

Statistics Stream

STAT*3110 [0.50] Introductory Mathematical Statistics II
STAT*3240 [0.50] Applied Regression Analysis
0.50 additional credits in MATH at 2000 level or above
1.00 additional credits in MATH or STAT at 2000 level or above
3.00 additional credits in MATH or STAT at 3000 level or above of which at least 1.50 credits must be STAT at the 4000 level

Areas of Emphasis

Students are required to complete 2.50 credits from one of the following Areas of Emphasis:

Each Area of Emphasis is 2.50 credits from a single field of study.

---

Computer Science (CS)***

The following credits must be taken:

CIS*2430 [0.50] Object Oriented Programming
CIS*2500 [0.50] Intermediate Programming
CIS*2520 [0.50] Data Structures
at least 1.00 credits from:
CIS*3110 [0.50] Operating Systems I
CIS*3190 [0.50] Software for Legacy Systems
CIS*3490 [0.50] The Analysis and Design of Computer Algorithms
CIS*3530 [0.50] Data Base Systems and Concepts

Note: CIS*2750 is recommended in addition to the Area of Emphasis requirements for students interested in Computer Science

Economics (ECON)***

The following credits must be taken:

ECON*1050 [0.50] Introductory Microeconomics
ECON*1100 [0.50] Introductory Macroeconomics
ECON*2310 [0.50] Intermediate Microeconomics
at least 1.00 credits from:
ECON*3100 [0.50] Game Theory
ECON*3710 [0.50] Advanced Microeconomics
ECON*4710 [0.50] Advanced Topics in Microeconomics

Individualized (IND)***

It is required that 2.50 credits are taken from humanities and social science electives where 1.00 credits must be at the 3000 level or above.

Students declaring an Individualized Area of Emphasis must have their choice of 2.50 credits approved by an academic advisor.

*** Students are reminded that they must meet the BA requirement that at least 7.00 credits must be at the 3000 level of above.

Mathematics (MATH)

Department of Mathematics and Statistics, College of Engineering and Physical Sciences

Knowledge of mathematics is crucial for understanding our world. Students can choose to study mathematics as a minor in the B.A. Honours Program or as an area of concentration in the General Program. These specializations are designed to provide considerable flexibility for students to pursue their own mathematical interests, whether they be in the concepts of "pure" mathematics or techniques and applications. The Mathematics specializations develop skills that are valued in many sectors such as business, education, government, and industry.

Area of Concentration (General Program)

A minimum of 5.00 Mathematics credits is required, including:

a. 4.00 credits in Mathematics, including at least 1.00 from courses at the 3000 level or above
b. 1.00 additional credits from Mathematics, Statistics and/or Computing Science

Minor (Honours Program)

A total of 5.00 credits is required to complete the Minor including:

(MATH*1080 or MATH*1200)*
(MATH*1090 or MATH*1210)**

MATH*1160 [0.50] Linear Algebra I
MATH*2000 [0.50] Proofs, Sets, and Numbers
MATH*2200 [0.50] Advanced Calculus I
STAT*2040 [0.50] Statistics I
0.50 additional Mathematics credits at the 2000 level or above
1.50 additional Mathematics credits at the 3000 or 4000 level
* IPS*1500 can count toward this 0.50 credit
** IPS*1510 can count toward this 0.50 credit

Note: Students majoring in Mathematical Science cannot minor in Mathematics.

Media & Cinema Studies (MCST)

College of Arts

This minor considers the various approaches to media, communication, and culture. By examining conventions used across media forms and texts, students are expected to demonstrate an understanding of the relationship between form and content, media and society, technology and culture. Attention will be given to cinema, sound/music, visual culture, and digital/Internet texts and practices. The minor in Media and Cinema Studies (MCST) guides students to an understanding of the pertinent questions at stake in today’s technological and information-focused environments.

Minor (Honours Program)

A minimum of 5.00 credits is required, including:

ARTH*2220 [0.50] The Visual Arts Today
THST*1200 [0.50] The Languages of Media

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Last Revision: July 4, 2019

2019-2020 Undergraduate Calendar
Approaches to Media Studies

Film as History
History of Photographic Media
(MUSC*4460 and MUSC*4470) or MUSC*4450
Canadian Cinema

Beethoven to Broadway: Music and Culture II

Canadian Cinema

2.00 additional credits in Art History

Art Historical Studies I

Musicianship I

Experiential Learning

Electronica: Music in the Digital Age

at least 1.00 Music credits at the 3000 level or above (excluding MUSC*3630)

Cinema and the Moving Image

Contemporary Cinema

Electronica: Music in the Digital Age

Art Historical Studies II

Amadeus to Zeppelin: Music and Culture I

Introduction to Art Theory and Criticism

Creating Music on the Computer

Introduction to Museology

MUSC*1060, MUSC*1180, MUSC*2180, MUSC*2330, MUSC*3010

Display: Visual Culture in Western Europe

ARTH*1510

Music and Popular Culture

Musicianship I

Contemporary Cinema

History of Communication

Introduction to Programming

Digital Media II: Animation

Materials of Music I

User Interface Design

European Cinema

World Music

Experiential Learning

1.50 credits from MUSC*2100, MUSC*2140, MUSC*2150, MUSC*2270,

Music and Popular Culture

European Cinema

Note: MUSC*1130 does not count toward either the Major (Honours), Minor (Honours), or Area of Concentration (General Program).

Area of Concentration (General Program)

A minimum of 6.00 Music credits is required, including:

a. MUSC*1060, MUSC*1180, MUSC*2180, MUSC*2330, MUSC*2660, MUSC*3010

b. 1.50 credits from MUSC*2100, MUSC*2140, MUSC*2150, MUSC*2270, MUSC*3630
c. at least 1.00 Music credits at the 3000 level or above (excluding MUSC*3630)
d. two of MUSC*2530, MUSC*2540, MUSC*2550, MUSC*2560.

Major (Honours Program)

A minimum of 9.00 Music credits is required, including:

a. the Music core (5.50 credits)
b. two of MUSC*2530, MUSC*2540, MUSC*2550, MUSC*2560.
c. (MUSC*4460 and MUSC*4470) or MUSC*4450
d. 2.00 additional credits of upper-level topics courses (MUSC*3730, MUSC*3740, MUSC*3800, MUSC*3820, MUSC*3860, MUSC*3880)

Participation in Applied Music courses is strongly recommended for all honours students. Students contemplating graduate studies in Music should consult music faculty early in their program.

Music majors are advised to take MUSC*1180 in Fall Year 1, followed by MUSC*2180 in Winter Year 1.

Minor (Honours Program)

A minimum of 5.00 Music credits is required, including:

MUSC*1060 [0.50] Amadeus to Zeppelin: Music and Culture I
MUSC*1180 [0.50] Musicianship I
One of:
MUSC*2030 [0.50] Music in Canada
MUSC*2100 [0.50] Creating Music on the Computer
MUSC*2140 [0.50] History of Jazz
MUSC*2150 [0.50] Music and Popular Culture
MUSC*2220 [0.50] Electronica: Music in the Digital Age
MUSC*2270 [0.50] World Music

At least 1.50 Music credits at the 3000 or 4000 level

Note: Students should be aware that courses at the 3000 or 4000 level may require additional prerequisites.

2.00 additional credits in Music

Philosophy (PHIL)

Department of Philosophy, College of Arts
Our programs are designed to educate students about philosophical discussions of central questions in ethics, political philosophy, theory of knowledge, metaphysics and philosophy of science, among other areas. This includes learning the history of these subjects as well as understanding current debates. In gaining this knowledge students develop crucial skills of articulation, critical thinking, intellectual independence and the ability to understand others’ viewpoints and assumptions. It is important that students discuss their programs with a Faculty Advisor (https://www.uoguelph.ca/uaic/facultyadvisors-ba) in order to ensure that the best selection of elective Philosophy courses is made. This is especially important for students who are contemplating graduate work in Philosophy.

Students may take PHIL*1000, PHIL*1100, PHIL*1030 and PHIL*1050 but only two may be counted towards the minimum number of Philosophy courses required for a degree.

Area of Concentration (General Program)

5.00 Philosophy credits are required, as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL*2240</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2370</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2120</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2280</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2100</td>
<td>0.50</td>
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<tr>
<td>PHIL*2110</td>
<td>0.50</td>
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</tbody>
</table>

One of:

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>PHIL*2240</td>
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</tr>
<tr>
<td>PHIL*2370</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2120</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2280</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2100</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2110</td>
<td>0.50</td>
</tr>
</tbody>
</table>

1.50 credits in Philosophy

Note: Students may only count 1.00 credits at the 1000 level towards this requirement.

1.50 credits in Philosophy at the 3000 level or higher. PHIL*3280 may be used as a 3000 level Philosophy course.

Major (Honours Program)

8.50 Philosophy credits are required, as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL*2120</td>
<td>0.50</td>
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<tr>
<td>PHIL*2140</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2160</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2280</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2370</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*3100</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*4820</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2100</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2110</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2180</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2240</td>
<td>0.50</td>
</tr>
</tbody>
</table>

1.50 credits in Philosophy

Note: Students may only count 1.00 credits at the 1000 level towards this requirement.

1.50 credits in Philosophy at the 3000 level or higher. PHIL*3280 may be used as a 3000 level Philosophy course.

1.00 credits in Philosophy at the 4000 level

Minor (Honours Program)

5.00 Philosophy credits are required, as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL*2240</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2370</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2120</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2280</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2100</td>
<td>0.50</td>
</tr>
<tr>
<td>PHIL*2110</td>
<td>0.50</td>
</tr>
</tbody>
</table>

1.00 credits in Philosophy

Note: Students may only count 1.00 credits at the 1000 level towards this requirement.

1.50 credits at the 4000 level, which must include one course from the 1.00 credit-weighted courses in the department.

Political Science (POLS)

Department of Political Science, College of Social and Applied Human Sciences

The Department of Political Science offers courses in the following areas: Political Thought; Canadian Politics; Public Policy, Governance, and Law; Comparative Politics; and International Relations and Global Studies. The Department of Political Science also participates in several interdisciplinary programs, including Criminal Justice and Public Policy, International Development Studies, Environmental Governance, and European Studies.

Students taking courses in Political Science may enrol initially in POLS*1150, POLS*1400, POLS*1500, the latter 2 courses providing overview and introductory treatments of particular interest to students who wish to take higher level courses in the department but who do not intend to specialize in the discipline. For students intending to pursue a general or honours specialization in Political Science, however, POLS*1150 is required.

Courses at the 2000 level provide students with essential grounding in specific areas of the discipline and are normally prerequisite for enrolment in 3000 and 4000 level courses. Students in the honours program major are required to take POLS*2650 and POLS*3650. Students in the honours program minor are required to take POLS*2650.

In addition to the requirements set out in the B.A. Program Regulations, the Department of Political Science requires that students pursuing general and honours programs successfully complete a core requirement of 2.50 credits and meet specific distribution requirements as follows:

Core Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS*1150</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2300</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*3650</td>
<td>0.50</td>
</tr>
</tbody>
</table>

One of:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL*2280</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2000</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2080</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2100</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2200</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2150</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2250</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2350</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Area of Concentration (General Program)

A minimum of 5.00 credits is required, including:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS*1150</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2300</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*3650</td>
<td>0.50</td>
</tr>
</tbody>
</table>

One of:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL*2280</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2000</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2080</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2100</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2200</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2150</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2250</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2350</td>
<td>0.50</td>
</tr>
</tbody>
</table>

2.50 additional credits, at least 1.50 of which must be at the 3000 level or above.

Major (Honours Program)

A minimum of 9.00 credits is required, including:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS*1150</td>
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<tr>
<td>POLS*2300</td>
<td>0.50</td>
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<tr>
<td>POLS*2650</td>
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</tr>
<tr>
<td>POLS*3650</td>
<td>0.50</td>
</tr>
</tbody>
</table>

One of:

<table>
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<tr>
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<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL*2280</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2000</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2080</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2100</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2200</td>
<td>0.50</td>
</tr>
<tr>
<td>POLS*2150</td>
<td>0.50</td>
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<tr>
<td>POLS*2250</td>
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<tr>
<td>POLS*2350</td>
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<tr>
<td>POLS*4970</td>
<td>0.50</td>
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<tr>
<td>POLS*4980</td>
<td>0.50</td>
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</tbody>
</table>

A maximum of 2.00 credits at the 4000 level may be counted towards a major in Political Science.

4.00 level courses that fulfill the writing and research intensive course requirement:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS*4050</td>
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<tr>
<td>POLS*4070</td>
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<tr>
<td>POLS*4100</td>
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<td>POLS*4140</td>
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<td>POLS*4300</td>
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<tr>
<td>POLS*4340</td>
<td>1.00</td>
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<tr>
<td>POLS*4710</td>
<td>1.00</td>
</tr>
<tr>
<td>POLS*4720</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Last Revision: July 4, 2019
The Department of Political Science offers courses in the following areas: Political Thought; Canadian Politics; Public Policy, Governance, and Law; Comparative Politics; and International Relations and Global Studies. The Department of Political Science also participates in several interdisciplinary programs, including Criminal Justice and Public Policy, International Development Studies, Environmental Governance, and European Studies.

**Program Requirements**

The Co-op program in Political Science is a four and a half year program, including three work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: [https://www.recruitguelph.ca/cecs/](https://www.recruitguelph.ca/cecs/)). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

**Political Science Academic and Co-op Work Term Schedule**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td>COOP*1000 Work Term I</td>
</tr>
<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>Academic Semester 6</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 7</td>
<td>COOP*3000 Work Term III</td>
<td>Off</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education website.

**Credit Summary (21.50 Total Credits)**

- 9.00 - Required Core Courses
- 1.50 – Humanities credits from at least two areas (BA distribution requirement)
- 0.50 - Social Science credit outside of POLS (BA distribution requirement)
- 1.00 - Natural Science credits (BA distribution requirement)
- 8.00 - Electives
- 1.50 - Co-op Work Terms

**Note:** Three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement.

The recommended program sequence is outlined below.

**Major (Honours Program)**

**Semester 1 - Fall**

- POLS*1150 [0.50] Understanding Politics
- 2.00 electives*

**Semester 2 - Winter**

- 2.50 electives*

**Semester 3 or 4 - Fall or Winter**

- COOP*1100 [0.00] Introduction to Co-operative Education
- POLS*2300 [0.50] Canadian Government and Politics
- POLS*2650 [0.50] Political Inquiry and Research Methods
- One of:
  - PHIL*2280 [0.50] Key Concepts in Political Philosophy
  - POLS*2000 [0.50] Political Theory
- One of:
  - POLS*2080 [0.50] Development and Underdevelopment
  - POLS*2100 [0.50] Comparative Politics
  - POLS*2200 [0.50] International Relations
- One of:
  - POLS*2150 [0.50] Gender and Politics
  - POLS*2250 [0.50] Public Administration and Governance
  - POLS*2350 [0.50] Law from a Political Science Perspective

**Note:** These may include electives required to complete the Humanities, Social Science, Natural and Mathematical Science distribution requirements, or POLS restricted electives.

**Summer Semester**

- COOP*1000 [0.50] Co-op Work Term I

**Fall Semester**

- COOP*2000 [0.50] Co-op Work Term II

**Semester 5 - Winter**

- POLS*3650 [0.50] Quantitative Methods of Data Analysis
- 1.50 POLS restricted electives
0.50 electives

Semester 6 - Summer

Two of:
- POLS*3130 [0.50] Law, Politics and Judicial Process
- POLS*3140 [0.50] Canadian Charter of Rights and Freedoms
- POLS*3320 [0.50] Politics of Aid & Development
- POLS*3370 [0.50] Environmental Politics and Governance
- POLS*3210*DE [0.50] The Constitution and Canadian Federalism
- POLS*3300*DE [0.50] Governing Criminal Justice

1.50 electives, which may include:
- POLS*3850 [0.50] Experiential Learning in Political Science
- POLS*3960 [0.50] Selected Topics in Political Science

Note: POLS*3850 and POLS*3960 are subject to faculty availability and departmental approval.

Semester 7 - Fall and Semester 8 - Fall

A minimum of 1.50 and a maximum of 2.00 credits of 4000-level POLS courses are required in semesters 7 and 8. At least 1.00 credits must come from either a 1.00 credit fourth-year seminar or the Honours Thesis sequence (POLS*4970 and POLS*4980).

Option A
- 1.50 POLS credits 4000-level
- 1.50 POLS electives
- 2.00 electives

Option B
- 2.00 POLS credits 4000-level
- 1.00 POLS electives
- 2.00 electives

Winter Semester

COOP*3000 [0.50] Co-op Work Term III

Summer Semester

No academic semester or work term.

Restricted Electives

1. At least 0.50 credits at the 3000 level in three of the five fields in the department (see field lists below).

Political Thought
- POLS*3230 [0.50] Modern Political Thought
- POLS*3710 [0.50] Politics and Sexuality

Canadian Politics
- HIST*3160 [0.50] Canadian Political History
- POLS*3050 [0.50] Canadian Campaigns & Elections
- POLS*3140 [0.50] Canadian Charter of Rights and Freedoms
- POLS*3210 [0.50] The Constitution and Canadian Federalism
- POLS*3270 [0.50] Local Government in Ontario
- POLS*3470 [0.50] Business-Government Relations in Canada

Public Policy, Governance and Law
- POLS*3130 [0.50] Law, Politics and Judicial Process
- POLS*3140 [0.50] Canadian Charter of Rights and Freedoms
- POLS*3210 [0.50] The Constitution and Canadian Federalism
- POLS*3250 [0.50] Public Policy: Challenges and Prospects
- POLS*3300 [0.50] Governing Criminal Justice
- POLS*3370 [0.50] Environmental Politics and Governance
- POLS*3440 [0.50] Corruption, Scandal and Political Ethics
- POLS*3470 [0.50] Business-Government Relations in Canada
- POLS*3670 [0.50] Comparative Public Policy and Administration

Comparative Politics
- POLS*3000 [0.50] Politics of Africa
- POLS*3060 [0.50] Politics of the Middle East and North Africa
- POLS*3080 [0.50] Politics of Latin America
- POLS*3160 [0.50] Global Gender Justice
- POLS*3320 [0.50] Politics of Aid & Development
- POLS*3410 [0.50] U.S. Politics and Government
- POLS*3440 [0.50] Corruption, Scandal and Political Ethics
- POLS*3450 [0.50] European Governments and Politics
- POLS*3670 [0.50] Comparative Public Policy and Administration
- POLS*3890 [0.50] Government and Politics of India
- POLS*3920 [0.50] Politics of China

International Relations and Global Studies
- POLS*3160 [0.50] Global Gender Justice
- POLS*3320 [0.50] Politics of Aid & Development
- POLS*3490 [0.50] Conflict and Conflict Resolution
- POLS*3790 [0.50] International Political Economy

2. 1.50 credits at the 4000 level, two of which must include either one course from the 1.00 credit-weighted research and writing intensive seminar courses or two courses which comprise the POLS*4970/POLS*4980 Honours Thesis sequence. A maximum of 2.00 credits at the 4000 level may be counted towards a major in Political Science.

4000 level courses that fulfill the Honours writing and research intensive course requirement:
- POLS*4050 [1.00] Advanced Topics in Law and Politics
- POLS*4070 [1.00] Courts and Parliament
- POLS*4100 [1.00] Women, Justice and Public Policy
- POLS*4140 [1.00] Conceptions of Canada
- POLS*4160 [1.00] Multi-Level Governance in Canada
- POLS*4200 [1.00] International Political Economy
- POLS*4250 [1.00] Topics in Public Management
- POLS*4260 [1.00] Topics in Public Policy
- POLS*4300 [1.00] Human Rights, Ethics, and Development
- POLS*4340 [1.00] Nationalism, State-building and Identity
- POLS*4710 [1.00] Topics in Comparative Politics
- POLS*4720 [1.00] Topics in International Relations
- POLS*4730 [1.00] International Relations of the Middle East
- POLS*4740 [1.00] Advanced Topics in Rights and Liberties
- POLS*4900 [1.00] Special Topics Seminar in Political Science

Note: Students interested in pursuing graduate or professional studies related to Political Science are encouraged to consider taking the POLS*4970/POLS*4980 Honours Thesis sequence. Interested students must obtain instructor consent in order to register for this option.

3. An additional 2.50 credits from courses in Political Science. Note: If 2.00 credits of 4000 level POLS courses are being completed then only an additional 2.00 credits from courses in Political Science are required.

**Psychology (PSYC)**

Department of Psychology, College of Social and Applied Human Sciences

The discipline of Psychology is normally associated with the social sciences, the biological sciences, and the health professions. Specialization in Psychology at Guelph is available as a B.A. Honours program major and minor and a B.A. General program area of concentration, all of which are described below, as well as a B.A. Honours program Co-op major (PSYC.C).

Through its different undergraduate programs, the Psychology Department provides: a) a broad general education emphasizing psychological theory and methodology, with an empirical basis in course work (e.g., experiments and projects); b) an appropriate background in psychology for those who leave the University with an undergraduate degree to embark on careers in related areas; and c) a sound preparation for graduate study in Psychology. Students intending to apply to Psychology graduate programs, and those who want a structured, intensive research experience, may apply to enrol in the Honours Thesis courses (See Option B – Honours Thesis Stream). In addition, students intending to apply for admission to graduate programs in Psychology should note most graduate programs require the applicant to have at least an A- average in order to be considered for admission.

**Note on Honours Courses**

Courses designated with (H) are for students in Psychology Honours programs. These include: B.A. Honours Psychology (PSYC, PSYC:C) major or minor and the Neuroscience (NEUR) major or minor. A cumulative average of at least 70% in all course attempts in Psychology, NEUR major or minor, or PBC major or minor is required to enrol in H designated courses.

**Advising Note**

We advise students to take PSYC*1000 In their first semester and PSYC*1010 and PSYC*1500 in their second semester

The maximum number of PSYC credits students can take at each level is as follows:

- 1000 level courses: no cap
- 2000 level courses: 3.50 credits
- 3000 level courses: 3.50 credits
- 4000 level courses: 3.00 credits

**Area of Concentration (General Program)**

A total of 6.00 credits are required for the Psychology Area of Concentration.

**Year 1**

Students must complete 1.50 credits at the 1000 level in Psychology, including:
- PSYC*1000 [0.50] Introduction to Psychology
- PSYC*1010 [0.50] Making Sense of Data in Psychological Research
- PSYC*1500 [0.50] Foundational Skills for Psychology

**Year 2**

Students must complete 2.50 credits at the 2000 level in Psychology, including:
- PSYC*2070 [0.50] Teams, Leadership, and Professional Behaviour
- PSYC*2360 [0.50] Psychological Methods and Statistics

One of:
A total of 5.00 credits are required for the Psychology Minor, including:

(For additional courses, please see the Psychology Department's website for details.)

**Year 3**

Students must complete 1.50 credits at the 3000 level in Psychology, including:
- PSYC*2470 [0.50] Putting Psychology to Work

1.00 additional credit in PSYC at the 3000 level.

Finally, students are required to take an additional 0.50 credit in PSYC at the 2000 level or above.

**Major (Honours Program)**

A total of 9.00 credits are required for the Psychology major BAH.

**Year 1**

Students must complete 1.50 credits at the 1000 level in Psychology, including:
- PSYC*1000 [0.50] Introduction to Psychology
- PSYC*1010 [0.50] Making Sense of Data in Psychological Research
- PSYC*1500 [0.50] Foundational Skills for Psychology

**Year 2**

Students must complete 3.00 credits at the 2000 level in Psychology, including:
- PSYC*2070 [0.50] Teams, Leadership, and Professional Behaviour
- PSYC*2360 [0.50] Psychological Methods and Statistics

Two of:
- PSYC*2330 [0.50] Principles of Learning
- PSYC*2390 [0.50] Sensation and Perception
- PSYC*2410 [0.50] Behavioural Neuroscience I
- PSYC*2650 [0.50] Cognitive Psychology

**OPTION A - HONOURS REGULAR STREAM**

**Year 3**

Students must complete 3.00 credits at the 3000 level in Psychology, including:
- PSYC*3000 [0.50] Historical and Critical Perspectives on Psychology
- PSYC*3250 [0.50] Psychological Measurement
- PSYC*3290 [0.50] Conducting Statistical Analyses in Psychology

1.50 additional credit in Psychology at 3000 level.

**Year 4**

Students must complete 1.50 credits at the 4000 level in Psychology, including:
- PSYC*4540 [1.00] Practical Applications of Psychology

0.50 additional credit in Psychology at 4000 level.

**OPTION B – HONOURS THESIS STREAM**

The Honours Thesis stream is recommended for students considering graduate work, as most graduate programs in Psychology expect that students will have completed an undergraduate thesis or equivalent. The two honours thesis courses (PSYC*4870 and 4880) are normally taken in a Fall-Winter sequence. Registration for these courses requires Department approval, which is normally granted to those students whose academic performance meets the minimum admission requirements of Psychology graduate programs.

**Year 3**

Students must complete 2.50 credits at the 3000 level in Psychology, including:
- PSYC*3000 [0.50] Historical and Critical Perspectives on Psychology
- PSYC*3250 [0.50] Psychological Measurement
- PSYC*3290 [0.50] Conducting Statistical Analyses in Psychology

1.0 additional credit in Psychology at 3000 level.

**Year 4**

Students must complete 2.00 credits at the 4000 level in Psychology, comprised of:
- PSYC*4780 [0.50] Advanced Research Methods and Statistics
- PSYC*4870 [0.50] Honours Thesis I
- PSYC*4880 [1.00] Honours Thesis II

**Note:** Students should note that the Honours Thesis courses are normally taken in a Fall-Winter sequence and are worth the equivalent of 1.50 credits toward the 20.00 credits Honours B.A. degree requirements.

**Minor (Honours Program)**

(May not be taken in combination with a Psychology Honours Major)

A total of 5.00 credits are required for the Psychology Minor, including:

- PSYC*1000 [0.50] Introduction to Psychology
- PSYC*1010 [0.50] Making Sense of Data in Psychological Research
- PSYC*2360 [0.50] Psychological Methods and Statistics

An additional 2.00 credits selected from the following:
- PSYC*2020 [0.50] Abnormal Psychology
- PSYC*2310 [0.50] Social Psychology
- PSYC*2330 [0.50] Principles of Learning
- PSYC*2390 [0.50] Sensation and Perception
- PSYC*2410 [0.50] Behavioural Neuroscience I
- PSYC*2450 [0.50] Developmental Psychology
- PSYC*2650 [0.50] Cognitive Psychology
- PSYC*2740 [0.50] Personality

An additional 1.50 credits at the 3000 level in Psychology.

**Note:** There is a maximum number of Psychology credits a student may complete. Please refer to the major for further information.

**Psychology (Co-op) (PSYC:C)**

**Department of Psychology, College of Social and Applied Human Sciences**

The discipline of Psychology is normally associated with the social sciences, the biological sciences, and the health professions. Specialization in Psychology at Guelph is available as a B.A. Honours program major and minor and a B.A. General program area of concentration, all of which are described below, as well as a B.A. Honours program Co-op major (PSYC:C).

Through its different undergraduate programs, the Psychology Department provides: a) a broad general education emphasizing psychological theory and methodology, with an empirical basis in course work (e.g., experiments and projects); b) an appropriate background in psychology for those who leave the University with an undergraduate degree to embark on careers in related areas; and c) a sound preparation for graduate study in Psychology.

**Program Requirements**

The Co-op program in Psychology is a four and a half year program, including three work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

**Psychology Academic and Co-op Work Term Schedule**

<table>
<thead>
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<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
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<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
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</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1100</td>
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<td></td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>COOP*3000 Work Term III</td>
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<tr>
<td>3</td>
<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

**Credit Summary (21.50 Total Credits)**

- 9.00 - Required Core Courses
  - 1.50 – Humanities credits from at least two areas (BA distribution requirement)
  - 0.50 - Social Science credit outside of PSYC (BA distribution requirement)
  - 1.00 - Natural Science credits (BA distribution requirement)
- 8.00 - Electives
  - 1.50 - Co-op Work Terms

**Note:** Three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement.

The recommended program sequence is outlined below.

**Major (Honours Program)**

**Note:** When selecting core and elective credits the student should keep in mind the prerequisites for their desired 3000- and 4000-level courses. When selecting courses beyond Psychology the student should keep in mind both their second specialization (if relevant) and courses appropriate for potential work-term placements.
Note on Honours Courses
Courses designated with (H) are for students in Psychology Honours programs. These include: B.A. Honours Psychology (PYSC, PYSC.C) major or minor, B.A. Information Systems and Human Behaviour (ISHB) major and the Neuroscience (NEUR) major or minor. A cumulative average of at least 70% in all course attempts in Psychology or registration in the ISHB major, NEUR minor, or PBC major or minor is required to enrol in H designated courses.

A total of 9.00 credits are required for the Psychology Co-op BAH. Students must complete 1.50 credits at the 1000 level and 3.00 credits at the 2000 level in Psychology. For those in the Honours Regular Stream, students must complete 3.00 credits at the 3000 level and 1.50 credits at the 4000 level in Psychology. For those in the Honours Thesis Stream, students must complete 2.50 credits at the 3000 level and 2.00 credits at the 4000 level in Psychology.

The maximum number of PSYC credits that students can take at each level is as follows:

<table>
<thead>
<tr>
<th>Level</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 level</td>
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</tr>
<tr>
<td>2000 level</td>
<td>3.50 credits</td>
</tr>
<tr>
<td>3000 level</td>
<td>3.50 credits</td>
</tr>
<tr>
<td>4000 level</td>
<td>3.00 credits</td>
</tr>
</tbody>
</table>

Students wanting to move more quickly through the program are recommended to take two DE courses in the summer of their first year and/or one DE course during each work term. If they do so, the number of electives required in Semester 8 will depend on how many additional courses the student has taken throughout the program to meet the 20.00 credit requirement.

Graduate Studies Advisory Note: Most graduate programs require the student to have at least an A- average in order to be considered for admission. They also require students to follow the Honours Thesis Stream. Students planning on applying to graduate school in Psychology will need to take the following courses in the semesters outlined below: PSYC*3250, PSYC*3290, PSYC*4780, PSYC*4870, and PSYC*4880.

**Major (Honours Program)**
A total of 9.00 credits are required for the Psychology major BAH.

### Year 1

#### Semester 1 - Fall
Students should complete:
- PSYC*1000 [0.50] Introduction to Psychology
- 2.00 additional credits

#### Semester 2 - Winter
Students should complete:
- COOP*1100 [0.00] Introduction to Co-operative Education
- PSYC*1010 [0.50] Making Sense of Data in Psychological Research
- PSYC*1500 [0.50] Foundational Skills for Psychology
  - One of:
    - PSYC*2390 [0.50] Sensation and Perception
    - PSYC*2650 [0.50] Cognitive Psychology
  - One of:
    - PSYC*2020 [0.50] Abnormal Psychology
    - PSYC*2740 [0.50] Personality
- 0.50 additional credits

#### Summer Semester
If students want to progress more quickly through the program or plan to apply to graduate school, they should complete: 1.00 PSYC credits at the 2000 level. If not taken in the summer semester, they must be completed by the end of semester 4.

### Year 2

#### Semester 3 - Fall
Students should complete:
- PSYC*2070 [0.50] Teams, Leadership, and Professional Behaviour
- PSYC*2360 [0.50] Psychological Methods and Statistics
  - One of:
    - PSYC*2330 [0.50] Principles of Learning
    - PSYC*2410 [0.50] Behavioural Neuroscience I
  - One of:
    - PSYC*2310 [0.50] Social Psychology
    - PSYC*2450 [0.50] Developmental Psychology
- 0.50 additional credits

#### Winter Semester
- COOP*1000 [0.50] Co-op Work Term I
- 0.50 credits in PSYC at the 3000 level
- 2.00 additional credits

#### Semester 4 - Summer
- 0.50 credits in PSYC at the 3000 level
- 2.00 additional credits

### OPTION A – HONOURS REGULAR STREAM

#### Year 3

#### Fall Semester
- COOP*2000 [0.50] Co-op Work Term II

#### Semester 5 - Winter
- PSYC*3000 [0.50] Historical and Critical Perspectives on Psychology
- PSYC*3290 [0.50] Conducting Statistical Analyses in Psychology
- 1.00 additional credits in PSYC at the 3000 level
- 0.50 additional credits

#### Summer Semester
- COOP*3000 [0.50] Co-op Work Term III

#### Year 4

#### Semester 6 - Fall
- PSYC*3250 [0.50] Psychological Measurement
- 0.50 additional credits in PSYC at the 4000 level
- 1.50 additional credits

#### Semester 7 - Winter
- PSYC*4450 [1.00] Practical Applications of Psychology
- 1.50 additional credits

#### Semester 8 - Summer
- 2.50 credits

### OPTION B – HONOURS THESIS STREAM

#### Year 3

#### Fall Semester
- COOP*2000 [0.50] Co-op Work Term II

#### Semester 5 - Winter
- PSYC*3000 [0.50] Historical and Critical Perspectives on Psychology
- PSYC*3250 [0.50] Psychological Measurement
- PSYC*3290 [0.50] Conducting Statistical Analyses in Psychology
- 1.00 additional credits

#### Summer Semester
- COOP*3000 [0.50] Co-op Work Term III

#### Year 4

#### Semester 6 - Fall
- PSYC*4780 [0.50] Advanced Research Methods and Statistics
- PSYC*4870 [0.50] Honours Thesis I
- 0.50 additional credits in PSYC at the 3000 level
- 1.00 additional credits at the 3000 or 4000 level

#### Semester 7 - Winter
- PSYC*4880 [1.00] Honours Thesis II
- 1.50 additional credits

#### Semester 8 - Summer
- 2.50 credits

### Sociology (SOC)

**Department of Sociology and Anthropology, College of Social and Applied Human Sciences**

The Department of Sociology and Anthropology offers three types of courses: sociology courses with the prefix SOC*, anthropology courses with the prefix ANTH*, and departmental courses with the prefix SOAN*. The departmental category of courses recognizes the fact that the disciplines of sociology and sociocultural anthropology have developed in tandem and it is possible to identify large areas of overlap and convergence in the work of practitioners both historically and in the present. Departmental courses include most of the core theory and methods courses as well as many elective courses. They contribute equally to the subject matter of sociology as well as the subject matter of sociocultural anthropology for purposes of the undergraduate programs of study in both disciplines. Please see the listings for all courses required for the Sociology program.

Note: the following courses may be used towards a sociology specialization:
- FRHD*3060 [0.50] Principles of Social Gerontology
- PHIL*2180 [0.50] Philosophy of Science

Courses will normally be offered in the semesters designated. For information on other semesters these courses will be offered and the semester those courses without designations will be offered, please check with the department. In addition to regularly scheduled courses, students may elect to do independent study. A student who wishes to do a reading course should first consult the professor with whom he/she wishes to work. Please note, a student is allowed a total of 1.00 credits only for reading courses.

SOAN courses will be used towards the Sociology specializations.

### Area of Concentration (General Program)

A minimum of 5.00 credits in Sociology and Anthropology is required, including:
- ANTH*1150 [0.50] Introduction to Anthropology
- SOAN*2111/2 [1.00] Classical Theory
- SOAN*2120 [0.50] Introductory Methods
A minimum of 5.00 credits in Sociology and Anthropology is required, including:

**ANTH*1150 [0.50] Introduction to Anthropology**

**SOC*1100 [0.50] Sociology**

2.50 additional credits in SOC and SOAN courses, including at least 1.00 credits at the 3000 level

**Major (Honours Program)**

A minimum of 8.00 credits in Sociology and Anthropology is required, including:

**ANTH*1150 [0.50] Introduction to Anthropology**

**SOC*1100 [0.50] Sociology**

**SOC*3310 [0.50] Contemporary Theory**

4.00 additional credits in SOC and SOAN courses, including at least 1.50 credits at the 4000 level

The following courses may be used toward a sociology specialization:

**FRHD*3060 [0.50] Principles of Social Gerontology**

**PHIL*2180 [0.50] Philosophy of Science**

**Minor (Honours Program)**

A minimum of 5.00 credits in Sociology and Anthropology is required, including:

**ANTH*1150 [0.50] Introduction to Anthropology**

**SOC*1100 [0.50] Sociology**

2.50 additional credits in SOC and SOAN courses, including at least 1.00 credits at the 3000 level or above

The following courses may be used toward a sociology specialization:

**FRHD*3060 [0.50] Principles of Social Gerontology**

**PHIL*2180 [0.50] Philosophy of Science**

**Spanish and Hispanic Studies (SPAH)**

**School of Languages and Literatures, College of Arts**

The Spanish and Hispanic Studies program enables students to concentrate on the Spanish language and on Spanish and Latin American literature. Language courses provide study of the grammatical concepts required to establish and enrich reading, writing, oral and aural skills from basic through advanced levels of study. Through literature and film, students are introduced to a variety of cultural, historical, social, and political topics.

The usual first course in Spanish is SPAN*1100. Students with 4U Spanish commonly take SPAN*2000. They may be admitted into SPAN*1110 only with the approval of the Instructor or the Faculty Advisor. Students with native or near-native fluency normally begin language courses with SPAN*2000.

All language students are strongly advised to include LING*1000 in their program, and CLAS*1000 among their electives in order to derive the maximum benefit from their studies.

**Study Abroad**

The Spanish and Hispanic Studies program encourages its students to take advantage of the University of Guelph’s exchange programs and the semester abroad opportunities. We offer exchange programs with the University of Madrid and the University of Alcalá de Henares in Spain the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) and the University of Guadalajara (with over 30 campuses) in Mexico and the University of San Andrés in Argentina. Students also enjoy the semester abroad opportunity every second winter in Guatemala. It is recommended that students go on exchange in their third year. In order to be eligible for an exchange, students should have completed at least SPAN*2010, SPAN*2990, SPAN*2040 and SPAN*3080. Credits successfully completed at the host university are applied towards University of Guelph degree requirements. Please see the International Study section of the undergraduate calendar and consult the Head of Spanish and Hispanic Studies for more information.

**Area of Concentration (General Program)**

A minimum of 5.00 credits in Spanish and Hispanic Studies is required, including:

2.00 credits from Group A:

**SPAN*2040 [0.50] Culture of Spain**

**SPAN*2990 [0.50] Hispanic Literary Studies**

**SPAN*3080 [0.50] Spanish American Culture**

One of:

**SPAN*3220 [0.50] Literature and Arts I: Spain**

**SPAN*3230 [0.50] Literature and Arts II: Latin America**

3.00 credits from Group B:

**SPAN*1100 [0.50] Introductory Spanish I**

**SPAN*1110 [0.50] Introductory Spanish II**

**SPAN*2000 [0.50] Intermediate Spanish I**

**SPAN*2010 [0.50] Intermediate Spanish II**

**SPAN*3210 [0.50] Topics in Hispanic Studies**

**SPAN*3230 [0.50] Literature and Arts II: Latin America**

**SPAN*3240 [0.50] Topics in Hispanic Linguistics**

**SPAN*3500 [0.50] Advanced Spanish I**

**SPAN*3700 [0.50] Experiential Learning and Language**

**SPAN*3800 [0.50] Directed Readings in Hispanic Studies**

**SPAN*3810 [0.50] Directed Readings in Hispanic Studies**

**SPAN*4100 [1.00] Seminar in Hispanic Studies**

**SPAN*4410 [1.00] Senior Seminar on Latin American**

**SPAN*4420 [1.00] Senior Seminar on Spain or Africa**

**SPAN*4500 [1.00] Spanish Translation - Theory and Practice**

**SPAN*4840 [1.00] Research Paper in Hispanic Studies**

A maximum of 0.50 credits from Group B may be substituted with courses from the following:

**ARTH*2050 [0.50] Modern Latin American Art**

**CLAS*2000 [0.50] Classical Mythology**

**ENGL*2040 [0.50] Latina/o Literature and Cultural Production: Intro**

**EURO*1100 [0.50] European Cinema**

**EURO*2200 [0.50] Towards European Modernism**

**HIST*2920 [0.50] Republican Latin America**

**HIST*3150 [0.50] History and Culture of Mexico**

**HIST*3230 [0.50] Spain and Portugal, 1085 to 1668**

**HUMN*1030 [0.50] What Makes a Literary Classic?**

**HUMN*3000 [0.50] Narratives of Migration**

**LAT*1100 [0.50] Preliminary Latin I**

**LAT*1110 [0.50] Preliminary Latin II**

**LING*1000 [0.50] Introduction to Linguistics**

**LING*2400 [0.50] Phonetics**

Students wishing to substitute required courses with courses taken abroad, or other options, should consult the Head of Spanish and Hispanic Studies.

**Major (Honours Program)**

A minimum of 8.00 credits in Spanish and Hispanic Studies is required, including:

3.50 credits from Group A:

**SPAN*2040 [0.50] Culture of Spain**

**SPAN*2990 [0.50] Hispanic Literary Studies**

**SPAN*3080 [0.50] Spanish American Culture**

**SPAN*3220 [0.50] Literature and Arts I: Spain**

**SPAN*3230 [0.50] Literature and Arts II: Latin America**

One of:

**SPAN*4410 [1.00] Senior Seminar on Latin American**

**SPAN*4420 [1.00] Senior Seminar on Spain or Africa**

4.50 credits from Group B:

**SPAN*1100 [0.50] Introductory Spanish I**

**SPAN*1110 [0.50] Introductory Spanish II**

**SPAN*2000 [0.50] Intermediate Spanish I**

**SPAN*2010 [0.50] Intermediate Spanish II**

**SPAN*3210 [0.50] Topics in Hispanic Studies**

**SPAN*3240 [0.50] Topics in Hispanic Linguistics**

**SPAN*3700 [0.50] Experiential Learning and Language**

**SPAN*3800 [0.50] Directed Readings in Hispanic Studies**

**SPAN*3810 [0.50] Directed Readings in Hispanic Studies**

**SPAN*4100 [1.00] Seminar in Hispanic Studies**

**SPAN*4410 [1.00] Senior Seminar on Latin American**

**SPAN*4420 [1.00] Senior Seminar on Spain or Africa**

**SPAN*4500 [1.00] Spanish Translation - Theory and Practice**

**SPAN*4840 [1.00] Research Paper in Hispanic Studies**

A maximum of 1.00 credits from Group B may be substituted with courses from the following:

**ARTH*2050 [0.50] Modern Latin American Art**

**CLAS*2000 [0.50] Classical Mythology**

**ENGL*2040 [0.50] Latina/o Literature and Cultural Production: Intro**

**EURO*1100 [0.50] European Cinema**

**EURO*2200 [0.50] Towards European Modernism**

**HIST*2920 [0.50] Republican Latin America**

**HIST*3150 [0.50] History and Culture of Mexico**

**HIST*3230 [0.50] Spain and Portugal, 1085 to 1668**

**HUMN*1030 [0.50] What Makes a Literary Classic?**

**HUMN*3000 [0.50] Narratives of Migration**

**LAT*1100 [0.50] Preliminary Latin I**

**LAT*1110 [0.50] Preliminary Latin II**

**LING*1000 [0.50] Introduction to Linguistics**

**LING*2400 [0.50] Phonetics**

Students wishing to substitute required courses with courses taken abroad, or other options, should consult the Head of Spanish and Hispanic Studies.

**Minor (Honours Program)**

A minimum of 5.00 credits in Spanish and Hispanic Studies is required, including:

2.50 credits from Group A:

**SPAN*3700 [0.50] Experiential Learning and Language**

**SPAN*3800 [0.50] Directed Readings in Hispanic Studies**

**SPAN*3810 [0.50] Directed Readings in Hispanic Studies**

**SPAN*4100 [1.00] Seminar in Hispanic Studies**

**SPAN*4410 [1.00] Senior Seminar on Latin American**

**SPAN*4420 [1.00] Senior Seminar on Spain or Africa**

**SPAN*4500 [1.00] Spanish Translation - Theory and Practice**

**SPAN*4840 [1.00] Research Paper in Hispanic Studies**


**Statistics (STAT)**

Department of Mathematics and Statistics, College of Engineering and Physical Sciences,

Knowledge of statistics is crucial for understanding our world. An understanding of statistics is vital in many disciplines including psychology, sociology, political science, marketing, and economics. Students can choose to study statistics as a minor in the B.A. Honours Program or as an area of concentration in the General Program.

**Area of Concentration (General Program)**

A minimum of 5.00 credits in Statistics and Mathematics is required, including:

- a. no more than 1.00 credits from courses at the 1000 level
- b. 3.00 credits in statistics (STAT), 2.00 of which must be from courses at the 3000 level or above

**Recommended Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>MATH*1200</td>
<td>0.50</td>
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<tr>
<td>MATH*1210</td>
<td>0.50</td>
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<tr>
<td>STAT*2040</td>
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<td>STAT*2050</td>
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<td>STAT*3100</td>
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<td>STAT*3110</td>
<td>0.50</td>
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<tr>
<td>STAT*3240</td>
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</table>

0.50 additional credits in Statistics
0.50 additional credits in Statistics or Mathematics

**Honours Programs**

**Minor (Honours Program)**

A total of 5.00 credits is required to complete the minor, including:

(MATH*1080 or MATH*2000)*
(MATH*1090 or MATH*2100)**
MATH*1160  0.50 Linear Algebra I
STAT*2040  0.50 Statistics I
STAT*2050  0.50 Statistics II
STAT*3100  0.50 Introductory Mathematical Statistics I
STAT*3110  0.50 Introductory Mathematical Statistics II

0.50 additional credits in Statistics
0.50 additional credits in Statistics or Mathematics

**Major (Honours Program)**

A minimum of 9.00 credits is required, including:

SART*1050  0.50 Foundation Studio
SART*1060  0.50 Core Studio

One of:

ARTH*1510  0.50 Art Historical Studies I
ARTH*1520  0.50 Art Historical Studies II

Students who have not been admitted directly into the major must also meet these requirements in order to declare a SART major.

**Cost of Studio Supplies**

The majority of the cost of supplies must be borne by the student. In order to permit the University to subsidize this cost and to allow for savings through discount buying, some materials are obtained through the school by payment of a lab fee. The amount of the fee is established for each semester prior to registration.

**Student Counselling**

Students who elect to take a substantial number of credits in Studio Art with the objective of graduate work are advised to obtain counselling from their academic advisor regarding their choices. However, in general, it is important to know that graduate studies in Studio Art normally require an in-depth knowledge of traditional and contemporary media, as well as a significant awareness of contemporary art history and theory. Students are encouraged to take electives in other disciplines from across the University to inform their Studio Art practice. Cognate electives in other disciplines in the College of Arts, such as Philosophy, History, and English will almost certainly prove an asset.

**Minor**

Students wishing to declare the SART minor must have a cumulative average of 70% or higher in the following courses:

SART*1050  0.50 Foundation Studio
SART*1060  0.50 Core Studio

One of:

ARTH*1510  0.50 Art Historical Studies I
ARTH*1520  0.50 Art Historical Studies II

Students who have not been admitted directly into the major must also meet these requirements in order to declare a SART major.

**School of Fine Art and Music, College of Arts**

The School offers programs that allow for concentrated study in Art History or in Studio Art, or a combination of the two disciplines.

The Studio Art program provides a thorough grounding in contemporary art practice, art history, theory, and criticism. Courses are offered in drawing, painting, photography, printmaking, sculpture, computer graphics, and experimental studio. Studio Art majors must also take a selection of courses in art history. Specific requirements are listed below.

**Honours Programs**

**Minor (Honours Program)**

A total of 5.00 credits is required, including:

SART*1050  0.50 Foundation Studio
SART*1060  0.50 Core Studio

One of:

ARTH*1510  0.50 Art Historical Studies I
ARTH*1520  0.50 Art Historical Studies II

Students who have not been admitted directly into the major must also meet these requirements in order to declare a SART major.

**Notes:**

- Students majoring in Mathematical Science cannot minor in Statistics.
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* IPS*1500 can count toward this 0.50 credit
** IPS*1510 can count toward this 0.50 credit

Note: Students majoring in Mathematical Science cannot minor in Statistics.

**Studio Art (SART)**

**School of Fine Art and Music, College of Arts**

The School offers programs that allow for concentrated study in Art History or in Studio Art, or a combination of the two disciplines.

The Studio Art program provides a thorough grounding in contemporary art practice, art history, theory, and criticism. Courses are offered in drawing, painting, photography, printmaking, sculpture, computer graphics, and experimental studio. Studio Art majors must also take a selection of courses in art history. Specific requirements are listed below.

**Cost of Studio Supplies**

The majority of the cost of supplies must be borne by the student. In order to permit the University to subsidize this cost and to allow for savings through discount buying, some materials are obtained through the school by payment of a lab fee. The amount of the fee is established for each semester prior to registration.

**Student Counselling**

Students who elect to take a substantial number of credits in Studio Art with the objective of graduate work are advised to obtain counselling from their academic advisor regarding their choices. However, in general, it is important to know that graduate studies in Studio Art normally require an in-depth knowledge of traditional and contemporary media, as well as a significant awareness of contemporary art history and theory. Students are encouraged to take electives in other disciplines from across the University to inform their Studio Art practice. Cognate electives in other disciplines in the College of Arts, such as Philosophy, History, and English will almost certainly prove an asset.

**Minor**

Students wishing to declare the SART minor must have a cumulative average of 70% or higher in the following courses:

SART*1050  0.50 Foundation Studio
SART*1060  0.50 Core Studio

One of:

ARTH*1510  0.50 Art Historical Studies I
ARTH*1520  0.50 Art Historical Studies II

Students who have not been admitted directly into the major must also meet these requirements in order to declare a SART major.

**Major (Honours Program)**

A minimum of 9.00 credits is required, including:

SART*1050  0.50 Foundation Studio
SART*1060  0.50 Core Studio

One of:

ARTH*1510  0.50 Art Historical Studies I
ARTH*1520  0.50 Art Historical Studies II

Students who have not been admitted directly into the major must also meet these requirements in order to declare a SART major.

**Notes:**

- Students majoring in Mathematical Science cannot minor in Statistics.
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Note: Students majoring in Mathematical Science cannot minor in Statistics.

**Honours Programs**

**Minor (Honours Program)**

A total of 5.00 credits is required to complete the minor, including:

(MATH*1080 or MATH*2000)*
(MATH*1090 or MATH*2100)**
MATH*1160  0.50 Linear Algebra I
STAT*2040  0.50 Statistics I
STAT*2050  0.50 Statistics II
STAT*3100  0.50 Introductory Mathematical Statistics I
STAT*3110  0.50 Introductory Mathematical Statistics II

0.50 additional credits in Statistics
0.50 additional credits in Statistics or Mathematics

**Major (Honours Program)**

A minimum of 5.00 credits is required, including:

SART*1050  0.50 Foundation Studio
SART*1060  0.50 Core Studio

One of:

ARTH*1510  0.50 Art Historical Studies I
ARTH*1520  0.50 Art Historical Studies II

Students who have not been admitted directly into the major must also meet these requirements in order to declare a SART major.

**Notes:**

- Students majoring in Mathematical Science cannot minor in Statistics.
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* IPS*1500 can count toward this 0.50 credit
** IPS*1510 can count toward this 0.50 credit

Note: Students majoring in Mathematical Science cannot minor in Statistics.
Notes:

1. In accordance with the B.A. program regulation limiting the number of credits to be taken in any subject area, OCADU graduates granted the maximum advanced standing of credits in Studio Arts will be limited to 2.00 additional credits in Studio Arts at the University of Guelph.

2. A cumulative average of at least 70% in all course attempts in Studio Arts and Art History is required in order to enter or continue in the Honours Studio Arts program.

Theatre Studies (THST)

School of English and Theatre Studies, College of Arts

The Theatre Studies program is a component of a liberal education, and is dedicated to integrating academic study and theatre practice. The program offers introductory and advanced courses that combine theory and practice with an emphasis on educating well-rounded theatre creators for both the academic and professional spheres. Students will have the opportunity to work on both scripted and devised productions and do in-depth research and analysis. Rather than a focus on individual disciplines such as acting, directing, design and technical theatre, the program integrates this knowledge into a series of variable topic courses that examine performance from various perspectives. Many of these courses have presentation or performance outcomes.

Notes:

1. A maximum of 2.00 credits in Directed Readings or Special Studies Courses (THST*3000, THST*3600) is allowed in the honours program major. A maximum of 1.00 credits in such courses is allowed in honours program minor or the general program area of concentration. Students will normally be permitted to take only 0.50 credits in Directed Readings or Special Studies courses per semester.

   Certain approved Dramatic Literature courses from the English Program within the School of English and Theatre Studies or other departments may be counted towards a degree in Theatre Studies. A list of approved courses may be obtained from the School’s website: [http://www.arts.uoguelph.ca/sets/](http://www.arts.uoguelph.ca/sets/).

2. In connection with THST*1040 and some upper-level courses, students are required as part of the course to attend various specified theatre performances in cities such as Toronto, Stratford, Niagara-on-the-Lake, and London. A special fee is charged for travel to these performances and students will be notified during the first week of classes of the amount of this fee and the dates of the performances.

3. In any given semester, a student may not enroll in more than ONE production-related course at a time. These include: THST*2190, THST*3190, THST*4280.

Area of Concentration (General Program)

A minimum of 5.00 credits in Theatre Studies is required, including:

- THST*1040 [0.50] Introduction to Performance
- THST*1190 [0.50] Theatre Workshop I
- THST*1270 [0.50] Theatre Research I
- THST*2050 [0.50] Devising
- THST*2270 [0.50] Theatre Research II
- THST*3170 [0.50] Special Topics

1.00 additional credit in THST at the 2000 level or above

1.00 additional credit in THST at the 3000 level or above

Major (Honours Program)

A minimum of 8.50 credits in Theatre Studies is required, including:

- THST*1040 [0.50] Introduction to Performance
- THST*1190 [0.50] Theatre Workshop I
- THST*1270 [0.50] Theatre Research I
- THST*2050 [0.50] Devising
- THST*2190 [1.00] Theatre Workshop II
- THST*2270 [0.50] Theatre Research II
- THST*3170 [0.50] Special Topics
- THST*4270 [0.50] Research Seminar I
- THST*4280 [1.00] Ensemble Project

1.00 additional credit in THST at the 2000 level or above

2.00 additional credits in THST at the 3000 level or above

Minor (Honours Program)

A minimum of 5.00 credits in Theatre Studies is required, including:

- THST*1040 [0.50] Introduction to Performance
Bachelor of Arts and Sciences (B.A.S.)

The University of Guelph offers an 8 semester (20.00 credits) honors program leading to a Bachelor of Arts and Sciences (B.A.S.) degree.

The Bachelor of Arts & Sciences program is designed for students who are motivated equally by the study of Arts/Social Sciences and the Sciences, and who find challenge and satisfaction in testing the traditional boundaries of study through undergraduate level interdisciplinary work. The program meets these objectives through a unique structure that accredits students in an Arts/Social Sciences core, a Sciences core, a Subject Area core of interdisciplinary humanities and sciences courses (ASCI*), and a minor in each of the Arts/Social Sciences and the Sciences (see program information for choices of minors). The structure of the program ensures disciplinary rigour and breadth through completion of core requirements for a B.A.S. degree, concentration in two distinct minors, and concentration of learning in an academic cohort of B.A.S. students through the interdisciplinary ASCI courses in the B.A.S. core. This core is open only to students in the B.A.S. program.

Program Information

Academic Counselling

The B.A.S. program counsellor assists students in the selection of minors, interpreting program and academic regulations, and with the selection of appropriate courses for chosen minors and distribution requirements. Students should consult the counsellor when experiencing particular difficulties affecting academic standing and progress through the program. Students are encouraged to check the B.A.S. program website regularly for course information and cross-listing of acceptable credits where appropriate.

Counselling on Minors

Academic departments offer the minors in the B.A.S. program and assign faculty advisors to assist students with academic planning (e.g., a faculty advisor in the History department handles queries about a minor in History). Students should consult the appropriate faculty advisor, along with the B.A.S. Program Counsellor, when requiring advice on the completion of specialization requirements. The list of faculty advisors is available on the Undergraduate Academic Information Centre website: http://www.uoguelph.ca/uaic/facultyadvisors or contact the B.A.S. Program Counsellor for further information.

Continuation of Study

To be eligible to continue in the program, students must meet the requirements for Continuation of Study as noted in Section VIII—Undergraduate Degree Regulations & Procedures of this calendar (Schedules 1 and 2).

Conditions for Graduation

To qualify for the degree Bachelor of Arts and Sciences, the student must successfully complete a minimum of 20.00 credits as identified below. In addition, students must meet the continuation of study requirements at the time of graduation and have a 60.00% cumulative average.

Distribution Requirements

This program will require the completion of 20.00 credits as indicated below, with a maximum of 7.00 credits at the 1000 level. First year core courses may be counted towards the minors.

Of the 20.00 credits required for this program, 3.00 credits must be completed at the 3000 or 4000 level, and 2.00 credits at the 4000 level. This requirement is partially fulfilled by senior level courses in the Subject Core (ASCI) requirements.

1. Science Core - 2.00 credits

When choosing their courses in the science core, students are advised to keep prerequisites for their BAS Science Minor in mind. For a list of suggested core science courses for each specific BAS Science Minor, please consult the BAS website (https://www.uoguelph.ca/bas/)

2. Arts and Social Science Core - 2.00 credits

3. Subject Area Core - (ASCI) - 3.00 credits

4. Arts/Social Sciences Minor - 5.00 credits minimum

5. Science Minor - 5.00 credits minimum

6. Free Electives - 3.00 credits

1. Science Core - 2.00 credits

2. Arts and Social Science Core - 2.00 credits

3. Subject Area Core - (ASCI) - 3.00 credits

4. Arts/Social Sciences Minor - 5.00 credits minimum

5. Science Minor - 5.00 credits minimum

6. Free Electives - 3.00 credits

1. Science Core - 2.00 credits

When choosing their courses in the science core, students are advised to keep prerequisites for their BAS Science Minor in mind. For a list of suggested core science courses for each specific BAS Science Minor, please consult the BAS website (https://www.uoguelph.ca/bas/)

2. Arts and Social Science Core - 2.00 credits

3. Subject Area Core - (ASCI) - 3.00 credits

4. Arts/Social Sciences Minor - 5.00 credits minimum

5. Science Minor - 5.00 credits minimum

6. Free Electives - 3.00 credits

1. Science Core - 2.00 credits

2. Arts and Social Science Core - 2.00 credits

3. Subject Area Core - (ASCI) - 3.00 credits

4. Arts/Social Sciences Minor - 5.00 credits minimum

5. Science Minor - 5.00 credits minimum

6. Free Electives - 3.00 credits

1. Science Core - 2.00 credits

When choosing their courses in the science core, students are advised to keep prerequisites for their BAS Science Minor in mind. For a list of suggested core science courses for each specific BAS Science Minor, please consult the BAS website (https://www.uoguelph.ca/bas/)

2. Arts and Social Science Core - 2.00 credits

3. Subject Area Core - (ASCI) - 3.00 credits

4. Arts/Social Sciences Minor - 5.00 credits minimum

5. Science Minor - 5.00 credits minimum

6. Free Electives - 3.00 credits

1. Science Core - 2.00 credits

When choosing their courses in the science core, students are advised to keep prerequisites for their BAS Science Minor in mind. For a list of suggested core science courses for each specific BAS Science Minor, please consult the BAS website (https://www.uoguelph.ca/bas/)

2. Arts and Social Science Core - 2.00 credits

3. Subject Area Core - (ASCI) - 3.00 credits

4. Arts/Social Sciences Minor - 5.00 credits minimum

5. Science Minor - 5.00 credits minimum

6. Free Electives - 3.00 credits
Biology  
Biotechnology  
Chemistry  
Computing & Information Science  
Ecology  
GIS* & Environmental Analysis  
Mathematics  
Mathematical Science  
Microbiology  
Molecular Biology and Genetics  
Neuroscience  
Nutritional and Nutraceutical Sciences  
Physics  
Plant Science  
Statistics  
Zoology  

* Geographic Information Systems

**Note:** Students cannot select Psychology or Mathematics for both their B.Sc. and B.A. minors.

### 6. Free Electives - 3.00 credits

The program includes 3.00 free electives. Electives may be completed in any subject area.

#### Double Counting Rule

A maximum of 3.00 credits may be double-counted:

a. 1.00 credits may be double-counted between minors.

b. Up to 1.00 credits may be double-counted between the science core and a minor; and up to 1.00 credits may be double-counted between the arts and social science core and a minor.

Students may not triple-count a course between a core and two minors.
Bachelor of Bio-Resource Management Degree (B.B.R.M.)

The University of Guelph offers a 20.00 credit program, normally completed over 8 semesters, leading to a Bachelor of Bio-Resource Management degree (B.B.R.M.). This degree is a unique blend of applied and theoretical learning, with an emphasis on experiential learning opportunities. This degree offers three majors: Environmental Management, Equine Management and Food Industry Management.

Program Information

The Bachelor of Bio-Resource Management degree program combines business studies and technical training with a strong emphasis on hands-on learning. A solid foundation in applied aspects of science, technology and business provides graduates with sufficient breadth and expertise to become competent managers in the environmental or food industry fields. Students begin studying in one of the following management majors during the first semester: Environmental Management, Equine Management or Food Industry Management.

Students will be encouraged to integrate their academic program with a well-planned series of employment activities in the summer months and to develop their leadership and interpersonal skills in on-campus and community activities. There is a strong commitment in the curriculum to personal development and students are encouraged to identify goals that they wish to accomplish throughout their university career.

Academic Advising and Counselling

Program Counselling

The Bachelor of Bio-Resource Program Counsellor is available to assist in-course students who require information or advice about their program or other academic regulations and who seek information about resources available to students. For information about how to contact a program counsellor, and for more information about program counselling, see Section VII -- Academic Counselling of the current Undergraduate Calendar.

Departmental Advising

On entering the program all students are assigned to a faculty advisor who will mentor them throughout their studies. The faculty advisor is familiar with the academic requirements of the program and is aware of career opportunities. Students are strongly encouraged to attend all meetings called by their advisor, and to set up individual meetings with him/her when they have questions or concerns about their performance or progress in the program.

Continuation of Study

Students are advised to consult the regulations for Continuation of Study which are outlined in detail in Section VIII -- Undergraduate Degree Regulations & Procedures in the current calendar.

Conditions for Graduation

To qualify for the degree Bachelor of Bio-Resource Management, the student must successfully complete a minimum of 20.00 credits as set out in the Schedule of Studies as listed. In addition, students must meet the continuation of study requirements at the time of graduation and have a minimum cumulative average of 60%.

Schedule of Studies

Courses specified in the Schedule of Studies are required courses and must be successfully completed. A full time course load normally includes 2.50 credits.

B.B.R.M. Program Regulations

Recommendations

Students entering Environmental Management or Equine Management who are deficient in U level Mathematics or Chemistry should consult with the program counsellor.

Environmental Management Major (EM)

School of Environmental Sciences and Department of Food, Agricultural and Resource Economics, Ontario Agricultural College

The major in Environmental Management focuses on the development of leaders in the areas of environmental science and technology. The program combines a solid background in environmental science and management with business, using a mix of theoretical and applied study. The flexibility provided in semesters 6 through 8 permits students to develop their understanding of specific areas of environmental science and business or take a variety of areas within the discipline. This flexibility also allows students to participate in international exchanges and semesters abroad. Students have the opportunity to incorporate a variety of field trips, experiential learning in the workplace and independent research projects into their program.

This major will require the completion of 20.00 credits: 12.00 from required courses, 6.00 from restricted electives, and 2.00 free electives. Of these credits, a minimum of 6.00 credits are required at the 3000 level or higher, of which at least 2.00 credits must be at the 4000 level.

Semester 1

BIOL*1070 [0.50] Discovering Biodiversity
CHEM*1040 [0.50] General Chemistry I

Semester 2

ACCT*1220 [0.50] Introductory Financial Accounting
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
FARE*1040 [1.00] Intro to Environmental Economics, Law & Policy
HROB*2090 [0.50] Individuals and Groups in Organizations

Semester 3

BIOL*2060 [0.50] Ecology
ENVS*2060 [0.50] Soil Science
ENVS*2230 [0.50] Communications in Environmental Science
FARE*2700 [0.50] Survey of Natural Resource Economics
GEOG*2480 [0.50] Mapping and GIS

Semester 4

ENVM*3500 [1.00] Environmental Management Integrated Project
ENVS*2040 [0.50] Plant Health and the Environment
ENVS*2080 [0.50] Introduction to Environmental Microbiology

Semester 5

GEOG*2420 [0.50] The Earth From Space
One of:
GEOG*2460 [0.50] Analysis in Geography
STAT*2060 [0.50] Statistics for Business Decisions
1.50 electives or restricted electives

Semester 6

ENVS*3020 [0.50] Pesticides and the Environment
ENVS*3060 [0.50] Groundwater

1.50 electives or restricted electives

Semester 7

2.50 electives or restricted electives

Semester 8

2.50 electives or restricted electives

Restricted Electives

Students must successfully complete a minimum of 6.00 credits at the 3000 level or higher, of which at least 2.00 credits must be at the 4000 level. Those credits at the 3000 level or above selected to satisfy lists A, B, and C below will be applied to satisfy these minimum credit requirements.

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

Students should consult with a faculty advisor before Semester 4 in planning their restricted elective choices. Students are advised to pay particular attention to prerequisite requirements when choosing individual courses and seek advice as needed.

1. Students must select a minimum of 6.50 credits from the following lists of restricted electives.

List A

Students must select a minimum of 3.50 credits from any of the following courses without regard to group of which at least 1.00 credits must be at the 4000 level:

Aquatic Science:
BIOL*3450 [0.50] Introduction to Aquatic Environments
CHEM*3360 [0.50] Environmental Chemistry and Toxicology
EDRD*3450 [0.50] Watershed Planning Practice
ENVS*3220 [0.50] Terrestrial Chemistry
ENVS*4370 [0.50] Environmental Organic Chemistry
GEOG*3610 [0.50] Environmental Hydrology

Atmospheric Science:
ENVS*2030 [0.50] Meteorology and Climatology
ENVS*2310 [0.50] Introduction to Biogeochemistry
ENVS*3340 [0.50] Use and Management of Environmental Data
GEOG*2110 [0.50] Climate and the Biophysical Environment
ENVS*2060 [0.50] Conservation Science and Biodiversity Science:
BIOL*3060 [0.50] Populations, Communities & Ecosystems
BIOL*3130 [0.50] Conservation Biology
ENVS*2210 [0.50] Apiculture and Honey Bee Biology
ENVS*2330 [0.50] Current Issues in Ecosystem Science and Biodiversity
ENVS*3000 [0.50] Nature Interpretation
ENVS*3010 [0.50] Climate Change Biology
ENVS*3090 [0.50] Insect Diversity and Biology
ENVS*3230 [0.50] Agroforestry Systems
ENVS*3250 [0.50] Forest Health and Disease
ENVS*3270 [0.50] Forest Biodiversity
ENVS*4070 [0.50] Pollinator Conservation

Last Revision: July 4, 2019

2019-2020 Undergraduate Calendar
Students may also select any of the following courses as* restricted electives: AGR*3450 [0.50] Research Methods in Agricultural Science AGR*3500 [0.50] Experiential Education I AGR*4450 [1.00] Research Project I AGR*4460 [1.00] Research Project II AGR*4600 [1.00] Agriculture and Food Issues Problem Solving BIOC*2580 [0.50] Introduction to Biochemistry CHEM*1080 [0.50] General Chemistry II ECON*1100 [0.50] Introductory Microeconomics ENVS*4410 [0.50] Introduction to Advanced Independent Research ENVS*4420 [0.50] Advanced Independent Research ENVS*4430 [1.00] Advanced Independent Research FARE*4550 [0.50] Independent Studies I FARE*4560 [0.50] Independent Studies II GEOG*1300 [0.50] Introduction to the Biophysical Environment * Students considering graduate studies are encouraged to take at least 1.00 of these credits.

**Equine Management Major (EQM)**

Department of Animal Biosciences and the Department of Food, Agricultural and Resource Economics, Ontario Agricultural College

The major in Equine Management focuses on the development of leaders with a genuine regard for all horses and their well-being, a conscious concern for the environment, and a passionate interest in all aspects of the horse industry. The program combines a solid background in business, biological sciences and equine management through practical and theoretical experience. It provides in-depth understanding of the economic, environmental and social dimensions of all equine disciplines with a broad and current knowledge of horse industry issues and develops the skills to gather, access, interpret and apply industry data. In consultation with the faculty advisor, students can participate in international exchange or semester abroad opportunities in semester 6. Students can also incorporate a variety of field trips, experiential learning in the workplace and independent research projects into their program.

This major will require the completion of 20.00 credits: 14.00 from required courses, 5.00 from restricted electives and 1.00 electives. Of these credits, a minimum of 6.00 credits are required at the 3000-level or higher, of which at least 2.00 credits must be at the 4000-level.

**Semester 1 - Fall**

ENVS*4050 [0.50] Biology of Plants & Animals in Managed Ecosystems ECON*3050 [0.50] Introduction to Molecular and Cellular Biology ECON*4050 [0.50] Introductory Microeconomics EQN*1010 [1.00] Introduction to Equine Management

**Semester 2 - Winter**

ACCT*2220 [0.50] Introductory Financial Accounting ANSC*1210 [1.00] Principles of Animal Care and Welfare ENVS*2040 [0.50] Equine Anatomy and Physiology One of: CHEM*1040 [0.50] General Chemistry I CHEM*1100 [0.50] Chemistry Today

**Semester 3 - Fall**

ACCT*2230 [0.50] Management Accounting ENVS*2060 [0.50] Soil Science EQN*2060 [0.50] Equine Event Management I EQN*2200 [0.50] Equine Industry Trends and Issues I 0.50 electives or restricted electives

**Semester 4 - Winter**

EQN*2050 [0.50] Introduction to Equine Nutrition EQN*2070 [0.50] Equine Event Management II EQN*2150 [0.50] Equine Facility Management and Design 1.00 electives or restricted electives

**Semester 5 - Fall**

ANSC*3080 [0.50] Agricultural Animal Physiology CROP*3340 [0.50] Managed Grasslands EQN*3070 [0.50] Equine Health Management STAT*2060 [0.50] Statistics for Business Decisions 0.50 electives or restricted electives

**Semester 6 - Winter**

EQN*3050 [0.50] Equine Exercise Physiology EQN*3150 [0.50] Equine Exercise Physiology Laboratory 1.50 electives or restricted electives

**Semester 7 - Fall**

EQN*4400 [0.50] Equine Industry Trends and Issues II EQN*4500 [1.00] Equine Integrated Project 1.00 electives or restricted electives

**Semester 8 - Winter**

EQN*3060 [0.50] Equine Reproduction EQN*4020 [0.50] Advanced Equine Nutrition 1.50 electives or restricted electives

**Restricted Electives**

Students must successfully complete a minimum of 6.00 credits at the 3000-level or higher, of which at least 2.00 credits must be at the 4000-level.

Students must select a minimum of 2.00 credits from the following four lists of restricted electives.

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.
Students must select a minimum of 1.50 credits from any of the following lists (grouped by topic areas):

**Animal Biology:**
- AGR*2350 [0.50] Animal Production Systems, Health and Industry
- ANSC*4090 [0.50] Applied Animal Behaviour
- ANSC*4100 [0.50] Applied Environmental Physiology and Animal Housing
- ANSC*4490 [0.50] Applied Endocrinology
- ANSC*4650 [0.50] Comparative Immunology
- POPM*4230 [0.50] Animal Health

**Genetics:**
- MBG*2400 [0.50] Fundamentals of Plant and Animal Genetics
- MBG*3060 [0.50] Quantitative Genetics
- MBG*4020 [0.50] Genetics of Companion Animals
- MBG*4030 [0.50] Animal Breeding Methods and Applications

**Pasture and Turf Management:**
- ENV*3080 [0.50] Soil and Water Conservation
- ENV*3140 [0.50] Management of Turfgrass Diseases

One of:
- ENV*4090 [0.50] Soil Management
- ENV*4160 [0.50] Soil and Nutrient Management
- HORT*2450 [0.50] Introduction to Turfgrass Science
- HORT*3050 [0.50] Management of Turfgrass Insect Pests and Weeds
- HORT*4450 [0.50] Advanced Turfgrass Science

**Advanced Nutrition:**
- BIOC*2580 [0.50] Introduction to Biochemistry
- CHEM*1050 [0.50] General Chemistry II
- NUTR*3210 [0.50] Fundamentals of Nutrition

Students must select a minimum of 1.50 credits from any of the following lists (grouped by topic areas):

**Accounting:**
- ACCT*3230 [0.50] Intermediate Management Accounting
- ACCT*4230 [0.50] Advanced Management Accounting

**Business and Management:**
- HROB*2010 [0.50] Foundations of Leadership
- HROB*2090 [0.50] Individuals and Groups in Organizations
- HROB*4010 [0.50] Leadership Certificate Capstone
- MGMT*2150 [0.50] Introduction to Canadian Business Management
- MGMT*3020 [0.50] Corporate Social Responsibility
- MGMT*3320 [0.50] Financial Management

**Food, Agricultural and Resource Economics:**
- FOOD*2620 [0.50] Introduction to Agribusiness
- ECON*1100 [0.50] Introduction to Microeconomics
- FARE*3310 [0.50] Food Industry Management
- FARE*3370 [0.50] Food Safety Management Systems

**Marketing:**
- MCS*1000 [0.50] Introductory Marketing
- MCS*2020 [0.50] Information Management
- MCS*2600 [0.50] Fundamentals of Consumer Behaviour
- MCS*3000 [0.50] Advanced Marketing
- MCS*3040 [0.50] Business and Consumer Law
- MCS*3620 [0.50] Marketing Communications

**3. Students must select a minimum of 1.00 credits from:**
- AGR*3010 [0.50] Special Studies in Agricultural Science I
- AGR*4010 [0.50] Special Studies in Agricultural Science II
- AGR*4600 [1.00] Agriculture and Food Issues Problem Solving
- AGR*4450 [1.00] Research Project I
- AGR*4460 [1.00] Research Project II
- ANSC*4610 [0.50] Critical Analysis in Animal Science

**4. Students may also count any of the following courses as restricted electives:**
- AGR*3500 [0.50] Experiential Education I
- ECON*1100 [0.50] Introductory Macroeconomics
- EDRD*2020 [0.50] Interpersonal Communication
- EDRD*3050 [0.50] Agricultural Communication I
- EDRD*3140 [0.50] Organizational Communication
- EDRD*3400 [0.50] Sustainable Communities
- EDRD*4120 [0.50] Leadership Development in Small Organizations
- EQN*2500 [0.50] Equine Field Course
- PSYC*1000 [0.50] Introduction to Psychology

**Food Industry Management (FIM)**
Department of Food, Agricultural and Resource Economics and Department of Food Science, Ontario Agricultural College

This major focuses on the development of leaders in the areas of Food Industry Innovation and Operations. The program combines a solid background in food science, economics and business, using a mix of theoretical and applied study. Students in this major will be able to create a curriculum uniquely tailored to their career goals. The flexibility provided in semesters 5 through 8 enables students to develop their understanding of specific areas of food science and business. Student participation in international exchanges and international summer research programs is encouraged and supported through academic advising on course selection and substitution. Students have the opportunity to incorporate a variety of field trips, experiential learning in the workplace and independent research projects into their program. The combination of a solid understanding of food science and current business practice with specialized skills and experience provided by this program is unique and greatly valued by prospective employers in this important sector of the Canadian and global economies.

This major will require the completion of 20.00 credits: 14.50 credits of required courses, 3.00 credits from restricted electives, and 2.50 credits of free electives. Of these credits, a minimum of 6.00 credits are required at the 3000 level or higher, of which at least 3.00 credits must be at the 4000 level.

**Semester 1**
- ACCT*1220 [0.50] Introductory Financial Accounting
- BIOL*1080 [0.50] Biological Concepts of Health
- CHEM*1040 [0.50] General Chemistry I
- HROB*2090 [0.50] Individuals and Groups in Organizations
- MATH*1030 [0.50] Business Mathematics

**Semester 2**
- BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
- CHEM*1050 [0.50] General Chemistry II
- FARE*1400 [1.00] Economics of the Agri-Food System
- 0.50 electives

**Semester 3**
- BIOC*2580 [0.50] Introduction to Biochemistry
- FOOD*2150 [0.50] Introduction to Nutritional and Food Science
- MCS*2020 [0.50] Information Management
- MICR*2420 [0.50] Introduction to Microbiology
- STAT*2060 [0.50] Statistics for Business Decisions

**Semester 4**
- ACCT*2230 [0.50] Management Accounting
- ECON*1100 [0.50] Introductory Macroeconomics
- FOOD*2100 [0.50] Communication in Food Science
- FOOD*2620 [0.50] Food Engineering Principles
- 0.50 electives or restricted electives

**Semester 5**
- FOOD*3170 [0.50] Food Processing II
- HROB*2010 [0.50] Foundations of Leadership
- PHIL*2120 [0.50] Ethics
- PHIL*2600 [0.50] Business and Professional Ethics
- 1.00 electives or restricted electives

**Semester 6**
- FOOD*3170 [0.50] Food Processing II
- FARE*3310 [0.50] Operations Management
- FOOD*3140 [0.50] Food Processing I
- FOOD*3240 [0.50] Food Microbiology

**Semester 7**
- FARE*3320 [0.50] Supply and Value Chain Management
- FARE*4370 [0.50] Food & Agri Marketing Management
- 1.50 electives or restricted electives

**Semester 8**
- FARE*4330 [0.50] Advanced Operations Management
- FARE*4380 [0.50] Retailing, Merchandising and Sales
- FOOD*4310 [0.50] Food Safety Management Systems
- 1.00 electives or restricted electives

**Restricted Electives**
Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements. Students must take a minimum of 3.00 credits from restricted electives.

A minimum of 1.00 credits from the following list:
- FOOD*4070 [0.50] Food Packaging
- FOOD*4110 [0.50] Meat and Poultry Processing
- FOOD*4400 [0.50] Dairy Processing
- FOOD*4520 [0.50] Utilization of Cereal Grains for Human Food

A minimum of 1.00 credits from the following list:
- FARE*3000 [0.50] Food Industry Analysis and Policy
Cost-Benefit Analysis
Marketing Research
Decision Science
Quality Management in the Food Industry
Business-Government Relations in Canada

Students may also count any of the courses from the following list as restricted electives:
- Food*3050 [0.50] Food Chemistry I
- Food*3700 [0.50] Sensory Evaluation of Foods
- Food*4090 [0.50] Functional Foods and Nutraceuticals
- Food*4260 [0.50] Product Development I
- Food*4270 [0.50] Product Development II

Students may also count any of the research/experiential learning/independent study courses from the following list as restricted electives:
- AGR*3010 [0.50] Special Studies in Agricultural Science
- AGR*3500 [0.50] Experiential Education
- FARE*4550 [0.50] Independent Studies I
- FARE*4560 [0.50] Independent Studies II
- Food*4220 [0.50] Topics in Food Science
- Food*4230 [0.50] Research in Food Science

Food Industry Management (Co-op) (FIM:C)

Department of Food, Agricultural and Resource Economics and Department of Food Science, Ontario Agricultural College

This major focuses on the development of leaders in the areas of Food Industry Innovation and Operations. The program combines a solid background in food science, economics and business, using a mix of theoretical and applied study. Students in this major will be able to create a curriculum uniquely tailored to their career goals. The flexibility provided in semesters 5 through 8 enables students to develop their understanding of specific areas of food science and business. Student participation in international exchanges and international summer research programs is encouraged and supported through academic advising on course selection and consultation. Students have the opportunity to incorporate a variety of field trips, experiential learning in the workplace and independent research projects into their program. The combination of a solid understanding of food science and current business practice with specialized skills and experience provided by this program is unique and greatly valued by prospective employers in this important sector of the Canadian and global economies.

A principal aim of the Co-op program in Food Industry Management is to facilitate the transition of students from academic studies to a professional career by enhancing the integration of theory and practice.

Program Requirements

The Co-op program in Food Industry Management is a five year program, including 4 work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cces/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Students are eligible to participate in a maximum two (2) summer employment processes and must follow the academic work schedule as outlined on the Co-operative Education website: https://www.recruitguelph.ca/cces/.

Food Industry Management Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
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<tr>
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<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
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<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
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To be eligible to continue in the Co-op program, they must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading and work term report grading.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (21.50 Total Credits)*

- 14.50 - Required Core Courses
- 3.00 - Restricted Electives
- 2.50 - Free Electives
- 1.50 - Co-op Work Terms

Students should note that a minimum of 6.00 credits of their BBRM degree are required at the 3000 level or higher, of which at least 3.00 credits must be at the 4000 level.

Note: A minimum of three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. A fourth work term is optional and if completed the total number of credits will equal 22.00.

Semester 1 - Fall
- ACCT*1220 [0.50] Introductory Financial Accounting
- BIOL*1080 [0.50] Biological Concepts of Health
- CHEM*1040 [0.50] General Chemistry I
- HROB*2090 [0.50] Individuals and Groups in Organizations
- MATH*1030 [0.50] Business Mathematics

Semester 2 - Winter
- BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
- CHEM*1050 [0.50] General Chemistry II
- FARE*1400 [1.00] Economics of the Agri-Food System

Summer Semester
- Off

Semester 3 - Fall
- BIOC*2580 [0.50] Introduction to Biochemistry
- COOP*1100 [0.00] Introduction to Co-operative Education
- FOOD*2150 [0.50] Introduction to Nutritional and Food Science
- MCS*2020 [0.50] Information Management
- MICR*2420 [0.50] Introduction to Microbiology

Semester 4 - Winter
- ACCT*2230 [0.50] Management Accounting
- ECON*1100 [0.50] Introductory Macroeconomics
- FOOD*2100 [0.50] Communication in Food Science
- FOOD*2620 [0.50] Food Engineering Principles

Semester 5 - Fall
- FARE*3310 [0.50] Operations Management
- FOOD*3140 [0.50] Food Processing I
- FOOD*3240 [0.50] Food Microbiology

Semester 6 - Winter
- FOOD*3170 [0.50] Food Processing II
- HROB*2010 [0.50] Foundations of Leadership
- One of:
  - PHIL*2120 [0.50] Ethics
  - PHIL*2600 [0.50] Business and Professional Ethics

Semester 7 - Fall
- FARE*3320 [0.50] Supply and Value Chain Management
- FARE*4370 [0.50] Food & Agri Marketing Management

Semester 8 - Winter
- FARE*4330 [0.50] Advanced Operations Management
- FARE*4380 [0.50] Retailing, Merchandising and Sales
- FOOD*4310 [0.50] Food Safety Management Systems

Restricted Electives

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements. Students must take a minimum of 3.00 credits from restricted electives.

A minimum of 1.00 credits from the following list:
- FOOD*4070 [0.50] Food Packaging
- FOOD*4110 [0.50] Meat and Poultry Processing
- FOOD*4400 [0.50] Dairy Processing
- FOOD*4520 [0.50] Utilization of Cereal Grains for Human Food
A minimum of 1.00 credits from the following list:

- FARE*3000 [0.50] Food Industry Analysis and Policy
- FARE*3170 [0.50] Cost-Benefit Analysis
- FARE*4360 [0.50] Marketing Research
- FARE*4500 [0.50] Decision Science
- FOOD*4020 [0.50] Quality Management in the Food Industry
- POLS*3470 [0.50] Business-Government Relations in Canada

Students may also count any of the courses from the following list as restricted electives:

- FOOD*3050 [0.50] Food Chemistry I
- FOOD*3700 [0.50] Sensory Evaluation of Foods
- FOOD*4090 [0.50] Functional Foods and Nutraceuticals
- FOOD*4260 [0.50] Food Product Development I
- FOOD*4270 [0.50] Food Product Development II

Students may also count any of the research/experiential learning/independent study courses from the following list as restricted electives:

- AGR*3010 [0.50] Special Studies in Agricultural Science I
- AGR*3500 [0.50] Experiential Education I
- FARE*4550 [0.50] Independent Studies I
- FARE*4560 [0.50] Independent Studies II
- FOOD*4220 [0.50] Topics in Food Science
- FOOD*4230 [0.50] Research in Food Science
Bachelor of Commerce (B.Comm.)

The University of Guelph offers an eight semester (20.00 credits) honors program leading to a Bachelor of Commerce degree (B.Comm.). The normal course load is 2.50 credits per semester for a full-time student. The program is of an interdisciplinary nature and designed to give students a sound professional management education with a focus on specific industry sectors or management functions which prepare the graduates for positions of responsibility in particular areas of management and business.

Elective options enable students to select courses which support or complement their primary field of study.

In their first semester, students may be admitted to one of eight specialized majors or enter as “undeclared”. Students in the undeclared first year, must declare a specialized major by the end of semester two in order to gain access to required courses in semester three.

Bachelor of Commerce Majors

All majors in the Bachelor of Commerce program are also available in the Co-operative Education (Co-op) option. Co-operative Education is not available in Undeclared.

Undeclared (only available in semesters one and two)

Accounting
Food and Agricultural Business
Hospitality and Tourism Management
Management
Management Economics and Finance
Marketing Management
Public Management
Real Estate and Housing

In addition to specializing in a major area of study, the B.Comm. core ensures that each major also provides a comprehensive commerce education to all students in the program.

The B.Comm. Core includes:

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
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<td>ACCT*1220</td>
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<td>MCS*1000</td>
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<td>MGMT*1000</td>
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<tr>
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<td>ACCT*2230</td>
<td>[0.50] Management Accounting</td>
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<tr>
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<td>MGMT*4000</td>
<td>[0.50] Strategic Management</td>
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</tbody>
</table>

*MGMT*1100 is part of the Career Development Program which is designed to provide students with knowledge and tools to enhance their career readiness skills.

Students who have successfully completed COOP*1100 will be exempted from MGMT*1100.

The following core areas are covered through a choice of courses as determined by your major:

- Law
- HROB*3050, MCS*3040, REAL*4840
- Operations
- FARE*3310, HTM*3120
- Statistics
- ECON*2740, PSYC*1010, STAT*2060

Liberal Education Requirement

Other requirements are accommodated by specialized courses within the major or through specific courses chosen by the major from those available on campus.

Program Information

Academic Counselling

Program Counselling

Students are urged to seek the assistance of the counsellors in the B.Comm. Counselling Office regarding their program and academic regulations, course selection issues, services and resources, and when they are experiencing difficulties that affect their academic progress.

Departmental Advising

On entering the program, all students are assigned to a departmental Faculty Advisor by major. Students should seek the advice of the Faculty Advisor when they have questions or concerns about courses and academic requirements for their program/major. The Faculty Advisor is also knowledgeable about career opportunities which relate to a student’s specific major. The list of Faculty Advisors is available on the Undergraduate Academic Information Centre website: [http://www.uoguelph.ca/uac/students_advisors.shtml](http://www.uoguelph.ca/uac/students_advisors.shtml) or contact the B.Comm. Counselling Office for further information.

Special Expenses

Expenses may include cost of field trips and supplies and, for some majors, laboratory coats and other protective clothing.

Study at Other Universities

Students contemplating study at another university for credit towards a Bachelor of Commerce degree at the University of Guelph should refer to the general regulations governing Letters of Permission in Section VII Degree and Regulations and Procedures in this calendar.

Students must obtain approval for the Letter of Permission prior to undertaking studies at another institution. Approval of the request depends on good standing in the program with a minimum cumulative average of 60%.

The total limit of credits taken on a Letter of Permission is 2.50 based on the University of Guelph’s credit system.

Study Abroad

Global understanding and perspectives are regarded as being of central importance among the university’s learning objectives, as they are, also, in understanding the international business environment. On both of these accounts, students enrolled in the B.Comm. program are urged to participate in one of the several exchange and study abroad programs specifically designed for the Commerce program. Planning for such participation is best undertaken quite early in the course of studies. For more specific information on possible opportunities refer to Section V -- International Study of the calendar or contact the B.Comm. program counsellor.

Continuation of Studies

Students are advised to consult the regulations for Continuation of Study within the program which are outlined in detail in Section VIII -- Undergraduate Degree Regulations and Procedures.

Conditions of Graduation

To qualify for a Bachelor of Commerce degree, the student must satisfy the following conditions:

- The student must successfully complete 1.50 credits from the Liberal Education Requirement list.
- The student must successfully complete a minimum of 20.00 approved credits, in accordance with the Schedule of Studies for the specified major, including the Liberal Education Requirement.
- The student must successfully pass Business Career Preparation [MGMT*1100] or Introduction to Co-operative Education [COOP*1100]
- Students will not be eligible to graduate while on probationary or required-to-withdraw status.

Career Development Program

The Career Development Program provides students with knowledge and tools to enhance their career readiness skills, leading to a greater level of confidence and success when approaching the career search process. Through a series of activities that would span over each year of the Bachelor of Commerce Program, including a mandatory Business Career Preparation Course [MGMT*1100]*, students will be guided through a framework for career management and steps to create a personal “career toolkit”.

*Students who have successfully completed [COOP*1100] will be exempted from [MGMT*1100]

Liberal Education Requirement

The Liberal Education Requirement is designed to provide the student with exposure to and some understanding of a range of disciplines in the Arts, Humanities, Social Sciences, and Mathematical and Natural Sciences.

The Liberal Education Requirement consists of 1.50 credits. The course prefixes listed below cannot be used to satisfy the Liberal Education Requirement:

- ACCT Accounting
- BUS Business
- ECON Economics
- FARE Food, Agricultural and Resource Economics
- HROB Human Resources and Organizational Behaviour
- HTM Hospitality and Tourism Management
- MGMT Management
- MCS Marketing and Consumer Studies
REAL Real Estate and Housing

Free Electives

Free Electives allow students to select courses that support or complement their primary field of study. Students may select undergraduate courses from any department, including Commerce/Business related courses, provided any individual course restrictions and prerequisites are satisfied. These courses can be at any level year.

The total number of Free Electives allowed varies by major (refer to the Schedule of Studies for details). Free Electives cannot be used to fulfill Required Core courses, Restricted Electives or Liberal Education Electives, but they could contribute to the total number of credits required for graduation.

Honours Minor

A minor is a group of courses which provide exposure to and mastery of the fundamental principles of a subject. A minor consists of a minimum of 5.00 credits (normally 10 courses). It may also require certain other courses from other areas to be taken along with the specified courses of the minor. A minor is taken in conjunction with a major. Students cannot earn a minor in the same subject area as their major. Additionally, students in the BComm program are not permitted to earn a minor in Business or Business Economics. For a list of Minors, please see Specializations and Their Degrees.

Given the professional and applied nature of the B.Comm program, there are no double majors associated with the degree.

Double Counting of Credits

A maximum of 2.50 credits required in a major program may be applied to meet the requirements of a minor. Courses used to meet the Liberal Education requirement may not double-count toward the requirements of their major but may double-count towards the completion of a minor.

Schedule of Studies

Courses specified in the schedule of studies are required courses and must be completed successfully. A full course load normally involves 2.50 credits per semester. Part-time study is also possible although students should discuss this option with their Program Counsellor or Faculty Advisor.

Undeclared (UND)

Gordon S. Lang School of Business and Economics

Applicants to the B.Comm program who want a flexible introduction to business studies should consider entering as an unspecialized student. Students must declare one of the eight majors in order to gain access to required courses. This must be done no later than the end of semester two.

Liberal Education Requirement

As part of the graduation requirement all students within the B.Comm Program are required to complete 1.50 credits from at least two different subject prefixes as listed under the B.Comm. Program Information section of the undergraduate calendar.

Major

Semester 1

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<td>MGMT*1000</td>
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One of:

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<th>Credits</th>
<th>Description</th>
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<tbody>
<tr>
<td>HTM*1070</td>
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<td>Responsible Tourism Policy and Planning</td>
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<td>HTM*1700</td>
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<td>POLS*1400</td>
<td>0.50</td>
<td>Issues in Canadian Politics</td>
</tr>
<tr>
<td>PSYC*1000</td>
<td>0.50</td>
<td>Introduction to Psychology</td>
</tr>
<tr>
<td>REAL*1820</td>
<td>0.50</td>
<td>Real Estate and Housing</td>
</tr>
</tbody>
</table>

0.50 elective

* These courses are offered in the Fall semester only

Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*1220</td>
<td>0.50</td>
<td>Introductory Financial Accounting</td>
</tr>
<tr>
<td>ECON*1100</td>
<td>0.50</td>
<td>Introductory Macroeconomics</td>
</tr>
<tr>
<td>HROB*2090</td>
<td>0.50</td>
<td>Individuals and Groups in Organizations</td>
</tr>
<tr>
<td>MCS*1000</td>
<td>0.50</td>
<td>Introductory Marketing</td>
</tr>
</tbody>
</table>

0.50 electives

Notes:

1. Students interested in choosing the ACCT major should take ACCT*1220 during the Fall semester instead of the 0.50 elective. ACCT*1240 Applied Financial Accounting will then be taken in the Winter semester.
2. Students interested in choosing the FAB major should take FARE*1400 Economics of the Agri-Food System instead of HROB*2090 and the 0.50 electives during the Winter Semester.
3. Students interested in choosing the MGMT major should take MGMT*1200 Principles of Management instead of ACCT*1220 in the Winter semester.
4. Students who select MATH*1200 do not also need to complete MATH*1030.

Students leaning towards a certain major may use their electives to take courses in that area. Undeclared students are encouraged to meet with a B.Comm, program counsellor for advice on elective selection. Further information on selecting electives for the Undeclared first year can be found on the B.Comm. Program Counselling Office website: https://www.uoguelph.ca/business/bcomm

Accting (ACCT)

Department of Management, Gordon S. Lang School of Business and Economics

By combining the conceptual and quantitative elements of accounting while promoting the integration of theory and practice, the accounting major provides graduates with the academic requirements for the postgraduate pursuit of a Professional Accounting designation. Students will develop the technical, analytical, evaluative and communication skills needed for a successful career in accounting and related management areas.

The program provides a strong foundation of accounting and general business knowledge while allowing significant opportunity to develop breadth and depth of knowledge in related areas of study.

Students pursuing a professional accounting designation should visit the Department of Management website for links to the requirements.

Elective options enable students to select courses which support or complement their primary field of study.

Degree Requirements (20.00 Total Credits)

13.00 - Required Core Courses
1.00 - Restricted Electives (see semester 7 & 8)
0.00 – MGMT*1100 (Business Career Preparation)
1.50 - Liberal Education Electives
4.50 - Free Electives

The recommended program sequence is outlined below.

Major

Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*1220</td>
<td>0.50</td>
<td>Introductory Financial Accounting</td>
</tr>
<tr>
<td>ECON*1050</td>
<td>0.50</td>
<td>Introductory Microeconomics</td>
</tr>
<tr>
<td>MATH*1030</td>
<td>0.50</td>
<td>Business Mathematics</td>
</tr>
<tr>
<td>MGMT*1000</td>
<td>1.00</td>
<td>Introduction to Business</td>
</tr>
</tbody>
</table>

Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*1220</td>
<td>0.50</td>
<td>Introductory Financial Accounting</td>
</tr>
<tr>
<td>ECON*1100</td>
<td>0.50</td>
<td>Introductory Macroeconomics</td>
</tr>
<tr>
<td>HROB*2090</td>
<td>0.50</td>
<td>Individuals and Groups in Organizations</td>
</tr>
<tr>
<td>MCS*1000</td>
<td>0.50</td>
<td>Introductory Marketing</td>
</tr>
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</table>

0.50 electives

Semester 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*2230</td>
<td>0.50</td>
<td>Management Accounting</td>
</tr>
<tr>
<td>MCS*2020</td>
<td>0.50</td>
<td>Information Management</td>
</tr>
<tr>
<td>MGMT*1100</td>
<td>0.00</td>
<td>Business Career Preparation</td>
</tr>
<tr>
<td>STAT*2060</td>
<td>0.50</td>
<td>Statistics for Business Decisions</td>
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</tbody>
</table>

1.00 electives

Semester 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*3330</td>
<td>0.50</td>
<td>Intermediate Financial Accounting I</td>
</tr>
<tr>
<td>ECON*2560</td>
<td>0.50</td>
<td>Introduction to Finance</td>
</tr>
<tr>
<td>MCS*3040</td>
<td>0.50</td>
<td>Business and Consumer Law</td>
</tr>
<tr>
<td>MGMT*3320</td>
<td>0.50</td>
<td>Financial Management</td>
</tr>
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</table>

0.50 electives

Semester 5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*3280</td>
<td>0.50</td>
<td>Auditing I</td>
</tr>
<tr>
<td>ACCT*3340</td>
<td>0.50</td>
<td>Intermediate Financial Accounting II</td>
</tr>
<tr>
<td>ACCT*3350</td>
<td>0.50</td>
<td>Taxation</td>
</tr>
<tr>
<td>HROB*2290</td>
<td>0.50</td>
<td>Human Resources Management</td>
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0.50 electives

Semester 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*3230</td>
<td>0.50</td>
<td>Intermediate Management Accounting</td>
</tr>
<tr>
<td>FARE*3310</td>
<td>0.50</td>
<td>Operations Management</td>
</tr>
<tr>
<td>MGMT*3020</td>
<td>0.50</td>
<td>Corporate Social Responsibility</td>
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1.00 electives

Semester 7 - Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACCT*4220</td>
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<td>Advanced Financial Accounting</td>
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Semester 8 - Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ACCT*4230</td>
<td>0.50</td>
<td>Advanced Management Accounting</td>
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</table>

Semester 7 or 8 - Fall or Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT*4000</td>
<td>0.50</td>
<td>Strategic Management</td>
</tr>
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</table>

Two of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACCT*4270</td>
<td>0.50</td>
<td>Auditing II</td>
</tr>
<tr>
<td>ACCT*4290</td>
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<td>IT Auditing and Data Analytics</td>
</tr>
<tr>
<td>ACCT*4340</td>
<td>0.50</td>
<td>Accounting Theory</td>
</tr>
</tbody>
</table>
Department of Management, Gordon S. Lang School of Business and Economics

Accounting (Co-op) (ACCT:C)

By combining the conceptual and quantitative elements of accounting while promoting the integration of theory and practice, the accounting major provides graduates with the academic requirements for the postgraduate pursuit of a Professional Accounting designation. Students will develop the technical, analytical, evaluative and communication skills needed for a successful career in accounting and related management areas. The program provides a strong foundation of accounting and general business knowledge while allowing significant opportunity to develop breadth and depth of knowledge in related areas of study.

Students pursuing a professional accounting designation should visit the Department of Management website for links to the requirements. Elective options enable students to select courses which support or complement their primary field of study.

The Co-op program in Accounting is designed to facilitate the transition of students from academic studies to a professional career by enhancing the integration of theory and practice.

Program Requirements

The Co-op program in Accounting is a five year program including four work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Accounting Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall Semester</th>
<th>Winter Semester</th>
<th>Summer Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Academic</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>COOP*1000 (Business Career Preparation)</td>
<td>COOP*1000</td>
<td></td>
</tr>
<tr>
<td>2 Academic</td>
<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COOP*1000 Work Term I</td>
<td>COOP*1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Or Academic Semester 4</td>
<td>Or Academic Semester 4</td>
<td></td>
</tr>
<tr>
<td>3 Academic</td>
<td>Academic Semester 5</td>
<td>Academic Semester 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COOP*2000 Work Term II</td>
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<td></td>
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<tr>
<td>4</td>
<td>Academic Semester 7</td>
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<tr>
<td></td>
<td>COOP*3000 Work Term III</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Or Academic Semester 8</td>
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<td></td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education website.

Credit Summary (21.50 Total Credits)

13.00 - Required Core Courses
1.00 - Restricted Electives (see semester 7 & 8)
1.50 - Liberal Education Electives
4.50 - Free Electives
1.50 – Co-op work terms

Note: A minimum of three Co-op work terms including a Fall, and Winter are necessary to complete the Co-op requirement. A fourth Co-op work term is optional and if completed, the total number of credits will equal 22.00.

The recommended program sequence is outlined below.

Major

Semester 1 -- Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*1220</td>
<td>0.50</td>
</tr>
<tr>
<td>ECON*1050</td>
<td>0.50</td>
</tr>
<tr>
<td>MATH*1030</td>
<td>0.50</td>
</tr>
<tr>
<td>MGMT*1000</td>
<td>1.00</td>
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</table>

Semester 2 -- Winter

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACCT*1240</td>
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<tr>
<td>COOP*1100</td>
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<tr>
<td>ECON*1000</td>
<td>0.50</td>
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<tr>
<td>HROB*2090</td>
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Semester 3 -- Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*2230</td>
<td>0.50</td>
</tr>
<tr>
<td>ACCT*3330</td>
<td>0.50</td>
</tr>
<tr>
<td>MCS*1000</td>
<td>0.50</td>
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<tr>
<td>STAT*2060</td>
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</table>

Semester 4 -- Summer

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*3280</td>
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<tr>
<td>ACCT*3340</td>
<td>0.50</td>
</tr>
<tr>
<td>ACCT*3350</td>
<td>0.50</td>
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<tr>
<td>MCS*2020</td>
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Semester 5 -- Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON*2560</td>
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</tr>
<tr>
<td>FARE*3310</td>
<td>0.50</td>
</tr>
<tr>
<td>HROB*2290</td>
<td>0.50</td>
</tr>
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</table>

Semester 6 -- Summer

<table>
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<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*3230</td>
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</tr>
<tr>
<td>MCS*3040</td>
<td>0.50</td>
</tr>
<tr>
<td>MGMT*3020</td>
<td>0.50</td>
</tr>
<tr>
<td>MGMT*3320</td>
<td>0.50</td>
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</tbody>
</table>

Semester 7 or 8 - Fall or Winter

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT*4000</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Note: ACCT*4270 and ACCT*4350 are offered in the Fall only, ACCT*4290, ACCT*4340 and ACCT*4440 are offered in the Winter only. Students may take MGMT*4000 in either Fall or Winter.

Food and Agricultural Business (FAB)

Department of Food, Agricultural and Resource Economics, Ontario Agricultural College

In this major, students will acquire the management education needed to succeed in the dynamic and innovative food and agribusiness industries. Building on an understanding of economic theory and applied methods in both the Canadian and the global context, the program prepares graduates with technical, entrepreneurial and leadership skills for a variety of professional opportunities in industry, government agencies and non-governmental organizations. The major provides a complete foundation for further studies leading to a graduate degree or professional accounting designation.

The major is administered by the Department of Food, Agricultural and Resource Economics in the Ontario Agricultural College and students are urged to consult the faculty advisor.

Degree Requirements (20.00 Total Credits)

15.00 - Required Core Courses
1.00 - Restricted Electives (from lists)
0.00 – MGM*1100 (Business Career Preparation)
1.50 - Liberal Education Electives
2.00 - Free Electives
Major

Semester 1
- ECON*1050 [0.50] Introductory Microeconomics
- MATH*1030 [0.50] Business Mathematics
- MCS*1000 [0.50] Introductory Marketing
- MGMT*1000 [1.00] Introduction to Business

Semester 2
- ACCT*1220 [0.50] Introductory Financial Accounting
- ECON*1100 [0.50] Introductory Macroeconomics
- FARE*1400 [1.00] Economics of the Agri-Food System

Semester 3
- ECON*2310 [0.50] Intermediate Microeconomics
- ECON*2740 [0.50] Economic Statistics
- HROB*2090 [0.50] Individuals and Groups in Organizations
- MCS*2020 [0.50] Information Management
- MGMT*1100 [0.00] Business Career Preparation

Semester 4
- ACCT*2230 [0.50] Management Accounting
- ECON*2410 [0.50] Intermediate Macroeconomics
- ECON*2770 [0.50] Introductory Mathematical Economics
- FARE*2410 [0.50] Agrifood Markets and Policy

Semester 5
- ECON*2560 [0.50] Introduction to Finance
- ECON*2740 [0.50] Introduction to Econometrics
- FARE*3310 [0.50] Operations Management
- MGMT*3020 [0.50] Corporate Social Responsibility
- MGMT*3320 [0.50] Financial Management

Semester 6
- FARE*4240 [0.50] Futures and Options Markets
- 0.5 electives or restricted electives

Semester 7
- FARE*3030 [0.50] The Firm and Markets
- FARE*4370 [0.50] Food & Agri Marketing Management
- MGMT*4000 [0.50] Strategic Management

One of:
- HROB*3050 [0.50] Employment Law
- MCS*3040 [0.50] Business and Consumer Law
- REAL*4840 [0.50] Housing and Real Estate Law

Semester 8
- AGR*4600 [1.00] Agriculture and Food Issues Problem Solving
- FARE*4251 [0.50] Advanced Agribusiness Management

0.50 electives or restricted electives

Restricted Electives

A minimum of 1.00 credits from the following list:
- FARE*1300 [0.50] Poverty, Food & Hunger
- FARE*2700 [0.50] Survey of Natural Resource Economics
- FARE*3170 [0.50] Cost-Benefit Analysis
- FARE*3250 [0.50] Food and International Development
- FARE*4210 [0.50] World Agriculture, Food Security and Economic Development
- FARE*4290 [0.50] Land Economics
- FARE*4310 [0.50] Resource Economics
- FARE*4360 [0.50] Marketing Research
- FARE*4500 [0.50] Decision Science
- FARE*4550 [0.50] Independent Studies I
- FARE*4560 [0.50] Independent Studies II

Department of Food, Agricultural and Resource Economics, Ontario Agricultural College

In this major, students will acquire the management education needed to succeed in the dynamic and innovative food and agribusiness industries. Building on an understanding of economic theory and applied methods in both the Canadian and the global context, the program prepares graduates with technical, entrepreneurial and leadership skills for a variety of professional opportunities in industry, government agencies and non-governmental organizations. The major provides a complete foundation for further studies leading to a graduate degree or professional accounting designation.

A principal aim of the Co-op program in Food and Agricultural Business is to facilitate the transition of students from academic studies to a professional career by enhancing the integration of theory and practice.

The major is administered by the Department of Food, Agricultural and Resource Economics in the Ontario Agricultural College and students are urged to consult the faculty advisor.

Program Requirements

The Co-op program in Food and Agricultural Business is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Food and Agricultural Business Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1100</td>
<td>COOP*1000 Work Term I</td>
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<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>COOP*3000 Work Term III</td>
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<td>Academic Semester 6</td>
<td>COOP*4000 Work Term IV</td>
<td>COOP*5000 Work Term V</td>
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<tr>
<td>5</td>
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<td>Academic Semester 8</td>
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</tr>
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</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (22.00 Total Credits)*

- 15.50 - Required Core Courses
- 1.00 - Restricted Electives (from lists)
- 1.50 - Liberal Education Electives
- 2.00 - Free Electives
- 2.00 Co-op Work Terms

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed the total number of credits will equal 22.50.

The recommended program sequence is outlined below.

Major

Semester 1 - Fall
- ECON*1050 [0.50] Introductory Microeconomics
- MATH*1030 [0.50] Business Mathematics
- MCS*1000 [0.50] Introductory Marketing
- MGMT*1000 [1.00] Introduction to Business

Semester 2 - Winter
- ACCT*1220 [0.50] Introductory Financial Accounting
- ECON*1100 [0.50] Introductory Macroeconomics
- FARE*1400 [1.00] Economics of the Agri-Food System

0.50 electives or restricted electives

Semester 3 - Fall
- COOP*1100 [0.00] Introduction to Co-operative Education
- ECON*2310 [0.50] Intermediate Macroeconomics
- ECON*2740 [0.50] Economic Statistics
- HROB*2090 [0.50] Individuals and Groups in Organizations
- MCS*2020 [0.50] Information Management

0.50 electives or restricted electives

Semester 4 - Winter
- ACCT*2230 [0.50] Management Accounting
- ECON*2410 [0.50] Intermediate Macroeconomics
- ECON*2770 [0.50] Introductory Mathematical Economics
- FARE*2410 [0.50] Agrifood Markets and Policy

0.50 electives or restricted electives

Summer Semester
- COOP*1000 [0.50] Co-op Work Term I

Fall Semester
- COOP*2000 [0.50] Co-op Work Term II
  (Eight month work term Summer/Fall)
Introduction to Finance

Students may use a combination of courses from their major, liberal education and sustainability; 1200 hours of verified work experience in the hospitality and tourism industry is required for students to be eligible for graduation. 700 hours of hospitality and tourism work experience must be completed before a student enters Semester 7.

Elective options enable students to select courses that support or complement their area of emphasis. Examples:

1. Students may use a combination of courses from their major, liberal education and free electives to earn the Certificate in Leadership. For information about this certificate and its course requirements, see http://www.leadershipcertificate.com/

2. Students interested in languages and/or participating in study abroad programs may use a combination of their liberal education or free electives to study one or more of the various languages taught at the University or to take courses while abroad.

3. Students interested in independent study courses (e.g. HTM*4130, HTM*4140, HTM*4150, HTM*4500) may use a combination of their restricted or free electives to study one or more of these special topic courses. For more information regarding current offerings, students should consult the Faculty Advisor.

Degree Requirements (20.00 Total Credits)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Required Core Courses</th>
<th>Area of Emphasis (Restricted Electives)</th>
<th>Liberal Education Electives</th>
<th>Free Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.50</td>
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<td>[0.50]</td>
<td>1.50</td>
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</tbody>
</table>

Major

Semester 1
ECON*1050 [0.50] Introductory Microeconomics
HTM*1700 [0.50] Foodservice Management
MCN*1000 [0.50] Introductory Marketing
MGMT*1000 [1.00] Introduction to Business

Semester 2
ACCT*1220 [0.50] Introductory Financial Accounting
ACCT*1100 [0.50] Introductory Macroeconomics
HTM*1160 [0.50] Lodging Operations
MATH*1030 [0.50] Business Mathematics

One of:
ECON*2740 [0.50] Economic Statistics

Semester 3
HTM*1070 [0.50] Responsible Tourism Policy and Planning
MCN*3040 [0.50] Business and Consumer Law

One of:
ECON*2740 [0.50] Economic Statistics

Semester 4
MCN*2020 [0.50] Information Management
MGMT*1100 [0.00] Business Career Preparation

Semester 5 or 4
MCN*2230 [0.50] Management Accounting
HROB*2090 [0.50] Individuals and Groups in Organizations
HTM*2010 [0.50] Hospitality and Tourism Business Communications
HTM*2030 [0.50] Control Systems in the Hospitality Industry

One of:
ECON*2560 [0.50] Introduction to Finance
HROB*2290 [0.50] Human Resources Management
HTM*3880 [0.50] Marketing Strategy for Hospitality Managers
HTM*3120 [0.50] Service Operations Analysis
MGMT*3020 [0.50] Corporate Social Responsibility
MGMT*3320 [0.50] Financial Management

Semester 7 or 8
HTM*4080 [0.50] Experiential Learning and Leadership in the Hospitality and Tourism Industry
HTM*4190 [0.50] Hospitality and Tourism Industry Consultation
HTM*4250 [0.50] Hospitality Revenue Management
MGMT*4000 [0.50] Strategic Management

The hotel and lodging area includes:
- property management;
- event management;
- design

The restaurant and foodservice area includes:
- food systems;
- restaurant management;
- beverage management

The tourism area includes:
- planning and development;
- sustainability;
- international tourism

An integral part of the HTM major is experiential learning, which means that theory is balanced with practice. Students are encouraged to participate in guided learning opportunities outside the conventional classroom, such as independent study courses, study abroad, and numerous networking events with industry leaders.

Additional information:

- 1200 hours of verified work experience in the hospitality and tourism industry is required for students to be eligible for graduation.
- 700 hours of hospitality and tourism work experience must be completed before a student enters Semester 7.

Degree Requirements (20.00 Total Credits)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Required Core Courses</th>
<th>Area of Emphasis (Restricted Electives)</th>
<th>Liberal Education Electives</th>
<th>Free Electives</th>
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Major

Semester 1
ECON*1050 [0.50] Introductory Microeconomics
HTM*1700 [0.50] Foodservice Management
MCN*1000 [0.50] Introductory Marketing
MGMT*1000 [1.00] Introduction to Business

Semester 2
ACCT*1220 [0.50] Introductory Financial Accounting
ACCT*1100 [0.50] Introductory Macroeconomics
HTM*1160 [0.50] Lodging Operations
MATH*1030 [0.50] Business Mathematics

One of:
ECON*2740 [0.50] Economic Statistics

Semester 3
HTM*1070 [0.50] Responsible Tourism Policy and Planning
MCN*3040 [0.50] Business and Consumer Law

One of:
ECON*2740 [0.50] Economic Statistics

Semester 4
MCN*2020 [0.50] Information Management
MGMT*1100 [0.00] Business Career Preparation

Semester 5 or 4
MCN*2230 [0.50] Management Accounting
HROB*2090 [0.50] Individuals and Groups in Organizations
HTM*2010 [0.50] Hospitality and Tourism Business Communications
HTM*2030 [0.50] Control Systems in the Hospitality Industry

One of:
ECON*2560 [0.50] Introduction to Finance
HROB*2290 [0.50] Human Resources Management
HTM*3880 [0.50] Marketing Strategy for Hospitality Managers
HTM*3120 [0.50] Service Operations Analysis
MGMT*3020 [0.50] Corporate Social Responsibility
MGMT*3320 [0.50] Financial Management

Semester 7 or 8
HTM*4080 [0.50] Experiential Learning and Leadership in the Hospitality and Tourism Industry
HTM*4190 [0.50] Hospitality and Tourism Industry Consultation
HTM*4250 [0.50] Hospitality Revenue Management
MGMT*4000 [0.50] Strategic Management

The hotel and lodging area includes:
- property management;
- event management;
- design

The restaurant and foodservice area includes:
- food systems;
- restaurant management;
- beverage management

The tourism area includes:
- planning and development;
- sustainability;
- international tourism

An integral part of the HTM major is experiential learning, which means that theory is balanced with practice. Students are encouraged to participate in guided learning opportunities outside the conventional classroom, such as independent study courses, study abroad, and numerous networking events with industry leaders.

Additional information:

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- 700 hours of hospitality and tourism work experience must be completed before a student enters Semester 7.

Degree Requirements (20.00 Total Credits)

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<thead>
<tr>
<th>Semester</th>
<th>Required Core Courses</th>
<th>Area of Emphasis (Restricted Electives)</th>
<th>Liberal Education Electives</th>
<th>Free Electives</th>
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</table>
Areas of Emphasis

Students in the Hospitality and Tourism Management (HTM) major choose one of the three areas of emphasis: Hotel and Lodging; Restaurant and Foodservice; or Tourism. Students should declare an area of emphasis by semester 4 in order to facilitate course selection for their chosen area. See the HTM Academic Advisor to declare your area of emphasis.

Hotel and Lodging
Semester 4, 6 or 8
HTM*2070 [0.50] Event Management
Semester 5 or 7
HTM*3060 [0.50] Lodging Management
Semester 7
HTM*4090 [0.50] Hospitality Development, Design and Sustainability
Semester 8
HTM*4060 [0.50] Advanced Lodging Management

1.50 credits of:
EDRD*3160 [0.50] International Communication
FARE*3460 [0.50] Marketing Research
HROB*2200 [0.50] Labour Relations
HTM*3160 [0.50] Destination Management and Marketing
HTM*3180 [0.50] Casino Operations Management
MGMT*4260 [0.50] International Business
REAL*1820 [0.50] Real Estate and Housing
REAL*2820 [0.50] Real Estate Finance
REAL*3810 [0.50] Real Estate Market Analysis
REAL*3890 [0.50] Property Management
REAL*4820 [0.50] Real Estate Appraisal
REAL*4840 [0.50] Housing and Real Estate Law

Restaurant and Foodservice
Semester 4, 5 or 6
HTM*2700 [0.50] Understanding Foods
Semester 5 or 6
HTM*3090 [1.00] Restaurant Operations Management
Semester 8
HTM*4110 [0.50] Advanced Food Service Operations

1.50 credits of:
FOOD*3700 [0.50] Sensory Evaluation of Foods
HROB*3010 [0.50] Compensation Systems
HROB*3070 [0.50] Recruitment and Selection
HROB*3090 [0.50] Training and Development
HROB*4060 [0.50] Human Resource Planning
HTM*2070 [0.50] Event Management
HTM*2740 [0.50] Cultural Aspects of Food
HTM*3030 [0.50] Beverage Management
HTM*3780 [0.50] Managing Food in Canada
HTM*4050 [0.50] Wine and Oenology
MSC*3010 [0.50] Quality Management
NUTR*1010 [0.50] Introduction to Nutrition

Tourism
Semester 6
GEOG*3490 [0.50] Tourism and Environment
HTM*3160 [0.50] Destination Management and Marketing
Semester 8
FARE*3460 [0.50] Marketing Research
HTM*4170 [0.50] International Tourism

1.50 credits of:
ECON*2100 [0.50] Economic Growth and Environmental Quality
ECON*2650 [0.50] Introductory Development Economics
ECON*4830 [0.50] Economic Development
EDRD*3400 [0.50] Sustainable Communities
EDRD*3500 [0.50] Recreation and Tourism Planning
EDRD*4010 [0.50] Tourism Planning in the Less Developed World
GEOG*1220 [0.50] Human Impact on the Environment
GEOG*2210 [0.50] Environment and Resources
HTM*2070 [0.50] Event Management
HTM*3180 [0.50] Casino Operations Management
LARC*2820 [0.50] Urban and Regional Planning
MSC*3030 [0.50] Research Methods

Hospitality and Tourism Management Co-op (HTM:C)

The Hospitality and Tourism Management (HTM) major prepares students to assume positions of responsibility within the world’s largest industry.

In the first two years of study, students are introduced to foundational business skills and knowledge; and provided with an in-depth overview of the industry’s three sectors: hotel and lodging; restaurant and foodservice; and tourism.

By the end of the second year, students must choose one of those sectors as their area of emphasis. For the remainder of the program, the courses and learning opportunities that students encounter have one goal: to help them cultivate the knowledge, skills and understanding required of a managerial leader in their chosen area.

Topics of study for all three areas of emphasis includes:
- human resources management;
- marketing;
- accounting;
- communications

The hotel and lodging area includes:
- operations;
- event management;
- design

The restaurant and foodservice area includes:
- food systems;
- restaurant management;
- beverage management

The tourism area includes:
- planning and development;
- sustainability;
- international tourism

The principal aim of the Hospitality and Tourism Management Co-op program is to facilitate the transition of students from academic studies to a professional work life by enhancing the integration of theory and practice. The focus on experiential learning means that theory is balanced with practice. Students are encouraged to participate in guided learning opportunities outside the conventional classroom, such as independent study courses, study abroad and numerous networking events with industry leaders. Team work is a significant part of the core courses.

Elective options enable students to select courses that support or complement their primary field of study. Examples:
1) Students may use a combination of courses from their major, liberal education and free electives to earn the Certificate in Leadership. For information about this certificate and its course requirements, see http://www.leadershipcertificate.com/.
2) Students interested in languages and/or participating in study abroad programs may use a combination of their liberal education or free electives to study one or more of the various languages taught at the University or to take courses while abroad.
3) Students interested in independent study courses (e.g. HTM*4500, HTM*4130, HTM*4140, HTM*4150) may use a combination of their restricted or free electives to study one or more of these special topic courses. For more information regarding current offerings, students should consult the Faculty Advisor.

Program Requirements

The Co-op program in Hospitality and Tourism Management is a five year program, including three work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

<table>
<thead>
<tr>
<th>Year</th>
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<td>2</td>
<td>Academic Semester 3 COOP*1100</td>
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<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
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</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (21.50 Total Credits)
13.50 - Required Core Courses
3.50 - Area of Emphasis (Restricted Electives)
1.50 - Liberal Education Electives
students to choose one area of emphasis: Hotel and Lodging; Restaurant and Foodservice; or Tourism. Students should declare an area of emphasis by semester 4 in order to facilitate course selection for their chosen area. See the HTM Academic Advisor to declare your area of emphasis.

### Hotel and Lodging

**Semester 4, 6 or 8 - Winter**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>HTM*2070</td>
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<tr>
<td>HTM*3090</td>
<td>Lodging Management</td>
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</table>

### Areas of Emphasis

Students in the Hospitality and Tourism Management (HTM) major choose one of the three areas of emphasis: Hotel and Lodging; Restaurant and Foodservice; or Tourism. Students should declare an area of emphasis by semester 4 in order to facilitate course selection for their chosen area. See the HTM Academic Advisor to declare your area of emphasis.

### Hotel and Lodging

**Semester 4, 6 or 8 - Winter**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit</th>
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<tbody>
<tr>
<td>HTM*2070</td>
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### Medicinal and Technical Services

**Semester 1 - Fall**

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**Semester 2 - Winter**

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**Semester 3 - Fall**

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**Semester 4 - Winter**

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**Semester 5 or 6 - Fall or Winter**

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<td>HTM*2030</td>
<td>Control Systems in the Hospitality Industry</td>
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**Semester 6 - Winter**

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<tr>
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<tbody>
<tr>
<td>HTM*3160</td>
<td>Destination Management and Marketing</td>
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<td>HTM*3180</td>
<td>Casino Operations Management</td>
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<td>MGMT*4260</td>
<td>International Business</td>
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<td>REAL*1820</td>
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**Tourism**

**Semester 6 - Winter**

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**Semester 8 - Winter**

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<td>HTM*4170</td>
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**Management (MGMT)**

**Department of Marketing, Gordon S. Lang School of Business and Economics**

The major in Management provides a balanced foundation of management knowledge and strategic leadership skills that will enable graduates to one day work as professional managers and organizational leaders. The major focuses on broad, transferrable competencies within the academic discipline of management (i.e., planning and goal setting, strategy development and execution, managerial decision making, designing organizational structure, managing change and innovation, motivating individuals and teams, managerial communication, negotiation and conflict management), while simultaneously providing the flexibility to explore a wide range of courses in other business disciplines. This major is well suited to students with a strong interest in the core skills of management who wish to develop a broad understanding and expertise in business management.

Courses extend beyond the traditional lecture based format to include community based group projects, guest lecturers, in-class simulations and case-based learning to help link academic expertise and theory with industry practice. Experiential learning is an integral part of the major, and occurs through the integration of industry examples in the classroom, and a required management capstone course that takes a consulting perspective to address real-world and simulated organizational challenges.

Graduates of the Management major will leave the University of Guelph equipped with a range of knowledge and skills which prepare them to meet management needs of the future in such roles as management consultant, business analyst, talent management specialist or as future general managers.

### Degree Requirements (20.00 Total Credits)

<table>
<thead>
<tr>
<th>Code</th>
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The recommended program sequence is outlined below.

Major

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0.50 electives

Semester 2

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0.50 electives

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Semester 4

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1.00 electives

Semester 5

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0.50 electives

Semester 6

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0.50 electives

Semester 7

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1.50 electives

Semester 8

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1.50 electives

Management (Co-op) (MGMT:C)

Department of Management, Gordon S. Lang School of Business and Economics

A principal aim of the Co-op program in Management is to facilitate the transition of students from academic studies to a professional career by enhancing the integration of theory and practice.

Program Requirements

The Co-op program in Management is a five-year program, including four work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Management Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall Semester</th>
<th>Winter Semester</th>
<th>Summer Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td>COOP*1000 Work Term I</td>
</tr>
<tr>
<td>3</td>
<td>Academic Semester 5</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 6</td>
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<td>4</td>
<td>COOP*3000 Work Term III</td>
<td>COOP*4000 Work Term IV</td>
<td>Off</td>
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<tr>
<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (21.50 Total Credits)*

13.50 - Required Core Courses
5.00 - Liberal Education Electives
1.50 - Co-op Work Terms

Note: A minimum of three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fourth Co-op work term is optional and if completed, the total number of credits will equal 22.00

The recommended program sequence is outlined below.

Major

Semester 1 - Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ECON*1050</td>
<td>0.50</td>
</tr>
<tr>
<td>MCSR5000</td>
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<tr>
<td>MGMT*1000</td>
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0.50 electives

Semester 2 - Winter

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<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ECON*1100</td>
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</tr>
<tr>
<td>HRBB*2090</td>
<td>0.50</td>
</tr>
<tr>
<td>MATH*1030</td>
<td>0.50</td>
</tr>
<tr>
<td>MGMT*1200</td>
<td>0.50</td>
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</table>

0.50 electives

Semester 3 - Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ACCT*1220</td>
<td>0.50</td>
</tr>
<tr>
<td>COOP*1100</td>
<td>0.00</td>
</tr>
<tr>
<td>HRBB*2010</td>
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<tr>
<td>HRBB*2290</td>
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<tr>
<td>STAT*2060</td>
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0.50 electives

Semester 4 - Winter

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ACCT*2230</td>
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</tr>
<tr>
<td>ECON*2560</td>
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<td>MCSR2020</td>
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1.00 electives

Summer Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
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Co-op Work Term I

Semester 5 - Fall

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>FARE*3310</td>
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<tr>
<td>HRBB*3100</td>
<td>0.50</td>
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<tr>
<td>MGMT*3200</td>
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0.50 electives

Winter Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COOP*2000</td>
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</tbody>
</table>

Co-op Work Term II

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.
### Degree Requirements (20.00 Total Credits)

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1.50 electives</td>
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<tr>
<td>2.00 Free Electives</td>
<td></td>
</tr>
<tr>
<td>1.50 Liberal Education Electives</td>
<td></td>
</tr>
<tr>
<td>1.50 Economics credits at the 3000 or 4000 level</td>
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</tr>
<tr>
<td>2.00 Required Core Courses</td>
<td></td>
</tr>
<tr>
<td>6.00 Restricted Electives (from lists)</td>
<td></td>
</tr>
<tr>
<td>0.00 – MGMT*1100 (Business Career Preparation)</td>
<td></td>
</tr>
</tbody>
</table>

#### Major

<table>
<thead>
<tr>
<th>Semester 1</th>
<th></th>
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<tbody>
<tr>
<td>ECON*1050</td>
<td>[0.50]</td>
<td>Introductory Microeconomics</td>
</tr>
<tr>
<td>MGMT*1000</td>
<td>[1.00]</td>
<td>Introduction to Business</td>
</tr>
<tr>
<td>One of:</td>
<td></td>
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</tr>
<tr>
<td>MATH*1030</td>
<td>[0.50]</td>
<td>Business Mathematics</td>
</tr>
<tr>
<td>MATH*1200</td>
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<td>Calculus I</td>
</tr>
<tr>
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<tr>
<td><strong>Note:</strong> MATH*1200 is recommended for the Finance Area of Emphasis.</td>
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<table>
<thead>
<tr>
<th>Semester 2</th>
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<tbody>
<tr>
<td>ACCT*1220</td>
<td>[0.50]</td>
<td>Introductory Financial Accounting</td>
</tr>
<tr>
<td>ECON*1100</td>
<td>[0.50]</td>
<td>Introductory Macroeconomics</td>
</tr>
<tr>
<td>HROB*2090</td>
<td>[0.50]</td>
<td>Individuals and Groups in Organizations</td>
</tr>
<tr>
<td>MCS*1000</td>
<td>[0.50]</td>
<td>Introductory Marketing</td>
</tr>
<tr>
<td>0.50 electives</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester 3</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT*2230</td>
<td>[0.50]</td>
<td>Management Accounting</td>
</tr>
<tr>
<td>ECON*2310</td>
<td>[0.50]</td>
<td>Intermediate Microeconomics</td>
</tr>
<tr>
<td>ECON*2740</td>
<td>[0.50]</td>
<td>Economic Statistics</td>
</tr>
<tr>
<td>ECON*2770</td>
<td>[0.50]</td>
<td>Introductory Mathematical Economics</td>
</tr>
<tr>
<td>MCS*2020</td>
<td>[0.50]</td>
<td>Information Management</td>
</tr>
<tr>
<td>MGMT*1100</td>
<td>[0.00]</td>
<td>Business Career Preparation</td>
</tr>
<tr>
<td><strong>Note:</strong> Students who wish to take the Statistics courses listed under the Finance Area of Emphasis may select STAT<em>2040 in place of ECON</em>2740.</td>
<td></td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Semester 4</th>
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<tbody>
<tr>
<td>ECON*2410</td>
<td>[0.50]</td>
<td>Intermediate Macroeconomics</td>
</tr>
<tr>
<td>ECON*2560</td>
<td>[0.50]</td>
<td>Introduction to Finance</td>
</tr>
<tr>
<td>MCS*3304</td>
<td>[0.50]</td>
<td>Business and Consumer Law **</td>
</tr>
<tr>
<td>MGMT*3320</td>
<td>[0.50]</td>
<td>Financial Management</td>
</tr>
<tr>
<td>0.50 electives or restricted electives in an area of emphasis</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Students may select REAL<em>4840 in place of MCS</em>3304. This is a Fall semester course and can be completed in any Fall semester, provided the prerequisites are completed.</td>
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</table>

<table>
<thead>
<tr>
<th>Semester 5</th>
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<tbody>
<tr>
<td>ECON*3740</td>
<td>[0.50]</td>
<td>Introduction to Econometrics</td>
</tr>
<tr>
<td>MGMT*3020</td>
<td>[0.50]</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>1.50 electives or restricted electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> ECON*3710 is required for the Finance Area of Emphasis.</td>
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</tr>
</tbody>
</table>

### Areas of Emphasis

Students choose either Finance or Management as an area of emphasis in the MEF major. This choice should be made by semester 5. See the Economics and Finance departmental advisor to declare an area of emphasis.

**FINANCE Area of Emphasis**

- ECON*3710 [0.50] Advanced Microeconomics
- ECON*3810 [0.50] Advanced Macroeconomics
- ECON*4560 [0.50] Advanced Topics in Finance

1.50 credits from the following Finance courses:

- ECON*3360 [0.50] The Strategy of Mergers and Acquisitions
- ECON*3660 [0.50] Investments
- ECON*3760 [0.50] Fundamentals of Derivatives
- ECON*3860 [0.50] International Finance
- ECON*3960 [0.50] Money, Credit and the Financial System

1.50 Economics credits at the 3000 or 4000 level

**Courses in Quantitative Finance**

- ECON*3100 [0.50] Game Theory
- ECON*4640 [0.50] Advanced Econometrics
- ECON*4700 [0.50] Advanced Mathematical Economics
- ECON*4840 [0.50] Financial Econometrics
- MATH*1160 [0.50] Linear Algebra I
- MATH*1210 [0.50] Calculus II
- STAT*3100 [0.50] Introductory Mathematical Statistics I
- STAT*3110 [0.50] Introductory Mathematical Statistics II

**Courses in preparation for post-graduate work in Economics (MA)**

- ECON*4640 [0.50] Advanced Econometrics
- ECON*4710 [0.50] Advanced Topics in Microeconomics
- ECON*4810 [0.50] Advanced Topics in Macroeconomics

**Community Engagement Courses**

- MGMT*4050 [0.50] Business Consulting
- MGMT*4350 [0.50] Business Case Competition Preparation
- MGMT*4350 [0.50] Business Case Competition Preparation

**Courses for Computational Finance**

- CIS*1910 [0.50] Discrete Structures in Computing I
- CIS*2500 [0.50] Intermediate Programming
- CIS*2520 [0.50] Data Structures
- CIS*2750 [0.75] Software Systems Development and Integration
- CIS*3750 [0.75] System Analysis and Design in Applications

**MANAGEMENT Area of Emphasis**

- ECON*4400 [0.50] Managerial Economics

1.50 credits from the following Finance courses:

- ECON*3360 [0.50] The Strategy of Mergers and Acquisitions
- ECON*3660 [0.50] Investments
- ECON*3760 [0.50] Fundamentals of Derivatives
- ECON*3860 [0.50] International Finance
- ECON*3960 [0.50] Money, Credit and the Financial System

2.50 additional credits in economics of which at least 0.50 must be at the 4000 level and at most 0.50*** may be at the 2000 level.

**Note:** May be replaced with a 4000 level 0.50 credits in Accounting.
Courses toward a professional accounting designation Chartered Professional Accountants (CPA)


ACCT*3230 [0.50] Intermediate Management Accounting
ACCT*3280 [0.50] Auditing I
ACCT*3330 [0.50] Intermediate Financial Accounting I
ACCT*3340 [0.50] Intermediate Financial Accounting II
ACCT*3350 [0.50] Taxation
ACCT*4220 [0.50] Advanced Financial Accounting
ACCT*4230 [0.50] Advanced Management Accounting
ACCT*4270 [0.50] Auditing II
ACCT*4290 [0.50] IT Auditing and Data Analytics
ACCT*4340 [0.50] Accounting Theory
ACCT*4350 [0.50] Income Taxation II
ACCT*4440 [0.50] Integrated Cases in Accounting

Courses to prepare for the Certified Human Resource Professional (CHRP) designation:


HROB*2200 [0.50] Labour Relations
HROB*2290 [0.50] Human Resources Management
HROB*3010 [0.50] Compensation Systems
HROB*3030 [0.50] Occupational Health and Safety
HROB*3070 [0.50] Recruitment and Selection
HROB*3090 [0.50] Training and Development
HROB*4060 [0.50] Human Resource Planning

Courses to prepare for a post-graduate program in Industrial Relations:

ECON*3400 [0.50] The Economics of Personnel Management
ECON*3520 [0.50] Labour Economics
ECON*3620 [0.50] International Trade
ECON*4790 [0.50] Topics in Labour Market Theory
HROB*2200 [0.50] Labour Relations
HROB*2290 [0.50] Human Resources Management
HROB*3010 [0.50] Compensation Systems
HROB*3030 [0.50] Occupational Health and Safety
HROB*3070 [0.50] Recruitment and Selection
HROB*3090 [0.50] Training and Development
HROB*4060 [0.50] Human Resource Planning

Courses toward the Leadership Certificate:


HROB*2010 [0.50] Foundations of Leadership
HROB*4010 [0.50] Leadership Certificate Capstone
POLS*2250 [0.50] Public Administration and Governance
POLS*3440 [0.50] Corruption, Scandal and Political Ethics

Courses in Public Administration:

ECON*3610 [0.50] Public Economics
POLS*2250 [0.50] Public Administration and Governance
POLS*2300 [0.50] Canadian Government and Politics
POLS*3210 [0.50] The Constitution and Canadian Federalism
POLS*3250 [0.50] Public Policy: Challenges and Prospects
POLS*3270 [0.50] Local Government in Ontario
POLS*3470 [0.50] Business-Government Relations in Canada

Courses in Real Estate and Housing:

ECON*3500 [0.50] Urban Economics
REAL*1820 [0.50] Real Estate and Housing
REAL*2820 [0.50] Real Estate Finance
REAL*3890 [0.50] Property Management
REAL*4820 [0.50] Real Estate Appraisal

** These courses count towards the Post Graduate Valuation Certificate offered by UBC, part of the requirements to obtain an Accredited Appraiser Canadian Institute designation

Courses in Corporate Social Responsibility:

BUS*4550 [0.50] Applied Business Project I
BUS*4560 [0.50] Applied Business Project II
ECON*2650 [0.50] Introductory Development Economics
ECON*3300 [0.50] Economics of Health and the Workplace
ECON*4930 [0.50] Environmental Economics
HROB*3030 [0.50] Occupational Health and Safety
REAL*2850 [0.50] Service Learning in Housing
MGMT*4050 [0.50] Business Consulting
MGMT*4060 [0.50] Business Consulting

Courses in Marketing:

MGMT*4060 [0.50] Business Consulting

Courses in Food and Agribusiness:

FARE*2410 [0.50] Agrifood Markets and Policy
FARE*3030 [0.50] The Firm and Markets
FARE*3170 [0.50] Cost-Benefit Analysis
FARE*4000 [0.50] Agricultural and Food Policy
FARE*4220 [0.50] Advanced Agribusiness Management

Management Economics and Finance (Co-op) (MEF:C)

Department of Economics and Finance, Gordon S. Lang School of Business and Economics

The Management Economics and Finance major is designed to offer students an appreciation of business and economic problems particularly in the area of finance.

The major provides a suitable education for a career in the business world or in the public service. It also constitutes a useful preparation for more advanced studies, including graduate studies in Economics, Finance, Business Administration, Accounting, Industrial Relations, Law, and Public Policy. The major is administered by the Department of Economics and Finance and students are urged to consult the faculty advisors.

A principal aim of the Co-op program in Management Economics and Finance is to facilitate the transition of students from academic studies to a professional career by enhancing the integration of theory and practice.

Program Requirements

The Co-op program in Management Economics and Finance is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: [https://www.recruituoguelph.ca/cecc/](https://www.recruituoguelph.ca/cecc/)). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Management Economics and Finance Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 1</td>
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<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1000 Work Term I</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>COOP*3000 Work Term III</td>
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<td>4</td>
<td>Academic Semester 6</td>
<td>COOP*4000 Work Term IV</td>
<td>COOP*5000 Work Term V</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (22.00 Total Credits)

10.50 - Required Core Courses
6.00 - Restricted Electives (from lists)
1.50 - Liberal Education Electives
2.00 - Free Electives
2.00 Co-op Work Terms

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed the total number of credits will equal 22.50.

The recommended program sequence is outlined below.

Major

Semester 1 - Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON*1050</td>
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</tr>
<tr>
<td>MGMT*1000</td>
<td>1.00</td>
</tr>
<tr>
<td>BUS*4550</td>
<td>0.50</td>
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<td>BUS*4560</td>
<td>0.50</td>
</tr>
<tr>
<td>ECON*2650</td>
<td>0.50</td>
</tr>
<tr>
<td>ECON*3320</td>
<td>0.50</td>
</tr>
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<td>HROB*3030</td>
<td>0.50</td>
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<tr>
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One of:

<table>
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<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH*1030</td>
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</tr>
<tr>
<td>MATH*1200</td>
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</table>

0.50 Electives

*Note: MATH*1200 is recommended for the Finance Area of Emphasis.

Semester 2 - Winter

<table>
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<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
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<td>ACCT*1230</td>
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<tr>
<td>ECON*0100</td>
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</tr>
<tr>
<td>HROB*2030</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Course in Marketing:

MGMT*4060 [0.50] Business Consulting

Choice of an additional Co-op work term is optional. Please consult the Co-operative Education program policy for details.

Last Revision: July 4, 2019

2019-2020 Undergraduate Calendar
Students who wish to take the Statistics courses listed under the Finance Area of Emphasis may select STAT*2040 in place of ECON*3040.

A Fall semester course and can be completed in any Fall semester, provided the prerequisites are completed.

In addition to the required credits listed above, students must take a minimum of 1.50

Students may select REAL*4840 in place of MCS*3040. This is a Fall semester

Select STAT*3100 is required for the Finance Area of Emphasis

If in the Finance Area of Emphasis take ECON*3710.

May be replaced with a 4000 level 0.50 credits in Accounting.

In addition to the economics credits listed above, students must take a minimum of 1.50 credits in restricted electives listed below. These courses have been grouped in major topical areas which are related to various professional interests. Students may, however, choose restricted electives from any of those listed without regard to the categories.

Courses in preparation for post-graduate work in Economics (MA):

Course towards a professional accounting designation Chartered Professional Accountants (CPA)

Courses toward a professional designation as a Chartered Financial Analyst (CFA):

Courses to prepare for the Certified Human Resource Professional (CHRP)

Courses to prepare for a post-graduate program in Industrial Relations:

Courses in Quantitative Finance:

Courses in preparation for post-graduate in Economics (MA):

Courses toward a professional designation as a Chartered Financial Analyst (CFA):

Courses to prepare for a post-graduate program in Industrial Relations:

Courses in preparation for post-graduate work in Economics (MA):
<table>
<thead>
<tr>
<th>Major</th>
<th>Semester 1 - Fall</th>
<th>Semester 2 - Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ECON*1050 [0.50]</td>
<td>Introductory Microeconomics</td>
</tr>
<tr>
<td></td>
<td>MGMT*1000 [1.00]</td>
<td>Introduction to Business</td>
</tr>
<tr>
<td>Semester 1 or 2 - Fall or Winter</td>
<td>ACCT*1220 [0.50]</td>
<td>Introductory Financial Accounting</td>
</tr>
<tr>
<td></td>
<td>ECON*1100 [0.50]</td>
<td>Introductory Macroeconomics</td>
</tr>
<tr>
<td></td>
<td>MCS*1000 [0.50]</td>
<td>Introductory Marketing</td>
</tr>
<tr>
<td>Semester 3 - Fall</td>
<td>ACCT*2230 [0.50]</td>
<td>Management Accounting</td>
</tr>
<tr>
<td></td>
<td>HROB*2000 [0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MCS*2000 [0.50]</td>
<td>Business Communication in a Changing World</td>
</tr>
<tr>
<td>Semester 4 - Winter</td>
<td>MGMT*1100 [0.00]</td>
<td>Business Career Preparation</td>
</tr>
<tr>
<td></td>
<td>ECON*2740 [0.50]</td>
<td>Economic Statistics</td>
</tr>
<tr>
<td></td>
<td>PSYC*1010 [0.50]</td>
<td>Making Sense of Data in Psychological Research</td>
</tr>
<tr>
<td></td>
<td>STAT*2060 [0.50]</td>
<td>Statistics for Business Decisions</td>
</tr>
</tbody>
</table>

| Semester 3 or 4 - Fall or Winter | MGMT*2000 [0.50] | Information Management |
|       | MCS*2600 [0.50] | Fundamentals of Consumer Behaviour |
|       | MCS*3040 [0.50] | Business and Consumer Law |
|       | 0.50 History/Global Perspective electives (see List E2) | 1.00 electives |

| Semester 5 or 6 - Fall or Winter | ECON*2560 [0.50] | Introduction to Finance |
|       | FARE*3310 [0.50] | Operations Management |
|       | MCS*3030 [0.50] | Research Methods |
|       | MCS*3500 [0.50] | Marketing Analytics |
|       | MCS*3620 [0.50] | Marketing Communications |
|       | MGMT*3320 [0.50] | Financial Management |
|       | 0.50 Leadership/Professionalism electives (see List E3) | 1.50 electives |

| Semester 7 or 8 - Fall or Winter | MCS*3600 [0.50] | Consumer Information Processes |
|       | MCS*3700 [0.50] | Marketing Strategy |
|       | MCS*4600 [0.50] | International Marketing |
|       | MGMT*3020 [0.50] | Corporate Social Responsibility |
|       | MGMT*4000 [0.50] | Strategic Management |
|       | 0.50 Advanced Marketing electives (see List E4) | 1.50 electives |

| Restricted Electives for the Marketing Management Major | 0.50 Experiential Learning Capstone electives (see List E5) | 1.50 electives |

<table>
<thead>
<tr>
<th>Marketing Environment Elective - List E1</th>
<th>0.50 credits</th>
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</thead>
<tbody>
<tr>
<td>ANTH*1150 [0.50]</td>
<td>Introduction to Anthropology</td>
<td></td>
</tr>
<tr>
<td>EDRD*1400 [0.50]</td>
<td>Introduction to Design</td>
<td></td>
</tr>
<tr>
<td>FRHD*1010 [0.50]</td>
<td>Human Development</td>
<td></td>
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<tr>
<td>GEOG*1200 [0.50]</td>
<td>Society and Space</td>
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</tr>
<tr>
<td>GEOG*1220 [0.50]</td>
<td>Human Impact on the Environment</td>
<td></td>
</tr>
<tr>
<td>GEOG*2510 [0.50]</td>
<td>Canada: A Regional Synthesis</td>
<td></td>
</tr>
<tr>
<td>NUTR*1010 [0.50]</td>
<td>Introduction to Nutrition</td>
<td></td>
</tr>
<tr>
<td>PHIL*2070 [0.50]</td>
<td>Philosophy of the Environment</td>
<td></td>
</tr>
<tr>
<td>POLS*1400 [0.50]</td>
<td>Issues in Canadian Politics</td>
<td></td>
</tr>
<tr>
<td>POLS*2250 [0.50]</td>
<td>Public Administration and Governance</td>
<td></td>
</tr>
<tr>
<td>POLS*2300 [0.50]</td>
<td>Canadian Government and Politics</td>
<td></td>
</tr>
<tr>
<td>SOC*1100 [0.50]</td>
<td>Sociology</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>History/Global Elective - List E2</th>
<th>0.50 History of Canadian Art</th>
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</thead>
<tbody>
<tr>
<td>ARTH*2490 [0.50]</td>
<td>History of Canadian Art</td>
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</tbody>
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Degree Requirements (20.00 Total Credits)

<table>
<thead>
<tr>
<th>Component</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>13.00 - Required Core Courses</td>
<td></td>
</tr>
<tr>
<td>2.50 - Restricted Electives (from lists)</td>
<td></td>
</tr>
<tr>
<td>0.00 - MGMT*1100 (Business Career Preparation)</td>
<td></td>
</tr>
<tr>
<td>1.50 - Liberal Education Electives</td>
<td></td>
</tr>
<tr>
<td>3.00 - Free Electives</td>
<td></td>
</tr>
</tbody>
</table>
Leadership/Professionalism Elective - List E3
To help prepare senior marketing management majors for leadership positions in organizations, they must take one [0.50 credits] of:

- ECON*2310 [0.50] Intermediate Microeconomics
- ECON*2410 [0.50] Intermediate Macroeconomics
- EDRD*3160 [0.50] International Communication
- EDRD*4120 [0.50] Leadership Development in Small Organizations
- HRB*2010 [0.50] Foundations of Leadership
- MGMT*4260 [0.50] International Business
- PHIL*2100 [0.50] Critical Thinking
- PHIL*2120 [0.50] Ethics
- PHIL*2600 [0.50] Business and Professional Ethics

Advanced Marketing Elective - List E4
To address the University Learning Objective of “Depth and Breadth of Learning” and to enhance the knowledge of product development, placement strategies, and the integration of societal influences on thinking, senior marketing management majors must take one [0.50 credits] of:

- MCS*3010 [0.50] Quality Management
- MCS*4020 [0.50] Research in Consumer Studies
- MCS*4040 [0.50] Management in Product Development
- MCS*4060 [0.50] Retail Management
- MCS*4300 [0.50] Marketing and Society
- MCS*4400 [0.50] Pricing Management
- MCS*4910 [0.50] Topics in Consumer Studies
- MGMT*4350 [0.50] Business Case Competition Preparation

Experiential Learning Capstone Electives - List E5
To enhance their understanding of marketing in terms of application, senior marketing management majors must take one [0.50 credits] of:

- HRB*4010 [0.50] Leadership Certificate Capstone
- MCS*4100 [0.50] Entrepreneurship
- MCS*4920 [0.50] Topics in Consumer Studies
- MCS*4950 [0.50] Consumer Studies Practicum
- MGMT*4020 [0.50] Interdisciplinary Food Product Development I
- MGMT*4030 [0.50] Interdisciplinary Food Product Development II
- MGMT*4050 [0.50] Business Consulting
- MGMT*4060 [0.50] Business Consulting

Marketing Management (Co-op) (MKMN:C)

**Department of Marketing and Consumer Studies, Gordon S. Lang School of Business and Economics**

The Marketing Management major is interdisciplinary, follows a liberal education philosophy, and is built on the Department’s expertise in the field of marketing and consumer research. The Department of Marketing and Consumer Studies prepares students for a career in marketing but also for educating them so that they can be active and engaged citizens. This is achieved from a balanced curriculum of marketing and liberal education courses that provide students with an understanding of the world they will work and live in. Students will gain knowledge in creating, communicating, and delivering product offerings to create value to stakeholders in a global and connected economy. Students completing this major will be prepared to pursue a variety of marketing career paths and diverse leadership roles.

The Co-op program in Marketing Management is designed to facilitate the transition of students from academic studies to a professional career by enhancing the integration of theory and practice.

Elective options enable students to select courses which support or complement their primary field of study. Examples: (1) students can use a combination of restricted, Liberal Education, and free electives to earn the Certificate in Leadership. See http://www.leadershipcertificate.com/ for information about this certificate and its course requirements; (2) students interested in languages and/or going on exchange can use their Liberal Education and free electives to study one or more of the various languages taught at the University. Note: students also can take courses of interest as electives without concern for categories.

**Program Requirements**

The Co-op program in Marketing Management is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: [https://www.yorku.ca/coed/]). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

**Marketing Management Academic and Co-op Work Term Schedule**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td>MGMT*1000 Work Term I</td>
</tr>
<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>MGMT*3000 Work Term III</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>COOP*4000 Work Term IV</td>
<td>MGMT*5000 Work Term V</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

**Credit Summary (22.00 Total Credits)**

- 13.00 - Required Core Courses
- 2.50 - Restricted Electives (from lists)
- 1.50 - Liberal Education Electives
- 3.00 - Free Electives
- 2.00 Co-op Work Terms

**Note:** A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. A fifth Co-op work term is optional and if completed the total number of credits will equal 22.50.

The recommended program sequence is outlined below.

**Major**

**Semester 1 - Fall**

- ECON*1050 [0.50] Introductory Microeconomics
- MGMT*1000 [1.00] Introduction to Business

**Semester 2 - Winter**

- ACCT*1220 [0.50] Introductory Financial Accounting
- ECON*1100 [0.50] Introductory Macroeconomics
- MCS*1000 [0.50] Introductory Marketing

**Semesters 1 or 2 - Fall or Winter**

- MATH*1030 [0.50] Business Mathematics
- PSYC*1000 [0.50] Introduction to Psychology

**0.50 Marketing Environment electives (see List E1)**

**Semester 3 - Fall**

- ACCT*2230 [0.50] Management Accounting
- COOP*1100 [0.00] Introduction to Co-operative Education
- HROB*2090 [0.50] Individuals and Groups in Organizations
- MCS*2000 [0.50] Business Communication in a Changing World

One of:

- ECON*2740 [0.50] Economic Statistics
- PSYC*1010 [0.50] Making Sense of Data in Psychological Research
- STAT*2060 [0.50] Statistics for Business Decisions

**0.50 electives**

**Semesters 4 - Winter**

- MCS*2020 [0.50] Information Management
- MCS*2600 [0.50] Fundamentals of Consumer Behaviour
- MCS*3030 [0.50] Research Methods
- MCS*3040 [0.50] Business and Consumer Law

**0.50 History/Global Perspective electives (see List E2)**
### Summer Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP*1000</td>
<td>0.50</td>
<td>Co-op Work Term I</td>
</tr>
</tbody>
</table>

### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>COOP*2000</td>
<td>0.50</td>
<td>Co-op Work Term II</td>
</tr>
</tbody>
</table>

### Semester 5 - Winter

The following 5.00 credits must be completed over semesters 5 and 6. Select 2.50 credits in Winter Semester 5 and the remaining 2.50 in Fall Semester 6:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON*2560</td>
<td>0.50</td>
<td>Introduction to Finance</td>
</tr>
<tr>
<td>FARE*3310</td>
<td>0.50</td>
<td>Operations Management</td>
</tr>
<tr>
<td>MCS*3500</td>
<td>0.50</td>
<td>Marketing Analytics</td>
</tr>
<tr>
<td>MCS*3620</td>
<td>0.50</td>
<td>Marketing Communications</td>
</tr>
<tr>
<td>MGMT*3320</td>
<td>0.50</td>
<td>Financial Management</td>
</tr>
</tbody>
</table>

0.50 Leadership/Professionalism electives (see List E3)

2.00 electives

### Summer Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP*3000</td>
<td>0.50</td>
<td>Co-op Work Term III</td>
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</table>

### Semester 6 - Fall

Select 2.50 credits from the list below that were not taken in Winter Semester 5:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON*2560</td>
<td>0.50</td>
<td>Introduction to Finance</td>
</tr>
<tr>
<td>FARE*3310</td>
<td>0.50</td>
<td>Operations Management</td>
</tr>
<tr>
<td>MCS*3500</td>
<td>0.50</td>
<td>Marketing Analytics</td>
</tr>
<tr>
<td>MCS*3620</td>
<td>0.50</td>
<td>Marketing Communications</td>
</tr>
<tr>
<td>MGMT*3320</td>
<td>0.50</td>
<td>Financial Management</td>
</tr>
</tbody>
</table>

0.50 Leadership/Professionalism electives (see List E3)

2.00 electives

### Winter Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP*4000</td>
<td>0.50</td>
<td>Co-op Work Term IV</td>
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</table>

(Eight month work term in conjunction with COOP*5000)

### Semesters 7 or 8 - Fall or Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
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<tbody>
<tr>
<td>MCS*4500</td>
<td>0.50</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>MGMT*3320</td>
<td>0.50</td>
<td>Strategic Management</td>
</tr>
</tbody>
</table>

0.50 Advanced Marketing electives (see List E4)

0.50 Experiential Learning Capstone electives (see List E5)

1.50 electives

### Restricted Electives for the Marketing Management Major

Substitutions for restricted electives will be allowed if a Marketing and Consumer Studies Faculty Advisor agrees that a proposed alternative is relevant to marketing in today’s world and has an appropriate level of rigour.

### Marketing Environment Elective - List E1

To supplement the knowledge students gain in MCS*1000 about the socio-cultural, economic, political/legal, and technological “environmental” factors that must be taken into consideration in marketing decision-making, marketing management majors must take one [0.50 credits] of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH*1150</td>
<td>0.50</td>
<td>Introduction to Anthropology</td>
</tr>
<tr>
<td>EDRD*1400</td>
<td>0.50</td>
<td>Introduction to Design</td>
</tr>
<tr>
<td>FRHD*1010</td>
<td>0.50</td>
<td>Human Development</td>
</tr>
<tr>
<td>GEOG*1200</td>
<td>0.50</td>
<td>Society and Space</td>
</tr>
<tr>
<td>GEOG*1220</td>
<td>0.50</td>
<td>Human Impact on the Environment</td>
</tr>
<tr>
<td>GEOG*2510</td>
<td>0.50</td>
<td>Canada: A Regional Synthesis</td>
</tr>
<tr>
<td>PHIL*2070</td>
<td>0.50</td>
<td>Philosophy of the Environment</td>
</tr>
<tr>
<td>POLS*1400</td>
<td>0.50</td>
<td>Issues in Canadian Politics</td>
</tr>
<tr>
<td>POLS*2250</td>
<td>0.50</td>
<td>Public Administration and Governance</td>
</tr>
<tr>
<td>POLS*2300</td>
<td>0.50</td>
<td>Canadian Government and Politics</td>
</tr>
<tr>
<td>SOC*1100</td>
<td>0.50</td>
<td>Sociology</td>
</tr>
</tbody>
</table>

### History/Global Elective - List E2

To help marketing majors develop a sense of the fundamental relativity of knowledge and understanding over time and to help them gain the global perspective needed in senior marketing courses, marketing management majors must take one [0.50 credits] of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTH*2490</td>
<td>0.50</td>
<td>History of Canadian Art</td>
</tr>
<tr>
<td>BIOL*1500</td>
<td>0.50</td>
<td>Humans in the Natural World</td>
</tr>
<tr>
<td>GEOG*2030</td>
<td>0.50</td>
<td>Environment and Development</td>
</tr>
<tr>
<td>HIST*1150</td>
<td>0.50</td>
<td>The Modern World</td>
</tr>
<tr>
<td>HIST*1250</td>
<td>0.50</td>
<td>Science and Technology in a Global Context</td>
</tr>
<tr>
<td>HIST*2070</td>
<td>0.50</td>
<td>World Religions</td>
</tr>
<tr>
<td>HIST*2250</td>
<td>0.50</td>
<td>Environment and History</td>
</tr>
<tr>
<td>HIST*2300</td>
<td>0.50</td>
<td>The United States Since 1776</td>
</tr>
<tr>
<td>HIST*2510</td>
<td>0.50</td>
<td>Modern Europe Since 1789</td>
</tr>
<tr>
<td>HIST*2910</td>
<td>0.50</td>
<td>Modern Asia</td>
</tr>
<tr>
<td>HIST*2930</td>
<td>0.50</td>
<td>Women and Cultural Change</td>
</tr>
<tr>
<td>HIST*3070</td>
<td>0.50</td>
<td>Modern India</td>
</tr>
<tr>
<td>HIST*3150</td>
<td>0.50</td>
<td>History and Culture of Mexico</td>
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<tr>
<td>ISS*2000</td>
<td>0.50</td>
<td>Asia</td>
</tr>
<tr>
<td>POLS*1500</td>
<td>0.50</td>
<td>World Politics</td>
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<td>POLS*2080</td>
<td>0.50</td>
<td>Development and Underdevelopment</td>
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<tr>
<td>POLS*2200</td>
<td>0.50</td>
<td>International Relations</td>
</tr>
</tbody>
</table>

### Leadership/Professionalism Elective - List E3

To help prepare senior marketing management majors for leadership positions in organizations, they must take one [0.50 credits] of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON*2310</td>
<td>0.50</td>
<td>Intermediate Microeconomics</td>
</tr>
<tr>
<td>ECON*2410</td>
<td>0.50</td>
<td>Intermediate Macroeconomics</td>
</tr>
<tr>
<td>EDRD*3160</td>
<td>0.50</td>
<td>International Communication</td>
</tr>
<tr>
<td>EDRD*4120</td>
<td>0.50</td>
<td>Leadership Development in Small Organizations</td>
</tr>
<tr>
<td>HROB*2010</td>
<td>0.50</td>
<td>Foundations of Leadership</td>
</tr>
<tr>
<td>MGMT*4260</td>
<td>0.50</td>
<td>International Business</td>
</tr>
<tr>
<td>PHIL*2100</td>
<td>0.50</td>
<td>Critical Thinking</td>
</tr>
<tr>
<td>PHIL*2120</td>
<td>0.50</td>
<td>Ethics</td>
</tr>
<tr>
<td>PHIL*2600</td>
<td>0.50</td>
<td>Business and Professional Ethics</td>
</tr>
</tbody>
</table>

### Advanced Marketing Elective - List E4

To address the University Learning Objective of “Depth and Breadth of Learning” and to enhance the knowledge of product development, placement strategies, and the integration of societal influences on thinking, senior marketing management majors must take one [0.5 credits] of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS*3010</td>
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<td>Quality Management</td>
</tr>
<tr>
<td>MCS*4020</td>
<td>0.50</td>
<td>Research in Consumer Studies</td>
</tr>
<tr>
<td>MCS*4040</td>
<td>0.50</td>
<td>Management in Product Development</td>
</tr>
<tr>
<td>MCS*4060</td>
<td>0.50</td>
<td>Retail Management</td>
</tr>
<tr>
<td>MCS*4300</td>
<td>0.50</td>
<td>Marketing and Society</td>
</tr>
<tr>
<td>MCS*4400</td>
<td>0.50</td>
<td>Pricing Management</td>
</tr>
<tr>
<td>MCS*4910</td>
<td>0.50</td>
<td>Topics in Consumer Studies</td>
</tr>
<tr>
<td>MGMT*4350</td>
<td>0.50</td>
<td>Business Case Competition Preparation</td>
</tr>
</tbody>
</table>

### Experiential Learning Capstone Electives - List E5

To enhance their understanding of marketing in terms of application, senior marketing management majors must take one [0.50 credits] of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HROB*4010</td>
<td>0.50</td>
<td>Leadership Certificate Capstone</td>
</tr>
<tr>
<td>MCS*4100</td>
<td>0.50</td>
<td>Entrepreneurship</td>
</tr>
<tr>
<td>MCS*4900</td>
<td>0.50</td>
<td>Topics in Consumer Studies</td>
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<tr>
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<td>0.50</td>
<td>Consumer Studies Practicum</td>
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<tr>
<td>MGMT*4020</td>
<td>0.50</td>
<td>Interdisciplinary Food Product Developement I</td>
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<td>MGMT*4030</td>
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<tr>
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</table>

### Public Management (PMGT)

**Department of Economics and Finance, Gordon S. Lang School of Business and Economic**

The Public Management program is designed to lead to an understanding of public sector administration and management from the “inside” - as an integrated enterprise - as well as from the outside - as a series of policy decisions and outcomes. Characterized by a multi-disciplinary approach employing political, economic and business-oriented analysis, students will confront questions of why politicians and public servants behave the way they do, and how their policy choices and processes can be optimized. Management of public entities features a unique set of challenges that arise from and interact with basic political issues like democracy, accountability, equity, fairness, and justice. At the same time it necessarily faces concerns common to all organizations, such as efficiency, human and capital resource management, morale, planning, and adaptation to change.

The program will appeal to students interested in the public service, public sector businesses or business-government relations.

Students enrolled in the PMGT major can choose to complete three of the five required courses for the Certificate in Leadership as part of their requirements for the program if they choose the appropriate restricted electives. If you would like to graduate both with a BComm degree and the Certificate in Leadership you should use two of your free electives to enroll in HROB*4010 in either semester 3 or 6 and HROB*4010 in semester 8. In addition to the five degree-credit courses selected from the above list, 120 hours of leadership practice are required to obtain the undergraduate Certificate in Leadership. See [http://www.leadershipcertificate.com/](http://www.leadershipcertificate.com/) for information regarding this Certificate and its course requirements.

### Degree Requirements (20.00 Total Credits)

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<thead>
<tr>
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<tr>
<td>12.50 - Required Core Courses</td>
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<td>4.50 - Restricted Electives (from lists)</td>
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<tr>
<td>0.00 – MGMT*1100 (Business Career Preparation)</td>
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<tr>
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Major

Semester 1

<table>
<thead>
<tr>
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<tr>
<td>ECON*1050</td>
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<td>Introductory Microeconomics</td>
</tr>
<tr>
<td>MCS*1000</td>
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<td>Introductory Marketing</td>
</tr>
<tr>
<td>MGMT*1000</td>
<td>1.00</td>
<td>Introduction to Business</td>
</tr>
<tr>
<td>POLS*1400</td>
<td>0.50</td>
<td>Issues in Canadian Politics</td>
</tr>
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</table>

Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ECON*1100</td>
<td>0.50</td>
<td>Introductory Macroeconomics</td>
</tr>
<tr>
<td>HRRO*2090</td>
<td>0.50</td>
<td>Individuals and Groups in Organizations</td>
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<tr>
<td>MATH*1030</td>
<td>0.50</td>
<td>Business Mathematics</td>
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<tr>
<td>POLS*2300</td>
<td>0.50</td>
<td>Canadian Government and Politics</td>
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Semester 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>ACCT*1220</td>
<td>0.50</td>
<td>Introductory Financial Accounting</td>
</tr>
<tr>
<td>ECON*2310</td>
<td>0.50</td>
<td>Intermediate Microeconomics</td>
</tr>
<tr>
<td>ECON*2740</td>
<td>0.50</td>
<td>Economic Statistics</td>
</tr>
<tr>
<td>POLS*3250</td>
<td>0.50</td>
<td>Public Policy: Challenges and Prospects</td>
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Semester 4

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<tr>
<td>ACCT*2230</td>
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<td>Management Accounting</td>
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<tr>
<td>ECON*2410</td>
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<td>Business Career Preparation</td>
</tr>
<tr>
<td>POLS*2250</td>
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Semester 5

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<tr>
<td>ECON*2560</td>
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<tr>
<td>FARE*3310</td>
<td>0.50</td>
<td>Operations Management</td>
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<td>MGMT*3320</td>
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Semester 6

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<tbody>
<tr>
<td>ECON*3610</td>
<td>0.50</td>
<td>Public Economics</td>
</tr>
<tr>
<td>MCS*2020</td>
<td>0.50</td>
<td>Information Management</td>
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Semester 7

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<tbody>
<tr>
<td>MGMT*3020</td>
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<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>POLS*3470</td>
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<td>Business-Government Relations in Canada</td>
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Semester 8

<table>
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<tr>
<th>Course Code</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ECON*4400</td>
<td>0.50</td>
<td>Managerial Economics</td>
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<tr>
<td>MGMT*4000</td>
<td>0.50</td>
<td>Strategic Management</td>
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<tr>
<td>POLS*4160</td>
<td>1.00</td>
<td>Multi-Level Governance in Canada</td>
</tr>
<tr>
<td>POLS*4250</td>
<td>1.00</td>
<td>Topics in Public Management</td>
</tr>
<tr>
<td>POLS*4980</td>
<td>0.50</td>
<td>Honours Political Science Research II</td>
</tr>
</tbody>
</table>

Credit Summary (22.00 Total Credits)*

- 12.50 Required Core Courses
- 4.50 Restricted Electives (from lists)
1.50 - Liberal Education Electives

1.50 - Free Electives

2.00 Co-op Work Terms

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed the total number of credits will equal 22.50.

The recommended program sequence is outlined below.

Major

Semester 1

ECON*1050 [0.50] Introductory Microeconomics
MCS*1000 [0.50] Introductory Marketing
MGMT*1000 [1.00] Introduction to Business
POLS*1400 [0.50] Issues in Canadian Politics

Semester 2

ECON*1100 [0.50] Introductory Macroeconomics
HROB*2090 [0.50] Individuals and Groups in Organizations
MATH*1030 [0.50] Business Mathematics
POLS*2300 [0.50] Canadian Government and Politics
0.50 elective

Semester 3

ACCT*1220 [0.50] Introductory Financial Accounting
COOP*1100 [0.00] Introduction to Co-operative Education
ECON*2310 [0.50] Intermediate Microeconomics
ECON*2740 [0.50] Economic Statistics
POLS*3250 [0.50] Public Policy: Challenges and Prospects

One of:
- ECON*2100 [0.50] Economic Growth and Environmental Quality
- ECON*2650 [0.50] Introductory Development Economics
- ECON*2720 [0.50] Business History

Semester 4 - Winter

ACCT*2230 [0.50] Management Accounting
ECON*2410 [0.50] Intermediate Macroeconomics
ECON*2560 [0.50] Introduction to Finance
POLS*2250 [0.50] Public Administration and Governance
0.50 electives

Summer Semester

COOP*1000 [0.50] Co-op Work Term I

Fall Semester

COOP*2000 [0.50] Co-op Work Term II

Semester 5 - Winter

ECON*3610 [0.50] Public Economics
FARE*3310 [0.50] Operations Management
MCS*2020 [0.50] Information Management
MGMT*3320 [0.50] Financial Management

One of:
- PHIL*2120 [0.50] Ethics
- PHIL*2600 [0.50] Business and Professional Ethics
- PHIL*3040 [0.50] Philosophy of Law

* This course may be offered in the fall and can be taken later in the program.

Summer Semester

COOP*3000 [0.50] Co-op Work Term III

Semester 6 - Fall

MGMT*3020 [0.50] Corporate Social Responsibility
POLS*3470 [0.50] Business-Government Relations in Canada

One of:
- ECON*3300 [0.50] Economics of Health and the Workplace
- ECON*3400 [0.50] The Economics of Personnel Management
- ECON*3520 [0.50] Labour Economics
- ECON*3580 [0.50] Economics of Regulation
- ECON*3620 [0.50] International Trade
- ECON*3730 [0.50] The Origins of International Inequality

One of:
- MCS*3040 [0.50] Business and Consumer Law
- REAL*4840 [0.50] Housing and Real Estate Law
0.50 electives

Winter Semester

COOP*4000 [0.50] Co-op Work Term IV (Eight month work term in conjunction with COOP*5000)

Summer Semester

COOP*5000 [0.50] Co-op Work Term V (Eight month work term in conjunction with COOP*4000)

Semester 7 - Fall

MGMT*4000 [0.50] Strategic Management

One of:
- ECON*3300 [0.50] Economics of Health and the Workplace
- ECON*3400 [0.50] The Economics of Personnel Management
- ECON*3520 [0.50] Labour Economics
- ECON*3580 [0.50] Economics of Regulation
- ECON*3620 [0.50] International Trade
- ECON*3730 [0.50] The Origins of International Inequality

One of **:
- POLS*4160 [1.00] Multi-Level Governance in Canada
- POLS*4320 [1.00] Topics in Public Management
- POLS*4270 [0.50] Advanced Lecture in Public Management
- POLS*4970 [0.50] Honours Political Science Research I
0.50 credits at the 3000 or 4000 level in Economics or 4000 level in Political Science
1.00 electives***

Semester 8 - Winter

ECON*4400 [0.50] Managerial Economics

Two of:
- POLS*3130 [0.50] Law, Politics and Judicial Process
- POLS*3210 [0.50] The Constitution and Canadian Federalism
- POLS*3270 [0.50] Local Government in Ontario
- POLS*3670 [0.50] Comparative Public Policy and Administration

One of **:
- POLS*4160 [1.00] Multi-Level Governance in Canada
- POLS*4250 [1.00] Topics in Public Management
- POLS*4980 [0.50] Honours Political Science Research II

0.50 credits at the 4000 level in Economics
0.50 electives***

** If a 1.00 credit POLS is taken in either semester 7 or 8 this will meet the restricted elective requirement for both semesters POLS*4250 is recommended

*** The number of electives will change if a 1.00 credit POLS course is taken in semester 7 or 8

Real Estate and Housing (REH)

Department of Marketing and Consumer Studies, Gordon S. Lang School of Business and Economics

The Real Estate and Housing major in the B.Comm. program is one of only a few undergraduate programs in Canada that specialize in the real estate sector. It takes a multi-disciplinary approach to the study of residential and commercial/investment real estate. Topics such as the development, financing, valuation, market analysis and management of real estate are taught in the context of economic, legal, political and social factors affecting this large and growing field of business in Canada and the world.

The purpose of this major is to develop the conceptual, analytical and management skills required for careers in real estate and housing. Students graduate with a degree that can lead to a variety of professional positions in the private or public sectors of the Canadian real estate industry or they can continue on to graduate work in business, planning or the social sciences.

Elective options enable students to select courses which support or complement their primary field of study. Examples: (1) students can use Liberal Education and free electives to earn the Certificate in Leadership. See http://www.leadershipcertificate.com/ for information regarding this Certificate and its course requirements; (2) students interested in languages and/or going on exchange can use their Liberal Education and free electives to study one or more of the various languages taught at the University. (3) Students interested in obtaining their Accredited Appraiser Canadian Institute (AACI) designation should consider taking some of the additional 4 required courses through University of British Columbia distance education by letter of permission to count as electives in their degree, once they have completed REAL*4820.

Students may consult the REH Faculty Advisor or B.Comm. Program Counsellor for additional information.

Degree Requirements (20.00 Total Credits)

16.00 - Required Core Courses
0.00 – MGMT*1100 (Business Career Preparation)
1.50 - Liberal Education Electives
2.50 - Free Electives

Major

Semester 1

ECON*1050 [0.50] Introductory Microeconomics
REAL*1820 [0.50] Real Estate and Housing
MGMT*1000 [1.00] Introduction to Business
0.50 electives

Semester 2

ACCT*1220 [0.50] Introductory Financial Accounting
### Real Estate and Housing (Co-op) (REH:C)

**Department of Marketing and Consumer Studies, Gordon S. Lang School of Business and Economics**

The Real Estate and Housing major in the B.Comm. program is one of only a few undergraduate programs in Canada that specialize in the real estate sector. It takes a multi-disciplinary approach to the study of residential and commercial/investment real estate.

The purpose of this major is to develop the conceptual, analytical and management skills required for careers in real estate and housing. Students graduate with a degree that can lead to a variety of professional positions in the private or public sectors of the Canadian real estate industry or they can continue on to graduate work in business, planning or the social sciences.

Elective options enable students to select courses which support or complement their primary field of study. Examples: (1) students can use Liberal Education and free electives to earn the Certificate in Leadership. See http://www.leadershipcertificate.com/ for information regarding this Certificate and its course requirements; (2) students interested in languages and/or going on exchange can use their Liberal Education and free electives to study one or more of the various languages taught at the University. (3) Students interested in obtaining their Accredited Appraiser Canadian Institute (AACI) designation should consider taking some of the additional four required courses through University of British Columbia distance education by letter of permission to count as electives in their degree, once they have completed REAL*4820.

A principal aim of the Co-op program in Real Estate and Housing is to facilitate the transition of students from academic studies to a professional career by enhancing the integration of theory and practice.

#### Program Requirements

The Co-op program in Real Estate and Housing is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: [https://www.recruitguelph.ca/cecs/](https://www.recruitguelph.ca/cecs/)). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

### Credit Summary (22.00 Total Credits)*

16.00 - Required Core Courses
1.50 - Liberal Education Electives
2.50 - Free Electives
2.00 Co-op Work Terms

*Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed the total number of credits will equal 22.50.

The recommended program sequence is outlined below.

#### Major

**Semester 1 - Fall**

- ECON*1050 [0.50] Introductory Microeconomics
- REAL*1820 [0.50] Real Estate and Housing
- MGMT*1000 [1.00] Introduction to Business
- 0.50 electives

**Semester 2 - Winter**

- ACCT*1220 [0.50] Introductory Financial Accounting
- ECON*1100 [0.50] Introductory Macroeconomics
- MCS*1000 [0.50] Introductory Marketing
- MATH*1030 [0.50] Business Mathematics
- 0.50 electives

**Semester 3 - Fall**

- ECON*2410 [0.50] Intermediate Macroeconomics
- FARE*3310 [0.50] Operations Management
- REAL*2820 [0.50] Real Estate Appraisal
- REAL*4840 [0.50] Housing and Real Estate Law
- 0.50 electives

**Semester 4 - Fall**

- ECON*3960 [0.50] Money, Credit and the Financial System
- LARC*2820 [0.50] Urban and Regional Planning
- MGMT*3020 [0.50] Corporate Social Responsibility
- MGMT*3320 [0.50] Financial Management
- REAL*3890 [0.50] Property Management
- 0.50 electives

**Semester 5 - Winter**

- ECON*3590 [0.50] Urban Economics
- MGMT*4000 [0.50] Strategic Management
- REAL*3810 [0.50] Real Estate Market Analysis
- REAL*4870 [0.50] Sustainable Real Estate
- 0.50 electives

**Semester 6 - Fall**

- REAL*2850 [0.50] Management Accounting
- COOP*2000 [1.00] Co-operative Education
- 0.50 electives

**Semester 7 - Winter**

- ECON*2410 [0.50] Intermediate Macroeconomics
- ECON*2310 [0.50] Intermediate Microeconomics
- STAT*2060 [0.50] Statistics for Business Decisions
- 0.50 electives

**Semester 8 - Fall**

- REAL*2820 [0.50] Real Estate Appraisal
- REAL*4840 [0.50] Housing and Real Estate Law
- 1.00 electives

### Real Estate and Housing Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall Semester</th>
<th>Winter Semester</th>
<th>Summer Semester</th>
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<tr>
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<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1100</td>
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<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>COOP*3000 Work Term III</td>
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<tr>
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<td>Academic Semester 6</td>
<td>COOP*4000 Work Term IV</td>
<td>COOP*5000 Work Term V</td>
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<tr>
<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
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</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.
0.50 electives

**Winter Semester**
COOP*4000 [0.50] Co-op Work Term IV
(Eight month work term in conjunction with COOP*5000)

**Summer Semester**
COOP*5000 [0.50] Co-op Work Term V
(Eight month work term in conjunction with COOP*4000)

**Semester 7 - Fall**
ECON*3500 [0.50] Urban Economics
MGMT*4000 [0.50] Strategic Management
REAL*3810 [0.50] Real Estate Market Analysis
REAL*4870 [0.50] Sustainable Real Estate
0.50 electives

**Semester 8 - Winter**
LARC*2820 [0.50] Urban and Regional Planning
POLS*3270 [0.50] Local Government in Ontario
REAL*4830 [1.00] Real Estate Development Project
0.50 electives
Bachelor of Computing (B.Comp.)

Students graduating from this program obtain a solid foundation in the theory and application of all aspects of computing and information science. Core subjects, combined with in-depth study in an area of application, give students the freedom to combine their interests in computing with other areas of study and application.

There are two majors available in the Bachelor of Computing honours program. The major in Computer Science provides a traditional computing foundation in software, hardware, and theory. The major in Software Engineering contains an emphasis on software development and design and has a greater focus on team work, communication skills, and professional standards.

Course projects are based on real-world software development scenarios and allows students to get the professional experience valued by today's high-tech employers. The focused study in a second discipline (area of application) gives students the background to effectively apply their knowledge.

Both majors require the equivalent of 8 semesters of successful full-time study. The general program requires the equivalent of 6 semesters of successful full-time study are available. Students in the honours program must choose a major in either Computer Science or Software Engineering. The majors are also available with a Co-op option.

Since not all courses are offered in every semester and prerequisite dependencies must be observed, students are encouraged to consult the program B.Comp. counsellor to plan an initial program of study or when considering modifications to the suggested schedule of studies list.

Program Information

To graduate with an honours Degree with a major in Computer Science or Software Engineering a student must:

a. Successfully complete 20.00 credits. These must include the 11.25 CIS credits, a minimum of 4.00 credits in an Area of Application and an additional 4.75 credits as free electives. Not more than 6.00 credits from courses at the introductory (1000) level may be counted towards the 20.00 credit requirement.

b. Obtain a cumulative average at least 70% in CIS courses and a 60% cumulative average in all courses.

c. An Area of Application normally consists of 4.00 credits (normally 8 courses) of a minor. Minors are described under the B.A. and B.Sc. programs. Access to some courses may be limited. Minors are listed in Section X of the Calendar. Students may complete a minor if they decide to do so.

 Students must consult the faculty advisor for approval of their Area of Application by semester 4. Not all disciplines or courses may be available as areas of application.

Students failing to meet the graduation requirements of the honours program may apply to graduate with a general degree if the requirements for the general degree are met.

Continuation of Study

Students are advised to consult the regulations for Continuation of Study which are outlined in detail in Section VIII Degree Regulations Procedures of this calendar.

General Program

School of Computer Science, College of Engineering and Physical Sciences

To graduate from a general program a student must:

a. Earn 15.00 credits. These must include courses that fulfill the distribution requirements of the general Degree (see below). At least 4.00 credits must be at the 3000 level or above. Not more than 6.00 credits at the introductory (1000) level may be counted towards the 15.00 credit requirement.

b. No more than 11.00 credits in any one subject or discipline, as indicated by the course prefix code, can be counted towards a general degree.

c. Successfully complete the following credits:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>CIS*1300</td>
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<td>Programming</td>
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<tr>
<td>CIS*1910</td>
<td>0.50</td>
<td>Discrete Structures in Computing I</td>
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<tr>
<td>CIS*2430</td>
<td>0.50</td>
<td>Object Oriented Programming</td>
</tr>
<tr>
<td>CIS*2500</td>
<td>0.50</td>
<td>Intermediate Programming</td>
</tr>
<tr>
<td>CIS*2520</td>
<td>0.50</td>
<td>Data Structures</td>
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<tr>
<td>CIS*2750</td>
<td>0.75</td>
<td>Software Systems Development and Integration</td>
</tr>
<tr>
<td>CIS*2910</td>
<td>0.50</td>
<td>Discrete Structures in Computing II</td>
</tr>
<tr>
<td>CIS*3530</td>
<td>0.50</td>
<td>Data Base Systems and Concepts</td>
</tr>
<tr>
<td>0.50 additional CIS or STAT credits at the 2000 level or higher</td>
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</tr>
<tr>
<td>1.00 additional CIS credits at 3000 level or higher</td>
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</tbody>
</table>

d. Earn 2.00 science credits (list of courses available in the Program Counsellor's office) and 2.00 credits in the College of Arts or College of Social and Applied Human Sciences in addition to the courses listed in c.

Computer Science (CS)

School of Computer Science, College of Engineering and Physical Sciences

Major (Honours Program)

Since many courses are offered in only one semester and course pre-requisites place an ordering on courses, the following program of studies is designed so that students can schedule their courses over 8 semesters of study. Students deviating from this schedule must consult with their academic advisor.

**Semester 1**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>CIS*1300</td>
<td>0.50</td>
<td>Programming</td>
</tr>
<tr>
<td>CIS*1910</td>
<td>0.50</td>
<td>Discrete Structures in Computing I</td>
</tr>
<tr>
<td>MATH*1200</td>
<td>0.50</td>
<td>Calculus I</td>
</tr>
<tr>
<td>1.00 credits in the Area of Application or electives</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Semester 2**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS*2500</td>
<td>0.50</td>
<td>Intermediate Programming</td>
</tr>
<tr>
<td>CIS*2910</td>
<td>0.50</td>
<td>Discrete Structures in Computing II</td>
</tr>
<tr>
<td>MATH*1160</td>
<td>0.50</td>
<td>Linear Algebra I</td>
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<td>1.00 credits in the Area of Application or electives</td>
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**Semester 3**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CIS*2030</td>
<td>0.50</td>
<td>Structure and Application of Microcomputers</td>
</tr>
<tr>
<td>CIS*2430</td>
<td>0.50</td>
<td>Object Oriented Programming</td>
</tr>
<tr>
<td>CIS*2520</td>
<td>0.50</td>
<td>Data Structures</td>
</tr>
<tr>
<td>1.00 credits in the Area of Application or electives</td>
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**Semester 4**

<table>
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<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS*2750</td>
<td>0.75</td>
<td>Software Systems Development and Integration</td>
</tr>
<tr>
<td>CIS*3110</td>
<td>0.50</td>
<td>Operating Systems I</td>
</tr>
<tr>
<td>CIS*3490</td>
<td>0.50</td>
<td>The Analysis and Design of Computer Algorithms</td>
</tr>
<tr>
<td>0.75 credits in the Area of Application or elective</td>
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</tr>
</tbody>
</table>

**Semester 5**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS*3150</td>
<td>0.50</td>
<td>Theory of Computation</td>
</tr>
<tr>
<td>CIS*3750</td>
<td>0.75</td>
<td>System Analysis and Design in Applications</td>
</tr>
<tr>
<td>STAT*2040</td>
<td>0.50</td>
<td>Statistics I</td>
</tr>
<tr>
<td>0.75 credits in the Area of Application or electives</td>
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**Semester 6**

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<tr>
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<tbody>
<tr>
<td>CIS*3760</td>
<td>0.75</td>
<td>Software Engineering</td>
</tr>
<tr>
<td>0.50 CIS electives at the 3000 level or above</td>
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<tr>
<td>1.25 credits in the Area of Application or electives</td>
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**Semester 7**

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<th>Credits</th>
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<tbody>
<tr>
<td>1.00 credits in the Area of Application or electives</td>
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<td></td>
</tr>
<tr>
<td>0.50 credits in CIS at 3000 level or above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00 credits in CIS at the 4000 level</td>
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**Semester 8**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS*4650</td>
<td>0.50</td>
<td>Compilers</td>
</tr>
<tr>
<td>1.00 credits in the Area of Application or electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.50 credits in CIS at the 3000 level or above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.50 credits in CIS at the 4000 level</td>
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</tr>
</tbody>
</table>

Computer Science (Co-op) (CS:C)

Computing and Information Science, College of Engineering and Physical Sciences

Program Requirements

The Co-op program in Computer Science is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruituelp.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Computer Science Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td>COOP*1000 Work Term I</td>
</tr>
<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>COOP*3000 Work Term III</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>COOP*4000 Work Term IV</td>
<td>COOP*5000 Work Term V</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.
For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education website. Students are advised to plan their schedule of studies well in advance so that they can take all required prerequisites for later (especially 4000 level) courses. Students should note that some 4000 level courses are only given in alternate years. Failure to plan may result in the inability to take a particular senior CIS course. Not all sequences may be viable. Please check with the CIS Co-op faculty advisor for semester planning.

Credit Summary (22.00 Total Credits)*
12.25 - Required Core Courses
4.00 – Area of Application
3.75 – Free electives
2.00 - Co-op Work Terms

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed the total number of credits will equal 22.50.

The recommended program sequence is outlined below.

Major Co-op (Honours Program)
The recommended schedule of studies for Co-op is as follows:

**Semester 1 - Fall**
CIS*1300 [0.50] Programming
CIS*1910 [0.50] Discrete Structures in Computing I
MATH*1200 [0.50] Calculus I
1.00 credits in the Area of Application or electives

**Semester 2 - Winter**
CIS*2500 [0.50] Intermediate Programming
CIS*2910 [0.50] Discrete Structures in Computing II
MATH*1160 [0.50] Linear Algebra I
1.00 credits in the Area of Application or electives

**Summer Semester - Off**

**Semester 3 - Fall**
CIS*2030 [0.50] Structure and Application of Microcomputers
CIS*2430 [0.50] Object Oriented Programming
CIS*2520 [0.50] Data Structures
CIS*3110 [0.50] Introduction to Co-operative Education
1.00 credits in the Area of Application or electives

**Semester 4 - Winter**
CIS*2750 [0.75] Software Systems Development and Integration
CIS*3110 [0.50] Operating Systems I
CIS*3490 [0.50] The Analysis and Design of Computer Algorithms
0.75 credits in the Area of Application or elective

**Summer Semester**
COOP*1000 Work Term 1

**Fall Semester**
COOP*2000 Work Term 2

**Semester 5 - Winter**
CIS*3750 [0.75] System Analysis and Design in Applications
CIS*3130 [0.50] Operating Systems II
CIS*3760 [0.50] Software Design I
STAT*2040 [0.50] Statistics I
0.50 credits in the Area of Application or electives
0.75 credits in the Area of Application or electives

**Summer Semester**
COOP*3000 Work Term 3

**Semester 6 - Fall**
CIS*3150 [0.50] Theory of Computation
CIS*3760 [0.75] Software Engineering
STAT*2040 [0.50] Statistics I
0.75 credits in the Area of Application or electives

**Winter Semester**
COOP*4000 Work Term 4

**Summer Semester**
COOP*5000 Work Term 5

**Semester 7 - Fall**
1.00 credits in the Area of Application or electives
0.50 credits in CIS at 3000 level or above
1.00 credits in CIS at the 4000 level

**Semester 8 - Winter**
CIS*4650 [0.50] Compilers
1.00 credits in the Area of Application or electives
0.50 credits in CIS at 3000 level or above
0.50 credits in CIS at the 4000 level

Software Engineering (SENG)
School of Computer Science, College of Engineering and Physical Sciences
Major (Honours Program)
Since many courses are offered in only one semester and course pre-requisites place an ordering on courses, the following program of studies is designed so that students can schedule their courses over 8 semesters of study. Students deviating from this schedule must consult with their academic advisor.

**Semester 1**
CIS*1250 [0.50] Software Design I
CIS*1300 [0.50] Programming
CIS*1910 [0.50] Discrete Structures in Computing I
1.00 credits in the Area of Application or electives

**Semester 2**
CIS*2250 [0.50] Software Design II
CIS*2500 [0.50] Intermediate Programming
MATH*1160 [0.50] Linear Algebra I
1.00 credits in the Area of Application or electives

**Semester 3**
CIS*2520 [0.50] Data Structures
CIS*3250 [0.50] Software Design III
0.50 credits in the Area of Application or electives

**Semester 4**
CIS*2750 [0.75] Software Systems Development and Integration
CIS*3110 [0.50] Operating Systems I
CIS*3490 [0.50] The Analysis and Design of Computer Algorithms
0.75 credits in the Area of Application or elective

**Semester 5**
CIS*3750 [0.75] System Analysis and Design in Applications
STAT*2040 [0.50] Statistics I
0.50 credits CIS at the 3000 level or above
0.75 credits in the Area of Application or electives

**Semester 6**
CIS*3670 [0.75] Software Engineering
0.50 CIS electives at the 3000 level or above
1.25 credits in the Area of Application or electives

**Semester 7**
CIS*3260 [0.50] Software Design IV
CIS*4150 [0.50] Software Reliability and Testing
CIS*4300 [0.50] Human Computer Interaction
1.00 credits in the Area of Application or electives

**Semester 8**
CIS*4250 [0.50] Software Design V
1.50 credits in the Area of Application or electives
0.50 credits in CIS at the 4000 level

Software Engineering (Co-op) (SENG:C)
Computing and Information Science, College of Engineering and Physical Sciences
Program Requirements
The Co-op program in Software Engineering is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Software Engineering Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1000 Work Term I</td>
<td>COOP*1000 Work Term I</td>
</tr>
<tr>
<td></td>
<td>COOP*1100</td>
<td>Academic Semester 4</td>
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<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>COOP*3000 Work Term III</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>COOP*4000 Work Term IV</td>
<td>COOP*5000 Work Term V</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.
For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Students are advised to plan their schedule of studies well in advance so that they can take all required prerequisites for later (especially 4000 level) courses. Students should note that some 4000 level courses are only given in alternate years. Failure to plan may result in the inability to take a particular senior CIS course. Not all sequences may be viable. Please check with the CIS Co-op faculty advisor for semester planning.

Credit Summary (22.00 Total Credits)*

12.25 - Required Core Courses
4.00 – Area of Application
3.75 – Free electives
2.00 - Co-op Work Terms

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed the total number of credits will equal 22.50.

The recommended program sequence is outlined below.

**Major (Honours Program) Co-op**

The recommended schedule of studies for Co-op is as follows:

**Semester 1 - Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS*1250</td>
<td>Software Design I</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CIS*1300</td>
<td>Programming</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CIS*1910</td>
<td>Discrete Structures in Computing I</td>
<td>[0.50]</td>
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</table>

1.00 credits in the Area of Application or electives

**Semester 2 - Winter**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS*2250</td>
<td>Software Design II</td>
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<tr>
<td>CIS*2500</td>
<td>Intermediate Programming</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MATH*1160</td>
<td>Linear Algebra I</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

1.00 credits in the Area of Application or electives

**Summer Semester - Off**

**Semester 3 - Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CIS*2030</td>
<td>Structure and Application of Microcomputers</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CIS*2430</td>
<td>Object Oriented Programming</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CIS*2520</td>
<td>Data Structures</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CIS*3250</td>
<td>Software Design III</td>
<td>[0.50]</td>
</tr>
<tr>
<td>COOP*1100</td>
<td>Introduction to Co-operative Education</td>
<td>[0.00]</td>
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</table>

0.50 credits in the Area of Application or electives

**Semester 4 - Winter**

<table>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CIS*2750</td>
<td>Software Systems Development and Integration</td>
<td>[0.75]</td>
</tr>
<tr>
<td>CIS*3110</td>
<td>Operating Systems I</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CIS*3490</td>
<td>The Analysis and Design of Computer Algorithms</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

0.75 credits in the Area of Application or elective

**Summer Semester**

COOP*1000 Work Term 1

**Fall Semester**

COOP*2000 Work Term 2

**Semester 5 - Winter**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS*3750</td>
<td>System Analysis and Design in Applications</td>
<td>[0.75]</td>
</tr>
</tbody>
</table>

0.50 CIS electives at the 3000 level or above

1.25 credits in the Area of Application or electives

**Summer Semester**

COOP*3000 Work Term 3

**Semester 6 - Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>CIS*3760</td>
<td>Software Engineering</td>
<td>[0.75]</td>
</tr>
<tr>
<td>STAT*2040</td>
<td>Statistics I</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

0.50 credits in CIS at 3000 level or above

0.75 credits in the Area of Application or electives

**Winter Semester**

COOP*4000 Work Term 4

**Summer Semester**

COOP*5000 Work Term 5

**Semester 7 - Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CIS*3260</td>
<td>Software Design IV</td>
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<tr>
<td>CIS*4150</td>
<td>Software Reliability and Testing</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CIS*4300</td>
<td>Human Computer Interaction</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

1.00 credits in the Area of Application or electives

**Semester 8 - Winter**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS*4250</td>
<td>Software Design V</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

1.50 credits in the Area of Application or electives

0.50 credits in CIS at the 4000 level

2019-2020 Undergraduate Calendar

Last Revision: July 4, 2019
Bachelor of Engineering [B.Eng.]

Program Information

Objectives of the Program

Students in this program obtain a liberal engineering education, which includes a comprehensive core of science, mathematics and engineering science that provides a strong foundation for engineering design and analysis. This enables students to undertake the solution of engineering problems in the areas of biological, biomedical, computer, engineering systems and computing, environmental, mechanical and water resources. Core subjects, combined with elective opportunities, provide an understanding of the connection between engineering and science, coupled with the interdisciplinary skills needed to address the problems and challenges faced by engineers in society today.

The curriculum includes a strong emphasis on engineering design. Students engage in engineering design throughout the program, and gain experience in computer aided design and modeling, conceptual design and physical construction. Emphasis is on teamwork and communications skills, as well as working on interdisciplinary projects.

Career opportunities are open in many segments of the economy. Examples are: consulting services to municipalities, utilities and industry; resource agencies in advisory, regulatory, planning and utilization; service industries of construction, power and water supply and public health; manufacturing, design of computer and control systems, hardware and software development; mechatronics and emerging energy systems; medical devices, pharmaceutical and food industries and industrial ergonomics; academic research and graduate studies within and without the field of engineering.

Many engineers assume management responsibilities after gaining experience in design, development and operations. The balance provided by liberal arts and engineering education allows graduates to enjoy a great deal of career mobility.

Accreditation

The baccalaureate degree programs in all engineering programs are accredited by the Canadian Engineering Accreditation Board of Engineers Canada. Graduates from accredited engineering programs have the educational requirements to apply for membership in the Professional Engineers Ontario (PEO) and other provinces after a number of years of acceptable engineering experience and successful completion of a PEO examination in engineering law and ethics.

Requirements of the Program

Students combine their required courses in mathematics, physical sciences and engineering with additional credits providing the opportunity for specialization in: one of the programs; complementary studies courses; and elective subjects. Complementary studies, consist of courses in the social sciences, arts, management, engineering economics and communication. They complement the technical content of the curriculum. All credits are selected according to the schedule of studies for the student's chosen program. Restrictions apply to the number of non-core credits which may be at the 1000 level. Further information on approved courses may be obtained from the B.Eng. Program Guide available from the director or program counsellor of the School of Engineering.

Programs

Entry into a specific B.Eng. program is done two ways. Students can select their desired program of study (major) at the time of application. If accepted, students will be given an offer to their program of choice. Students also have the option of selecting the Undeclared First Year (Undeclared Stream) entry point due to the similarities of first year. Students in the Undeclared Stream then normally select their specific program of study during course selection for Semester II. Students in the Undeclared stream are strongly encouraged to meet with their Program Counsellor during Semester I. The School's Associate Director - Undergraduate Affairs or designate approve program selection during the semester add periods. There are no enrollment caps on any program, so students are free to select their programs of choice. Students wanting to make a switch in majors after the above dates are free to do so with prior approval, but will be off sequence and may be required to take additional courses.

The available programs are:

- Undeclared First Year: Students selecting this entry point are required to select one of the B.Eng. Majors at the time of course selection in Semester II.
- Biological Engineering - the application of engineering to the control and management of biological processes, environments, and human factors in engineering design.
- Biomedical Engineering - the application of engineering to health and medicine.
- Computer Engineering - the application of engineering to the design, fabrication, and testing of computing machines and computer systems.
- Engineering Systems and Computing - the application of engineering to the design, operation and management of data sensing, transmission and processing systems, and of control systems.
- Environmental Engineering - the application of engineering to protect and restore the environment, through the prevention and treatment of gaseous, liquid and solid wastes.
- Mechanical Engineering - The application of engineering to the design, manufacturing and control of mechanical and electro-mechanical equipment, systems and devices.

Water Resources Engineering - the application of engineering to the control and management of water and soil resources to meet human needs while sustaining the natural environment.

The schedule of studies for each program is provided below but guidance in the selection of appropriate courses is available from the program counsellor of the School of Engineering.

Additional Course Requirements

Students lacking specific subject requirements are advised to consult the Recommendations and Notes in Section IV--Admission Information-B.Eng.

Continuation of Study

Students are advised to consult the regulations for continuation of study within the program which are outlined in detail in Section VIII, Undergraduate Degree Regulation & Procedures. Students will be ineligible to continue in the B.Eng. program and will not be readmitted to the degree program if the same course is failed three times.

Normally, students in the B.Eng. program will be permitted only one supplemental privilege during their studies. It will usually be granted for 3000 or 4000 level courses only.

Conditions for Graduation

To qualify for the degree the student must complete the courses required for a B.Eng. program and must achieve an overall minimum cumulative average of at least 60% and a minimum cumulative average of at least 60% in all ENGG courses.

Co-operative Education

Students studying for the B.Eng. degree may participate in a Co-operative Education program following the completion of the first 4 semesters of study. The Co-operative Education program consists of a minimum of 4 semesters of experience in industry with employers who participate in the program. Reports and assignments are graded by a faculty supervisor with assistance from the employer. Evaluations of Co-op semesters are recorded on the student's academic record. The Co-operative Education program provides an excellent opportunity for students to obtain work experience in industry directly related to their field of study. Interested students should consult their program counsellor.

Students wishing to participate in the Co-operative Education program should indicate their intention to do so by applying for admission to the Co-op program on entrance. Following the completion of semester 2, in-course applicants will be considered for admission to the Co-op program if space permits.

Successful applicants will:

1. have a minimum cumulative average of 70% in semesters 1 and 2
2. have successfully completed all of the credits required in the schedule of studies for semesters 1 and 2
3. be employable in Canada or be in possession of an appropriate work-permit for Co-op students
4. have obtained the approval of their Co-op advisor in the school to participate in the program. The Co-op advisor's approval will signify that the schedule of work semesters in the Co-op program as planned by the student is compatible with the schedule of studies in the program in which the student is enrolled.

5. completion of COOP*1100 is a requirement for entry into the first work term.

Please refer to Co-operative Education Program for Admission requirements into the Co-op Program.

B. Eng. Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Semester</th>
<th>Yr. 1</th>
<th>Yr. 2</th>
<th>Yr. 3</th>
<th>Yr. 4</th>
<th>Yr. 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>work</td>
</tr>
<tr>
<td>Winter</td>
<td>2</td>
<td>4</td>
<td>work</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Summer</td>
<td>work</td>
<td>work</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All candidates must complete a minimum of 4 of the preceding 5 work terms with at least one work-term in each of a Fall, Winter and Summer semester. Students are eligible to participate in a maximum of two (2) work terms commencing in the summer and must follow the academic work schedule as outlined in the Co-operative Education & Career Services website.

Undeclared First Year Entry - B.Eng. Program

School of Engineering, College of Engineering and Physical Sciences

Semester 1 - Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit Hours</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>CHEM*1040</td>
<td>0.50</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>ENGG*1100</td>
<td>0.75</td>
<td>Engineering and Design I</td>
</tr>
<tr>
<td>MATH*1200</td>
<td>0.50</td>
<td>Calculus I</td>
</tr>
<tr>
<td>PHYS*1130</td>
<td>0.50</td>
<td>Physics with Applications</td>
</tr>
<tr>
<td>One of: CIS*1300</td>
<td>0.50</td>
<td>Programming</td>
</tr>
<tr>
<td>CIS*1500</td>
<td>0.50</td>
<td>Introduction to Programming</td>
</tr>
</tbody>
</table>

Note: Students planning to declare one of Computer Engineering or Engineering Systems and Computing should take CIS*1300. This course is required for progression into CIS*2500 in Semester 2
Semester 2 - Winter
(for students planning to declare one of: Biological Engineering, Biomedical Engineering, Environmental Engineering, Water Resources Engineering)
CHEM*1050 [0.50] General Chemistry II
ENGG*1210 [0.50] Engineering Mechanics I
ENGG*1500 [0.50] Engineering Analysis
MATH*1210 [0.50] Calculus II
PHYS*1010 [0.50] Introductory Electricity and Magnetism

Semester 2 - Winter
(for students planning to declare one of: Computer Engineering, Engineering Systems and Computing)
CIS*2500 [0.50] Intermediate Programming
ENGG*1210 [0.50] Engineering Mechanics I
ENGG*1500 [0.50] Engineering Analysis
MATH*1210 [0.50] Calculus II
PHYS*1010 [0.50] Introductory Electricity and Magnetism

0.50 restricted electives

Biological Engineering Program (BIOE)
School of Engineering, College of Engineering and Physical Sciences
Students interested in problems requiring the application of knowledge from both the biological sciences and engineering will find a challenge as a Biological Engineer. This field of engineering is the application of principles, methods and concepts of biology to systems and tools, ranging in scale from molecular to ecosystem level. This field combines engineering principles with life sciences to design creative solutions for biological systems, ranging in scale from molecular to ecosystem level. This field combines engineering principles with life sciences to design creative solutions for biological systems.

Major (Honours Program)
Semester 1
CHEM*1040 [0.50] General Chemistry I
ENGG*1100 [0.75] Engineering and Design I
ENGG*1500 [0.50] Engineering Analysis
MATH*1200 [0.50] Calculus I
PHYS*1130 [0.50] Physics with Applications

Semester 2
CHEM*1050 [0.50] General Chemistry II
CIS*1500 [0.50] Introduction to Programming
ENGG*1210 [0.50] Engineering Mechanics I
MATH*1210 [0.50] Calculus II
PHYS*1010 [0.50] Introductory Electricity and Magnetism

Semester 3
BIOL*1080 [0.50] Biological Concepts of Health
ENGG*2230 [0.50] Fluid Mechanics
ENGG*2400 [0.50] Engineering Systems Analysis
MATH*2270 [0.50] Applied Differential Equations
STAT*2120 [0.50] Probability and Statistics for Engineers

One of:
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology

Semester 4
BIOC*2580 [0.50] Introduction to Biochemistry
ENGG*2100 [0.75] Engineering and Design II
ENGG*2120 [0.50] Material Science
ENGG*2450 [0.50] Electric Circuits
ENGG*2660 [0.50] Biological Engineering Systems I
MATH*2130 [0.50] Numerical Methods

Semester 5
ENGG*3160 [0.50] Biological Engineering Systems II
ENGG*3260 [0.50] Thermodynamics
ENGG*3450 [0.50] Electronic Devices
ENGG*3830 [0.50] Bio-Process Engineering
HIST*1250 [0.50] Science and Technology in a Global Context

0.50 restricted electives

Semester 6
ENGG*3100 [0.75] Engineering and Design III
ENGG*3170 [0.50] Biomechanics
ENGG*3410 [0.50] Systems and Control Theory
ENGG*3430 [0.50] Heat and Mass Transfer

1.00 restricted electives

Semester 7
ENGG*3240 [0.50] Engineering Economics
ENGG*4000 [0.00] Proposal for Engineering Design IV
ENGG*4380 [0.75] Bioreactor Design
ENGG*4390 [0.75] Bio-instrumentation Design

1.00 restricted electives

Semester 8
ENGG*4110 [1.00] Biological Engineering Design IV

1.75 restricted electives

Restricted Electives (see Program Guide for more information)
The Engineering Program requires Biological Engineering students to complete the following combination of elective credits to complete their program:

- 1.00 credits from the BIOE-1 Biological Engineering electives
- 0.75 credits from the BIOE-2 Biological Engineering design electives
- 2.00 credits from Complementary Studies electives
- 0.50 credits in Free Electives

Consult the Program Guide for further information on the prerequisite requirements specific to each elective. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

Biological Engineering Program Co-op (BIOE:C)
School of Engineering, College of Engineering and Physical Sciences
Students interested in problems requiring the application of knowledge from both the biological sciences and engineering will find a challenge as a Biological Engineer. This field of engineering is the application of principles, methods and concepts of biology to systems and tools, ranging in scale from molecular to ecosystem level. This field combines engineering principles with life sciences to design creative solutions for biological systems, ranging in scale from molecular to ecosystem level. This field combines engineering principles with life sciences to design creative solutions for biological systems.

Program Requirements
The Co-op program in Biological Engineering is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Biological Engineering Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
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<tbody>
<tr>
<td></td>
<td>Academic Semester 1</td>
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<tr>
<td>1</td>
<td>Academic Semester 3</td>
<td>COOP*1100</td>
<td>COOP*1000 Work Term I</td>
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<td>2</td>
<td>Academic Semester 5</td>
<td>COOP*2000 Work Term II</td>
<td>COOP*3000 Work Term III</td>
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<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
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<td>4</td>
<td>COOP*5000 Work Term V</td>
<td>Academic Semester 8</td>
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</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term requirements grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Coordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (25.50 Total Credits)*
19.25 - Required Core Courses
1.00 – BIOE-1 Biological Engineering Electives
0.75 – BIOE-2 Biological Engineering Design Electives
2.00 – Complementary Studies Electives
0.50 – Free Electives
2.00 Co-op Work Terms
Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. A fifth Co-op work term is optional and if completed, the total number of credits will equal 26.00.

See Program Guide for more information on restricted electives and their prerequisite requirements. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

The recommended program sequence is outlined below.

### Major (Honours Program)

<table>
<thead>
<tr>
<th>Semester 1 - Fall</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM*1040</td>
<td>General Chemistry I</td>
<td>0.50</td>
</tr>
<tr>
<td>ENGG*1100</td>
<td>Engineering and Design I</td>
<td>0.75</td>
</tr>
<tr>
<td>ENGG*1500</td>
<td>Engineering Analysis</td>
<td>0.50</td>
</tr>
<tr>
<td>MATH*1200</td>
<td>Calculus I</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*1130</td>
<td>Physics with Applications</td>
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<table>
<thead>
<tr>
<th>Semester 2 - Winter</th>
<th>Course</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>CHEM*1050</td>
<td>General Chemistry II</td>
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</tr>
<tr>
<td>CIS*1500</td>
<td>Introduction to Programming</td>
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</tr>
<tr>
<td>ENGG*1210</td>
<td>Engineering Mechanics I</td>
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<tr>
<td>MATH*1210</td>
<td>Calculus II</td>
<td>0.50</td>
</tr>
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<td>PHYS*1010</td>
<td>Introductory Electricity and Magnetism</td>
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<thead>
<tr>
<th>Semester 3 - Fall</th>
<th>Course</th>
<th>Credits</th>
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<tr>
<td>BIOL*1080</td>
<td>Biological Concepts of Health</td>
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<tr>
<td>COOP*1100</td>
<td>Introduction to Co-operative Education</td>
<td>0.00</td>
</tr>
<tr>
<td>ENGG*2230</td>
<td>Fluid Mechanics</td>
<td>0.50</td>
</tr>
<tr>
<td>ENGG*2400</td>
<td>Engineering Systems Analysis</td>
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<td>MATH*2270</td>
<td>Applied Differential Equations</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*2120</td>
<td>Probability and Statistics for Engineers</td>
<td>0.50</td>
</tr>
</tbody>
</table>

One of:

- BIOL*1070 | Discovering Biodiversity | 0.50 |
- BIOL*1090 | Introduction to Molecular and Cellular Biology | 0.50 |

<table>
<thead>
<tr>
<th>Semester 4 - Winter</th>
<th>Course</th>
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<tr>
<td>BIOC*2580</td>
<td>Introduction to Biochemistry</td>
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<tr>
<td>ENGG*2100</td>
<td>Engineering and Design II</td>
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</tr>
<tr>
<td>ENGG*2120</td>
<td>Material Science</td>
<td>0.50</td>
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<tr>
<td>ENGG*2450</td>
<td>Electric Circuits</td>
<td>0.50</td>
</tr>
<tr>
<td>ENGG*2660</td>
<td>Biological Engineering Systems I</td>
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<tr>
<td>MATH*2130</td>
<td>Numerical Methods</td>
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<tr>
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<table>
<thead>
<tr>
<th>Semester 5 - Fall</th>
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</thead>
<tbody>
<tr>
<td>ENGG*3160</td>
<td>Biological Engineering Systems II</td>
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</tr>
<tr>
<td>ENGG*3260</td>
<td>Thermodynamics</td>
<td>0.50</td>
</tr>
<tr>
<td>ENGG*3450</td>
<td>Electronic Devices</td>
<td>0.50</td>
</tr>
<tr>
<td>ENGG*3830</td>
<td>Bio-Process Engineering</td>
<td>0.50</td>
</tr>
<tr>
<td>HIST*1250</td>
<td>Science and Technology in a Global Context</td>
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0.50 restricted electives

<table>
<thead>
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<th>Winter Semester</th>
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<tr>
<td>COOP*2000</td>
<td>Co-op Work Term II</td>
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<tr>
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<td>COOP*3000</td>
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<th>Semester 6 - Fall</th>
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<tbody>
<tr>
<td>ENGG*3240</td>
<td>Engineering Economics</td>
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<tr>
<td>ENGG*4380</td>
<td>Bioreactor Design</td>
<td>0.75</td>
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<td>ENGG*4390</td>
<td>Bio-instrumentation Design</td>
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1.00 restricted electives

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<thead>
<tr>
<th>Semester 7 - Winter</th>
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<tr>
<td>ENGG*3100</td>
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<td>ENGG*3170</td>
<td>Biomaterials</td>
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<tr>
<td>ENGG*3410</td>
<td>Systems and Control Theory</td>
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<td>ENGG*3430</td>
<td>Heat and Mass Transfer</td>
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<td>PATH*3610</td>
<td>Principles of Disease</td>
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0.50 restricted electives

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<tbody>
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<th>Course</th>
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<tr>
<td>COOP*5000</td>
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<tr>
<td>ENGG*4000</td>
<td>Proposal for Engineering Design IV</td>
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<thead>
<tr>
<th>Semester 8 - Winter</th>
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</thead>
<tbody>
<tr>
<td>ENGG*4110</td>
<td>Biomedical Engineering Design IV</td>
<td>1.00</td>
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</table>

1.75 restricted electives

### Biomedical Engineering Program (BME)

School of Engineering, College of Engineering and Physical Sciences

Biomedical Engineering is a field of engineering that deals with health and medicine. (e.g.: electronic and mechanical devices used on biological materials, animals and humans, medical implants and instruments, ergonomics, bioinstrumentation, imaging and pharmacology). Graduates in Biomedical engineering are able to apply mathematical, scientific and engineering principles to a wide variety of fields and find employment across the private and public sectors of the health care industry. The program provides students with a common base of knowledge essential to engineering, and then allows them to select from a menu of electives to attain a degree of specialization in one of three areas, or to choose electives which broaden their general knowledge base. Elective concentrations are available in the areas of biomechanics; biosignal processing; and pharmaceuticals. The program is built around the concept of interdisciplinary application of engineering principles to health related problems.

### Major (Honours Program)

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM*1040</td>
<td>General Chemistry I</td>
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<tr>
<td>ENGG*1100</td>
<td>Engineering and Design I</td>
<td>0.75</td>
</tr>
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<td>ENGG*1500</td>
<td>Engineering Analysis</td>
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<td>MATH*1200</td>
<td>Calculus I</td>
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<td>PHYS*1130</td>
<td>Physics with Applications</td>
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<table>
<thead>
<tr>
<th>Semester 2</th>
<th>Course</th>
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<tbody>
<tr>
<td>CHEM*1050</td>
<td>General Chemistry II</td>
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</tr>
<tr>
<td>CIS*1500</td>
<td>Introduction to Programming</td>
<td>0.50</td>
</tr>
<tr>
<td>ENGG*1210</td>
<td>Engineering Mechanics I</td>
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<td>MATH*1210</td>
<td>Calculus II</td>
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<tr>
<td>PHYS*1010</td>
<td>Introductory Electricity and Magnetism</td>
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<table>
<thead>
<tr>
<th>Semester 3</th>
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<tbody>
<tr>
<td>BIOL*1080</td>
<td>Biological Concepts of Health</td>
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<tr>
<td>COOP*1100</td>
<td>Introduction to Co-operative Education</td>
<td>0.00</td>
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<tr>
<td>ENGG*2230</td>
<td>Fluid Mechanics</td>
<td>0.50</td>
</tr>
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<td>ENGG*2400</td>
<td>Engineering Systems Analysis</td>
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<td>MATH*2270</td>
<td>Applied Differential Equations</td>
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</tr>
<tr>
<td>STAT*2120</td>
<td>Probability and Statistics for Engineers</td>
<td>0.50</td>
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</tbody>
</table>

One of:

- BIOL*1070 | Discovering Biodiversity | 0.50 |
- BIOL*1090 | Introduction to Molecular and Cellular Biology | 0.50 |

<table>
<thead>
<tr>
<th>Semester 4</th>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOC*2580</td>
<td>Introduction to Biochemistry</td>
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<tr>
<td>ENGG*2100</td>
<td>Engineering and Design II</td>
<td>0.75</td>
</tr>
<tr>
<td>ENGG*2120</td>
<td>Material Science</td>
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<tr>
<td>ENGG*2450</td>
<td>Electric Circuits</td>
<td>0.50</td>
</tr>
<tr>
<td>ENGG*2660</td>
<td>Biological Engineering Systems I</td>
<td>0.50</td>
</tr>
<tr>
<td>MATH*2130</td>
<td>Numerical Methods</td>
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<thead>
<tr>
<th>Summer Semester</th>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COOP*1000</td>
<td>Co-op Work Term I</td>
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<table>
<thead>
<tr>
<th>Semester 5</th>
<th>Course</th>
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<tbody>
<tr>
<td>ENGG*3160</td>
<td>Biological Engineering Systems II</td>
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<tr>
<td>ENGG*3260</td>
<td>Thermodynamics</td>
<td>0.50</td>
</tr>
<tr>
<td>ENGG*3450</td>
<td>Electronic Devices</td>
<td>0.50</td>
</tr>
<tr>
<td>ENGG*3830</td>
<td>Bio-Process Engineering</td>
<td>0.50</td>
</tr>
<tr>
<td>HIST*1250</td>
<td>Science and Technology in a Global Context</td>
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0.50 restricted electives

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<tr>
<th>Winter Semester</th>
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<tbody>
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<table>
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<tbody>
<tr>
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<tr>
<th>Semester 6</th>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGG*3240</td>
<td>Engineering Economics</td>
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<tr>
<td>ENGG*4380</td>
<td>Bioreactor Design</td>
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<tr>
<td>ENGG*4390</td>
<td>Bio-instrumentation Design</td>
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1.00 restricted electives

<table>
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<tbody>
<tr>
<td>ENGG*3100</td>
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<td>ENGG*3170</td>
<td>Biomaterials</td>
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</tr>
<tr>
<td>ENGG*3410</td>
<td>Systems and Control Theory</td>
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<td>ENGG*3430</td>
<td>Heat and Mass Transfer</td>
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</tr>
<tr>
<td>PATH*3610</td>
<td>Principles of Disease</td>
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0.50 restricted electives

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<tr>
<td>ENGG*4180</td>
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1.75 restricted electives

### Restricted Electives (see Program Guide for more information)

The Engineering Program requires Biomedical Engineering students to complete the following combination of elective credits to complete their program:

- 2.50 credits from the BME-1 Biomedical Engineering electives
- 0.75 credits from the BME-2 Biomedical Engineering design electives
- 2.00 credits from Complementary Studies electives

Consult the Program Guide for further information on the prerequisite requirements specific to each elective. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.
Biomedical Engineering Program Co-op (BME:C)

School of Engineering, College of Engineering and Physical Sciences

Biomedical Engineering is a field of engineering that deals with health and medicine. (e.g.: electronic and mechanical devices used on biological materials, animals and humans, medical implants and instruments, ergonomics, bioinstrumentation, imaging and pharmacology). Graduates in Biomedical engineering are able to apply mathematical, scientific and engineering principles to a wide variety of fields and find employment across the private and public sectors of the health care industry. The program provides students with a common base of knowledge essential to engineering, and then allows them to select from a menu of electives to attain a degree of specialization in one of three areas, or to choose electives which broaden their general knowledge base. Elective concentrations are available in the areas of biomechanics; biosignal processing; and pharmaceuticals. The program is built around the concept of interdisciplinary application of engineering principles to health related problems.

Program Requirements
The Co-op program in Biomedical Engineering is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Biomedical Engineering Academic and Co-op Work Term Schedule

<table>
<thead>
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<td>Academic Semester 5</td>
<td>COOP*2000 Work Term II</td>
<td>COOP*3000 Work Term III</td>
</tr>
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<td>Academic Semester 7</td>
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To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (25.75 Total Credits)*
18.50 - Required Core Courses
2.50 – BME-1 Biomedical Engineering Electives
0.75 – BME-2 Biomedical Engineering Design Electives
2.00 – Complementary Studies Electives
2.00 Co-op Work Terms

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 26.25.

See Program Guide for more information on restricted electives and their prerequisite requirements. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

The recommended program sequence is outlined below.

Major (Honours Program)

Semester 1 - Fall
CHEM*1040 [0.50] General Chemistry I
ENGG*1100 [0.75] Engineering and Design I
ENGG*1500 [0.50] Engineering Analysis
MATH*1200 [0.50] Calculus I
PHYS*1130 [0.50] Physics with Applications

Semester 2 - Winter
CHEM*1050 [0.50] General Chemistry II
CIS*1500 [0.50] Introduction to Programming
ENGG*1210 [0.50] Engineering Mechanics I
MATH*1210 [0.50] Calculus II
PHYS*1010 [0.50] Introductory Electricity and Magnetism

Semester 3 - Fall
COOP*1100 [0.00] Introduction to Co-operative Education
ENGG*2100 [0.75] Engineering and Design II
ENGG*2120 [0.50] Material Science
ENGG*2160 [0.50] Engineering Mechanics II
ENGG*2400 [0.50] Engineering Systems Analysis

MATH*2270 [0.50] Applied Differential Equations

Semester 4 - Winter
BIOL*1080 [0.50] Biological Concepts of Health
BIOM*2000 [0.50] Concepts in Human Physiology
ENGG*2230 [0.50] Fluid Mechanics
ENGG*2450 [0.50] Electric Circuits
MATH*2130 [0.50] Numerical Methods
STAT*2120 [0.50] Probability and Statistics for Engineers

Note: Students pursuing the pharmaceutical series of electives may select ENGG*2660 in Semester 4. If ENGG*2660 is selected, students must select BIOM*2000 in Semester 6 in place of a 0.50 restricted elective.

Summer Semester
COOP*1000 [0.50] Co-op Work Term I

Semester 5 - Fall
ENGG*3260 [0.50] Thermodynamics
ENGG*3390 [0.50] Signal Processing
ENGG*3450 [0.50] Electronic Devices
HIST*1250 [0.50] Science and Technology in a Global Context

Winter Semester
COOP*2000 [0.50] Co-op Work Term II
COOP*3000 [0.50] Co-op Work Term III

Semester 6 - Winter
ENGG*3240 [0.50] Engineering Economics
ENGG*4390 [0.75] Bio-instrumentation Design

Semester 7 - Winter
ENGG*3100 [0.75] Engineering and Design III
ENGG*3170 [0.50] Biomaterials
ENGG*3410 [0.50] Systems and Control Theory
ENGG*3430 [0.50] Heat and Mass Transfer
PATH*3610 [0.50] Principles of Disease

Computer Engineering Program (CENG)

School of Engineering, College of Engineering and Physical Sciences

Computer Engineering is a field of engineering that focuses on the design and organization of computer systems. Graduates in Computer Engineering are able to apply mathematical, scientific and engineering principles to design and integrate computer systems suitable for applications in a wide range of fields. The program provides students with a common base of knowledge essential to computer engineering and then allows them to select from a menu of electives to attain a degree of specialization in one of four areas or to choose electives to broaden their knowledge base. Elective concentrations are available in areas of Electronic Design automation, Software Design, Artificial Intelligence and Robotics, and Microsystems.

Major (Honours Program)

Semester 1
CHEM*1040 [0.50] General Chemistry I
CIS*1300 [0.50] Programming
ENGG*1100 [0.75] Engineering and Design I
MATH*1200 [0.50] Calculus I
PHYS*1130 [0.50] Physics with Applications

Semester 2
CIS*2500 [0.50] Intermediate Programming
ENGG*1210 [0.50] Engineering Mechanics I
ENGG*1500 [0.50] Engineering Analysis
MATH*1210 [0.50] Calculus II
PHYS*1010 [0.50] Introductory Electricity and Magnetism

Semester 3
CIS*2430 [0.50] Object Oriented Programming
CIS*2520 [0.50] Data Structures
ENGG*2400 [0.50] Engineering Systems Analysis

2019-2020 Undergraduate Calendar

Reference: Last Revision: July 4, 2019
Semester 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
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<tr>
<td>ENGG*2910</td>
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<td>Discrete Structures in Computing II</td>
</tr>
<tr>
<td>ENGG*2100</td>
<td>0.75</td>
<td>Engineering and Design II</td>
</tr>
<tr>
<td>ENGG*2450</td>
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<td>Electric Circuits</td>
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<tr>
<td>ENGG*3380</td>
<td>0.50</td>
<td>Computer Organization and Design</td>
</tr>
<tr>
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Semester 5

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<td>Signal Processing</td>
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<td>ENGG*3450</td>
<td>0.50</td>
<td>Electronic Devices</td>
</tr>
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<td>ENGG*3640</td>
<td>0.50</td>
<td>Microcomputer Interfacing</td>
</tr>
<tr>
<td>HIST*1250</td>
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Semester 6

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<td>Operating Systems I</td>
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<tr>
<td>CIS*3490</td>
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<td>The Analysis and Design of Computer Algorithms</td>
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<tr>
<td>ENGG*3100</td>
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<td>Engineering and Design III</td>
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<td>ENGG*3210</td>
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<td>Communication Systems</td>
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<td>ENGG*3410</td>
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Semester 7

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<td>Embedded Reconfigurable Computing Systems</td>
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<tr>
<td>ENGG*3240</td>
<td>0.50</td>
<td>Engineering Economics</td>
</tr>
<tr>
<td>ENGG*4000</td>
<td>0.00</td>
<td>Proposal for Engineering Design IV</td>
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<td>ENGG*4420</td>
<td>0.75</td>
<td>Real-time Systems Design</td>
</tr>
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<td>ENGG*4450</td>
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<td>Large-Scale Software Architecture Engineering</td>
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Semester 8

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<td>Advanced Computer Architecture</td>
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<td>ENGG*4550</td>
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<td>VLSI Digital Design</td>
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Restricted Electives (see Program Guide for more information)

- 1.50 credits from the CENG-1 Computer Engineering electives
- 2.00 credits from Complementary Studies electives

Consult the Program Guide for further information on the prerequisite requirements specific to each elective. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

Computer Engineering Program Co-op (CENG:C)

School of Engineering, College of Engineering and Physical Sciences

Computer Engineering is a field of engineering that focuses on the design and organization of computer systems. Graduates in Computer Engineering are able to apply mathematical, scientific and engineering principles to design and integrate computer systems suitable for applications in a wide range of fields. The program provides students with a common base of knowledge essential to computer engineering and then allows them to select from a menu of electives to attain a degree of specialization in one of four areas or to choose electives to broaden their knowledge base. Elective concentrations are available in areas of Electronic Design automation, Software Design, Artificial Intelligence and Robotics, and Microsystems.

Program Requirements

The Co-op program in Computer Engineering is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Computer Engineering Academic and Co-op Work Term Schedule

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<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
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<tbody>
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<td>Academic Semester 1</td>
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<tr>
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To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (26.00 Total Credits)*

- 20.50 - Required Core Courses
- 1.50 – CENG-1 Computer Engineering Electives
- 2.00 – Complementary Studies Electives
- 2.00 Co-op Work Terms

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 26.50.

See Program Guide for more information on restricted electives and their prerequisite requirements. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

The recommended program sequence is outlined below.

Major (Honours Program)

Semester 1 - Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
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<tr>
<td>CHEM*1040</td>
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<tr>
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</tr>
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Semester 2 - Winter

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<td>ENGG*1500</td>
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<td>MATH*1210</td>
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<tr>
<td>PHYS*1010</td>
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<td>Introductory Electricity and Magnetism</td>
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Semester 3 - Fall

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<th>Course Code</th>
<th>Credits</th>
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<tr>
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<td>CIS*2520</td>
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<td>Data Structures</td>
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<td>ENGG*2400</td>
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<td>Engineering Systems Analysis</td>
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<td>MATH*2270</td>
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<td>Applied Differential Equations</td>
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<td>STAT*2120</td>
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Semester 4 - Winter

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Summer Semester

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Semester 5 - Fall

<table>
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<td>Signal Processing</td>
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<td>ENGG*3450</td>
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<td>ENGG*3640</td>
<td>0.50</td>
<td>Microcomputer Interfacing</td>
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<tr>
<td>HIST*1250</td>
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Winter Semester

<table>
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<tbody>
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Summer Semester

<table>
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<th>Course Name</th>
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<tbody>
<tr>
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Semester 6 - Fall

<table>
<thead>
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<th>Credits</th>
<th>Course Name</th>
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</thead>
<tbody>
<tr>
<td>ENGG*3050</td>
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<td>Embedded Reconfigurable Computing Systems</td>
</tr>
<tr>
<td>ENGG*3240</td>
<td>0.50</td>
<td>Engineering Economics</td>
</tr>
<tr>
<td>ENGG*4420</td>
<td>0.75</td>
<td>Real-time Systems Design</td>
</tr>
<tr>
<td>ENGG*4450</td>
<td>0.50</td>
<td>Large-Scale Software Architecture Engineering</td>
</tr>
</tbody>
</table>

1.00 restricted electives
Engineering Systems and Computing Program (ESC)

School of Engineering, College of Engineering and Physical Sciences

In the last quarter century, the computer has grown so rapidly in importance that engineering, science, business and industry could not function without it. With this growth, a need has evolved for specialists who can incorporate computers and information into complex industrial processes. The Engineering Systems and Computing program has been conceived to satisfy this need. Graduates from this program will have, in addition to the basic engineering skills, the ability to identify application areas where computer technology represents the optimum solution, specify appropriate software for process control, data reduction and/or expert system implementation and integrate the computer into the overall system application.

**Major (Honours Program)**

**Semester 1**
- CHEM*1040 [0.50] General Chemistry I
- CIS*1300 [0.50] Programming
- ENGG*1100 [0.75] Engineering and Design I
- MATH*1200 [0.50] Calculus I
- PHYS*1130 [0.50] Physics with Applications

**Semester 2**
- CIS*2500 [0.50] Intermediate Programming
- ENGG*1210 [0.50] Engineering Mechanics I
- ENGG*1500 [0.50] Engineering Analysis
- MATH*1210 [0.50] Calculus II
- PHYS*1010 [0.50] Introductory Electricity and Magnetism

**Semester 3**
- CIS*2430 [0.50] Object Oriented Programming
- CIS*2520 [0.50] Data Structures
- ENGG*2230 [0.50] Fluid Mechanics
- ENGG*2400 [0.50] Engineering Systems Analysis
- ENGG*2410 [0.50] Digital Systems Design Using Descriptive Languages
- MATH*2270 [0.50] Applied Differential Equations

**Semester 4**
- ENGG*2100 [0.75] Engineering and Design II
- ENGG*2120 [0.50] Material Science
- ENGG*2450 [0.50] Electric Circuits
- MATH*2130 [0.50] Numerical Methods
- STAT*2120 [0.50] Probability and Statistics for Engineers

**Semester 5**
- ENGG*3260 [0.50] Thermodynamics
- ENGG*3390 [0.50] Signal Processing
- ENGG*3450 [0.50] Electronic Devices
- ENGG*3640 [0.50] Microcomputer Interfacing

**Semester 6**
- ENGG*3100 [0.75] Engineering and Design III
- ENGG*3130 [0.50] Modelling Complex Systems
- ENGG*3410 [0.50] Systems and Control Theory
- ENGG*3430 [0.50] Heat and Mass Transfer
- HIST*1250 [0.50] Science and Technology in a Global Context

**Semester 7**
- ENGG*3240 [0.50] Engineering Economics
- ENGG*4000 [0.00] Proposal for Engineering Design IV
- ENGG*4420 [0.75] Real-time Systems Design

**Semester 8**
- ENGG*4450 [0.50] Large-Scale Software Architecture Engineering

**Fall Semester**
- COOP*5000 [0.50] Co-op Work Term V
- ENGG*4000 [0.00] Proposal for Engineering Design IV

**Semester 8 - Winter**
- ENGG*4170 [1.00] Computer Engineering Design IV
- ENGG*4540 [0.50] Advanced Computer Architecture
- ENGG*4550 [0.50] VLSI Digital Design

**Restricted Electives (see Program Guide for more information)**

The Engineering Program requires Engineering Systems and Computing students to complete the following combination of elective credits to complete their program:

- 1.50 credits from the ESC-1 Engineering Systems and Computing electives
- 0.75 credits from the ESC-2 Engineering Systems and Computing electives
- 2.00 credits from Complementary Studies electives

Consult the Program Guide for further information on the prerequisite requirements specific to each elective. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

**Engineering Systems and Computing Program Co-op (ESC:C)**

School of Engineering, College of Engineering and Physical Sciences

In the last quarter century, the computer has grown so rapidly in importance that engineering, science, business and industry could not function without it. With this growth, a need has evolved for specialists who can incorporate computers and information into complex industrial processes. The Engineering Systems and Computing program has been conceived to satisfy this need. Graduates from this program will have, in addition to the basic engineering skills, the ability to identify application areas where computer technology represents the optimum solution, specify appropriate software for process control, data reduction and/or expert system implementation and integrate the computer into the overall system application.

**Program Requirements**

The Co-op program in Engineering Systems and Computing is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: [https://www.recruitguelph.ca/cecs/]). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

**Engineering Systems and Computing Academic and Co-op Work Term Schedule**

**Credit Summary (25.50 Total Credits)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
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</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

**Credit Summary (25.50 Total Credits)**

19.25 - Required Core Courses
- 1.50 – ESC-1 Engineering Systems and Computing Electives
- 0.75 – ESC-2 Engineering Systems and Computing Electives
- 2.00 – Complementary Studies Electives
- 2.00 Co-op Work Terms

**Note:** A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 26.00.*

See Program Guide for more information on restricted electives and their prerequisite requirements. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

The recommended program sequence is outlined below.

**Major (Honours Program)**

**Semester 1 - Fall**
- CHEM*1040 [0.50] General Chemistry I
- CIS*1300 [0.50] Programming
- ENGG*1100 [0.75] Engineering and Design I
- MATH*1200 [0.50] Calculus I

**Semester 2**
- ENGG*1500 [0.50] Engineering Analysis
- MATH*1210 [0.50] Calculus II

**Semester 3**
- ENGG*2100 [0.75] Engineering and Design II
- ENGG*2120 [0.50] Material Science
- ENGG*2450 [0.50] Electric Circuits
- MATH*2130 [0.50] Numerical Methods

**Semester 4**
- ENGG*3260 [0.50] Thermodynamics
- ENGG*3390 [0.50] Signal Processing
- ENGG*3450 [0.50] Electronic Devices
- ENGG*3640 [0.50] Microcomputer Interfacing

**Semester 5**
- ENGG*3100 [0.75] Engineering and Design III
- ENGG*3130 [0.50] Modelling Complex Systems
- ENGG*3410 [0.50] Systems and Control Theory
- ENGG*3430 [0.50] Heat and Mass Transfer

**Semester 6**
- HIST*1250 [0.50] Science and Technology in a Global Context

**Semester 7**
- ENGG*3240 [0.50] Engineering Economics
- ENGG*4000 [0.00] Proposal for Engineering Design IV
- ENGG*4420 [0.75] Real-time Systems Design

**Semester 8**
- ENGG*4450 [0.50] Large-Scale Software Architecture Engineering

1.00 or 1.25 restricted electives

2.00 – Complementary Studies Electives

**Credit Summary (25.50 Total Credits)**

19.25 - Required Core Courses

1.50 – ESC-1 Engineering Systems and Computing Electives

0.75 – ESC-2 Engineering Systems and Computing Electives

2.00 – Complementary Studies Electives

2.00 Co-op Work Terms

**Note:** A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 26.00.*

See Program Guide for more information on restricted electives and their prerequisite requirements. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

The recommended program sequence is outlined below.

**Major (Honours Program)**

**Semester 1 - Fall**
- CHEM*1040 [0.50] General Chemistry I
- CIS*1300 [0.50] Programming
- ENGG*1100 [0.75] Engineering and Design I
- MATH*1200 [0.50] Calculus I
The degradation of the environment is a concern shared by citizens, government agencies, and those involved in the engineering profession. The School of Engineering, College of Engineering and Physical Sciences offers a Bachelor of Engineering (B.Eng.) degree program with specialization in Environmental Engineering to apply for a Minor in Environmental Engineering. A Minor in Environmental Engineering consists of at least 5.00 course credits. A maximum of 2.50 restricted electives from the above list of electives are allowed. A Minor in Environmental Engineering is open to any engineering degree program except those in Chemical Engineering and Energy Resources & Technologies.

Students must be registered in a B.Eng degree program specialization other than Environmental Engineering to apply for a Minor in Environmental Engineering. A Minor in Environmental Engineering consists of at least 5.00 course credits. A maximum of 2.50 course credits taken as part of the Environmental Engineering Minor may also be applied toward the requirements of the B.Eng. Major specialization.

The following courses (2.00 credits) are required:

- CHEM*1050 [0.50] General Chemistry I
- CHEM*1100 [0.50] General Chemistry II
- ENGG*2120 [0.50] Engineering Mechanics I
- ENGG*2130 [0.50] Engineering Mechanics II
- PHYS*1010 [0.50] Introductory Electricity and Magnetism
- ENGG*2100 [0.75] Engineering and Design I
- ENGG*2120 [0.50] Material Science
- ENGG*2130 [0.50] Introduction to Environmental Engineering
- ENGG*2400 [0.50] Engineering Systems Analysis
- MATH*2270 [0.50] Applied Differential Equations
- ENGG*2230 [0.50] Fluid Mechanics
- MATH*3420 [0.50] Numerical Methods
- STAT*2120 [0.50] Probability and Statistics for Engineers
- ENGG*3180 [0.50] Air Quality
- ENGG*3240 [0.50] Engineering Economics
- ENGG*3260 [0.50] Thermodynamics
- ENGG*3590 [0.50] Water Quality
- ENGG*3650 [0.50] Hydrology
- ENGG*3670 [0.50] Soil Mechanics
- ENGG*3100 [0.75] Engineering and Design III
- ENGG*3220 [0.50] Groundwater Engineering
- ENGG*3410 [0.50] Systems and Control Theory
- ENGG*3430 [0.50] Heat and Mass Transfer
- ENGG*3470 [0.50] Mass Transfer Operations
- ENGG*4120 [1.00] Environmental Engineering Design IV

Restricted Electives (see Program Guide for more information)

The Engineering Program requires Environmental Engineering students to complete the following combination of elective credits to complete their program:

- 1.00 credits from the ENVE-1 Environmental Engineering electives
- 2.00 credits from the ENVE-2 Environmental Engineering electives
- 1.50 credits from Complementary Studies electives

Consult the Program Guide for further information on the prerequisite requirements specific to each elective. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

## Minor (Honours Program)

Students must be registered in a B.Eng degree program specialization other than Environmental Engineering to apply for a Minor in Environmental Engineering. A Minor in Environmental Engineering consists of at least 5.00 course credits. A maximum of 2.50 course credits taken as part of the Environmental Engineering Minor may also be applied toward the requirements of the B.Eng. Major specialization.

The following courses (2.00 credits) are required:

- CHEM*1050 [0.50] General Chemistry I
- CHEM*1100 [0.50] General Chemistry II
- ENGG*2120 [0.50] Engineering Mechanics I
- ENGG*2130 [0.50] Engineering Mechanics II
- PHYS*1010 [0.50] Introductory Electricity and Magnetism
- ENGG*2100 [0.75] Engineering and Design I
- ENGG*2120 [0.50] Material Science
- ENGG*2130 [0.50] Introduction to Environmental Engineering
- ENGG*2400 [0.50] Engineering Systems Analysis
- MATH*2270 [0.50] Applied Differential Equations
- EN GG*2230 [0.50] Fluid Mechanics
- MATH*3420 [0.50] Numerical Methods
- STAT*2120 [0.50] Probability and Statistics for Engineers
- ENGG*3180 [0.50] Air Quality
- ENGG*3240 [0.50] Engineering Economics
- ENGG*3260 [0.50] Thermodynamics
- ENGG*3590 [0.50] Water Quality
- ENGG*3650 [0.50] Hydrology
- ENGG*3670 [0.50] Soil Mechanics
- ENGG*3100 [0.75] Engineering and Design III
- ENGG*3220 [0.50] Groundwater Engineering
- ENGG*3410 [0.50] Systems and Control Theory
- ENGG*3430 [0.50] Heat and Mass Transfer
- ENGG*3470 [0.50] Mass Transfer Operations
- ENGG*4120 [1.00] Environmental Engineering Design IV

## Environmental Engineering Program (ENVE)

School of Engineering, College of Engineering and Physical Sciences

The degradation of the environment is a concern shared by citizens, government agencies, non-governmental agencies and businesses. The Environmental Engineering Program offered by the School of Engineering provides graduates with design and engineering skills to minimize and prevent the impact of human activities on water, soil and air systems. Both simple and innovative solutions are part of the tool box. Graduates will also creatively integrate humanistic and social perspectives in their solutions.

## Major (Honours Program)

### Semester 1

- CHEM*1040 [0.50] General Chemistry I
- ENGG*1100 [0.75] Engineering and Design I
- ENGG*1500 [0.50] Engineering Analysis
- MATH*1200 [0.50] Calculus I
- PHYS*1130 [0.50] Physics with Applications

### Semester 2

- CHEM*1050 [0.50] General Chemistry II

The recommended program sequence is outlined below.

<table>
<thead>
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<th>Year</th>
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<th>Winter</th>
<th>Summer</th>
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<td>COOP*5000 Work Term V</td>
<td>Academic Semester 8</td>
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</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

For additional program information students should consult with their Co-op Coordinator and Co-op Faculty Advisor, listed on the Co-operative Education website.

**Credit Summary (25.50 Total Credits)**

- 19.00 - Required Core Courses
- 1.00 – ENVE-1 Environmental Engineering Electives
- 2.00 – ENVE-2 Environmental Engineering Electives
- 1.50 – Complementary Studies Electives
- 2.00 - Co-op Work Terms

**Note:** A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 26.00.

See Program Guide for more information on restricted electives and their prerequisite requirements. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

**Major (Honours Program)**

**Semester 1 - Fall**

- CHEM*1040 [0.50] General Chemistry I
- ENGG*1100 [0.75] Engineering and Design I
- ENGG*1500 [0.50] Engineering Analysis
- MATH*1200 [0.50] Calculus I
- PHYS*1130 [0.50] Physics with Applications

**Semester 2 - Winter**

- CHEM*1050 [0.50] General Chemistry II
- CIS*1500 [0.50] Introduction to Programming
- ENGG*1210 [0.50] Engineering Mechanics I
- MATH*1210 [0.50] Calculus II
- PHYS*1010 [0.50] Introductory Electricity and Magnetism

**Semester 3 - Fall**

- COOP*1100 [0.00] Introduction to Co-operative Education
- ENGG*2130 [0.50] Introduction to Environmental Engineering
- ENGG*2230 [0.50] Fluid Mechanics
- ENGG*2400 [0.50] Engineering Systems Analysis
- MATH*2270 [0.50] Applied Differential Equations
- STAT*2120 [0.50] Probability and Statistics for Engineers

One of:

- BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
- MICR*2420 [0.50] Introduction to Microbiology

**Semester 4 - Winter**

- ENGG*2100 [0.75] Engineering and Design II
- ENGG*2120 [0.50] Material Science
- ENGG*2560 [0.50] Environmental Engineering Systems
- HIST*1250 [0.50] Science and Technology in a Global Context
- MATH*2130 [0.50] Numerical Methods

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<th>Restricted Electives</th>
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**Summer Semester**

- COOP*1000 [0.50] Co-op Work Term I

**Semester 5 - Fall**

- ENGG*3180 [0.50] Air Quality
- ENGG*3240 [0.50] Engineering Economics
- ENGG*3260 [0.50] Thermodynamics
- ENGG*3590 [0.50] Water Quality
- ENGG*3650 [0.50] Hydrology
- ENGG*3670 [0.50] Soil Mechanics

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<th>Restricted Electives</th>
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**Semester 6 - Fall**

- ENGG*4130 [0.50] Solid and Hazardous Waste Management
- ENGG*4370 [0.75] Urban Water Systems Design

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<th>Restricted Electives</th>
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**Semester 7 - Winter**

- ENGG*3100 [0.75] Engineering and Design III
- ENGG*3220 [0.50] Groundwater Engineering
- ENGG*3410 [0.50] Systems and Control Theory
- ENGG*3430 [0.50] Heat and Mass Transfer
- ENGG*3470 [0.50] Mass Transfer Operations

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**Summer Semester**

- COOP*4000 [0.50] Co-op Work Term IV

**Fall Semester**

- COOP*5000 [0.50] Co-op Work Term V
- ENGG*4000 [0.00] Proposal for Engineering Design IV

**Semester 8 - Winter**

- ENGG*4130 [1.00] Environmental Engineering Design IV

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<th>Restricted Electives</th>
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**Food Engineering (FENG)**

**School of Engineering, College of Engineering and Physical Sciences**

**Minor (Honours Program)**

Students must be registered in the B.Eng. degree program to apply for a Minor in Food Engineering.

The minor can be satisfied by taking the following additional courses:

- ACCT*1220 [0.50] Introductory Financial Accounting
- BIOC*2580 [0.50] Introduction to Biochemistry
- ENGG*2660 [0.50] Biological Engineering Systems I
- ENGG*3830 [0.50] Bio-Process Engineering
- FOOD*2150 [0.50] Introduction to Nutritional and Food Science
- MICR*1020 [0.50] Fundamentals of Applied Microbiology

One of:

- ENGG*4300 [0.75] Food Processing Engineering Design
- ENGG*4380 [0.75] Bioreactor Design

Two of:

- FOOD*4070 [0.50] Food Packaging
X. Degree Programs, Bachelor of Engineering [B.Eng.]

FOOD*4110 [0.50] Meat and Poultry Processing
MCS*3010 [0.50] Quality Management

One of:
FOOD*3160 [0.75] Food Processing I
FOOD*4520 [0.50] Utilization of Cereal Grains for Human Food

One of:
FOOD*2400 [0.50] Introduction to Food Chemistry
FOOD*3010 [0.50] Food Chemistry
FOOD*3230 [0.75] Food Microbiology
FOOD*3260 [0.50] Industrial Microbiology

*Students must incorporate a food engineering application as part of their capstone design course worth 1.0 credits in the final semester of their B.Eng. major program.

NOTE: Courses taken for the minors are credited to appropriate elective areas.

Mechanical Engineering Program (MECH)

School of Engineering, College of Engineering and Physical Sciences

Mechanical Engineering at Guelph is built around concepts of sustainability and sustainable design to equip graduates to tackle issues associated with emerging technologies. Graduates in mechanical engineering are able to apply mathematical, scientific and engineering principles to a wide variety of fields and find employment across the private and public sectors. The program provides students with a common base of knowledge essential to mechanical engineering, and then allows them to select from a menu of electives to attain a degree of specialization in one of five areas, or to choose electives which broaden their general knowledge base. Elective concentrations are available in the areas of wind and solar energy, food and beverage engineering, mechatronics, manufacturing system design and biomechanics.

Major (Honours Program)

Semester 1
CHEM*1040 [0.50] General Chemistry I
CIS*1500 [0.50] Introduction to Programming
ENGG*1100 [0.75] Engineering and Design I
MATH*1200 [0.50] Calculus I
PHYS*1130 [0.50] Physics with Applications

Semester 2
ENGG*1210 [0.50] Engineering Mechanics I
ENGG*1500 [0.50] Engineering Analysis
MATH*1210 [0.50] Calculus II
PHYS*1010 [0.50] Introductory Electricity and Magnetism

Semester 3
ENGG*1070 [0.25] Occupational Health and Safety
ENGG*2100 [0.75] Engineering and Design II
ENGG*2120 [0.50] Material Science
ENGG*2160 [0.50] Engineering Mechanics II
ENGG*2400 [0.50] Engineering Systems Analysis
MATH*2270 [0.50] Applied Differential Equations

Semester 4
ENGG*2180 [0.50] Introduction to Manufacturing Processes
ENGG*2230 [0.50] Fluid Mechanics
ENGG*2340 [0.50] Kinematics and Dynamics
ENGG*2450 [0.50] Electric Circuits
MATH*2130 [0.50] Numerical Methods
STAT*2120 [0.50] Probability and Statistics for Engineers

Semester 5
ENGG*3240 [0.50] Engineering Economics
ENGG*3260 [0.50] Thermodynamics
ENGG*3280 [0.75] Machine Design
ENGG*3510 [0.50] Electromechanical Devices
HIST*1250 [0.50] Science and Technology in a Global Context

Semester 6
ENGG*3100 [0.75] Engineering and Design III
ENGG*3370 [0.50] Applied Fluids and Thermodynamics
ENGG*3410 [0.50] Systems and Control Theory
ENGG*3430 [0.50] Heat and Mass Transfer

Semester 7
ENGG*3140 [0.50] Mechanical Vibration
ENGG*4000 [0.00] Proposal for Engineering Design IV

Semester 8
ENGG*4160 [1.00] Mechanical Engineering Design IV

Restricted Electives (see Program Guide for more information)

The Engineering Program requires Mechanical Engineering students to complete the following combination of elective credits to complete their program:

- 3.50 credits from the MECH-1 Mechanical Engineering electives
- 0.75 credits from the MECH-2 Mechanical Engineering design electives
- 2.00 credits from Complementary Studies electives

Consult the Program Guide for further information on the prerequisite requirements specific to each elective. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

Mechanical Engineering Program Co-op (MECH:C)

School of Engineering, College of Engineering and Physical Sciences

Mechanical Engineering at Guelph is built around concepts of sustainability and sustainable design to equip graduates to tackle issues associated with emerging technologies. Graduates in mechanical engineering are able to apply mathematical, scientific and engineering principles to a wide variety of fields and find employment across the private and public sectors. The program provides students with a common base of knowledge essential to mechanical engineering, and then allows them to select from a menu of electives to attain a degree of specialization in one of five areas, or to choose electives which broaden their general knowledge base. Elective concentrations are available in the areas of wind and solar energy, food and beverage engineering, mechatronics, manufacturing system design and biomechanics.

Program Requirements

The Co-op program in Mechanical Engineering is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitgueiph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Mechanical Engineering Academic and Co-op Work Term Schedule

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<td>5</td>
<td>COOP*5000 Work Term V</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (25.50 Total Credits)*

17.25 - Required Core Courses
3.50 – MECH-1 Mechanical Engineering Electives
0.75 – MECH-2 Mechanical Engineering Design Electives
2.00 – Complementary Studies Electives
2.00 – Co-op Work Terms

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 26.00.

See Program Guide for more information on restricted electives and their prerequisite requirements. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

The recommended program sequence is outlined below.

Major (Honours Program)

Semester 1 - Fall
CHEM*1040 [0.50] General Chemistry I
CIS*1500 [0.50] Introduction to Programming
ENGG*1100 [0.75] Engineering and Design I
MATH*1200 [0.50] Calculus I

Semester 2 - Winter
ENGG*1210 [0.50] Engineering Mechanics I
ENGG*1500 [0.50] Engineering Analysis
MATH*1210 [0.50] Calculus II
Water Resources Engineering Program (WRE)

**School of Engineering, College of Engineering and Physical Sciences**

Water resources engineering focuses on the use and management of land and water resources in rural and urban watersheds. The hydrologic and hydraulic behaviour of watershed flow systems is combined with engineering science and ecological principles in the design of water management systems and strategies. Water management includes flood prevention, warning and control; drainage; design of natural channels; irrigation; and erosion prevention and control. The supply of water for municipal, industrial and agricultural purposes is considered in the context of resource conservation. Identification of potential point and diffused sources of pollutants is used to develop efficient, environmentally sustainable and economical methods to preserve high-quality water to sustain human life and water-dependent ecosystems.

**Major (Honours Program)**

**Semester 1**
- PHYS*1010  [0.50] Introductory Electricity and Magnetism
- 0.50 restricted electives

**Semester 3 - Fall**
- COOP*1100  [0.00] Introduction to Co-operative Education
- ENGG*1070  [0.25] Occupational Health and Safety
- ENGG*2100  [0.75] Engineering and Design II
- ENGG*2120  [0.50] Material Science
- ENGG*2160  [0.50] Engineering Mechanics II
- ENGG*2400  [0.50] Engineering Systems Analysis
- MATH*2270  [0.50] Applied Differential Equations

**Summer Semester**
- COOP*1000  [0.50] Co-op Work Term I

**Semester 5 - Fall**
- ENGG*3240  [0.50] Engineering Economics
- ENGG*3260  [0.50] Thermodynamics
- ENGG*3590  [0.50] Water Quality
- ENGG*3650  [0.50] Hydrology
- ENGG*3670  [0.50] Soil Mechanics
- 0.50 restricted electives

**Semester 4**
- ENGG*2100  [0.75] Engineering and Design II
- ENGG*2120  [0.50] Material Science
- ENGG*2550  [0.50] Water Management
- ENGG*2560  [0.50] Environmental Engineering Systems
- MATH*2130  [0.50] Numerical Methods
- 0.50 restricted electives

**Semester 5**
- ENGG*3240  [0.50] Engineering Economics
- ENGG*3260  [0.50] Thermodynamics
- ENGG*3590  [0.50] Water Quality
- ENGG*3650  [0.50] Hydrology
- ENGG*3670  [0.50] Soil Mechanics
- 0.50 restricted electives

**Water Resources Engineering Program (WRE)**

1.00 restricted electives

**Semester 3**
- ENGG*2230  [0.50] Fluid Mechanics
- ENGG*2400  [0.50] Engineering Systems Analysis
- GEOG*2000  [0.50] Geomorphology
- MATH*2270  [0.50] Applied Differential Equations
- STAT*2120  [0.50] Probability and Statistics for Engineers

One of:
- BIOL*1090  [0.50] Introduction to Molecular and Cellular Biology
- MICR*2420  [0.50] Introduction to Microbiology

**Semester 4**
- ENGG*2100  [0.75] Engineering and Design II
- ENGG*2120  [0.50] Material Science
- ENGG*2550  [0.50] Water Management
- ENGG*2560  [0.50] Environmental Engineering Systems
- MATH*2130  [0.50] Numerical Methods
- 0.50 restricted electives

**Semester 5**
- ENGG*3240  [0.50] Engineering Economics
- ENGG*3260  [0.50] Thermodynamics
- ENGG*3590  [0.50] Water Quality
- ENGG*3650  [0.50] Hydrology
- ENGG*3670  [0.50] Soil Mechanics
- 0.50 restricted electives

**Semester 6**
- ENGG*3100  [0.75] Engineering and Design III
- ENGG*3220  [0.50] Groundwater Engineering
- ENGG*3430  [0.50] Heat and Mass Transfer
- HIST*1250  [0.50] Science and Technology in a Global Context
- 1.00 restricted electives

**Semester 7**
- ENGG*3340  [0.50] Geographic Information Systems in Environmental Engineering
- ENGG*4000  [0.00] Proposal for Engineering Design IV
- ENGG*4360  [0.75] Soil-Water Conservation Systems Design
- ENGG*4370  [0.75] Urban Water Systems Design
- 1.00 restricted electives

**Semester 8**
- ENGG*4150  [1.00] Water Resources Engineering Design IV
- ENGG*4250  [0.75] Watershed Systems Design
- 1.00 restricted electives

**Note:** ENGG*4250 can be taken in Semester 6

**Restricted Electives (see Program Guide for more information)**

The Engineering Program requires Water Resources Engineering students to complete the following combination of elective credits to complete their program:
- 1.00 credits from the WRE-1 Water Resources Engineering electives
- 1.00 credits from the WRE-2 Environmental and Water Resources electives
- 2.00 credits from Complementary Studies electives

Consult the Program Guide for further information on the prerequisite requirements specific to each elective. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

**Water Resources Engineering Program Co-op (WRE:C)**

**School of Engineering, College of Engineering and Physical Sciences**

Water resources engineering focuses on the use and management of land and water resources in rural and urban watersheds. The hydrologic and hydraulic behaviour of watershed flow systems is combined with engineering science and ecological principles in the design of water management systems and strategies. Water management includes flood prevention, warning and control; drainage; design of natural channels; irrigation; and erosion prevention and control. The supply of water for municipal, industrial and agricultural purposes is considered in the context of resource conservation. Identification of potential point and diffused sources of pollutants is used to develop efficient, environmentally sustainable and economical methods to preserve high-quality water to sustain human life and water-dependent ecosystems.

**Program Requirements**

The Co-op program in Water Resources Engineering is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: [https://www.recruitqueens.ca/cecw]). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

**Water Resources Engineering Academic and Co-op Work Term Schedule**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>Year</td>
<td>Fall Semester</td>
<td>Winter Semester</td>
<td>Summer Semester</td>
</tr>
<tr>
<td>------</td>
<td>---------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td>COOP*1000 Work Term I</td>
</tr>
<tr>
<td>3</td>
<td>Academic Semester 5</td>
<td>COOP*2000 Work Term II</td>
<td>COOP*3000 Work Term III</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
</tr>
<tr>
<td>5</td>
<td>COOP*5000 Work Term V</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

**Credit Summary (25.50 Total Credits)**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00 – WRE-1 Water Resources Engineering Electives</td>
<td>[0.50]</td>
</tr>
<tr>
<td>1.00 – WRE-2 Environmental and Water Resources Electives</td>
<td>[0.50]</td>
</tr>
<tr>
<td>2.00 – Complementary Studies Electives</td>
<td>[0.50]</td>
</tr>
<tr>
<td>2.00 - Co-op Work Terms</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

**Major (Honours Program)**

**Semester 1 - Fall**
- CHEM*1040 [0.50] General Chemistry I
- ENGG*1100 [0.75] Engineering and Design I
- ENGG*1500 [0.50] Engineering Analysis
- MATH*1200 [0.50] Calculus I
- PHYS*1130 [0.50] Physics with Applications

**Semester 2 - Winter**
- CHEM*1050 [0.50] General Chemistry II
- CIS*1500 [0.50] Introduction to Programming
- ENGG*2120 [0.50] Engineering Mechanics I
- MATH*1210 [0.50] Calculus II
- PHYS*1010 [0.50] Introductory Electricity and Magnetism

**Semester 3 - Fall**
- COOP*1100 [0.00] Introduction to Co-operative Education
- ENGG*2230 [0.50] Fluid Mechanics
- ENGG*2400 [0.50] Engineering Systems Analysis
- GEOG*2000 [0.50] Geomorphology
- MATH*2270 [0.50] Applied Differential Equations
- STAT*2120 [0.50] Probability and Statistics for Engineers
- One of:
  - BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
  - MICR*2420 [0.50] Introduction to Microbiology

**Semester 4 - Winter**
- ENGG*2100 [0.75] Engineering and Design II
- ENGG*2120 [0.50] Material Science
- ENGG*2550 [0.50] Water Management
- ENGG*2560 [0.50] Environmental Engineering Systems
- MATH*2130 [0.50] Numerical Methods
- 0.50 restricted electives

**Summer Semester**
- COOP*1000 [0.50] Co-op Work Term I

**Semester 5 - Fall**
- ENGG*3240 [0.50] Engineering Economics
- ENGG*3260 [0.50] Thermodynamics
- ENGG*3590 [0.50] Water Quality
- ENGG*3650 [0.50] Hydrology
- ENGG*3670 [0.50] Soil Mechanics
- 0.50 restricted electives

**Winter Semester**
- COOP*2000 [0.50] Co-op Work Term II

**Credit Summary (25.50 Total Credits)**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.50 - Required Core Courses</td>
<td>[0.50]</td>
</tr>
<tr>
<td>1.00 – WRE-1 Water Resources Engineering Electives</td>
<td>[0.50]</td>
</tr>
<tr>
<td>1.00 – WRE-2 Environmental and Water Resources Electives</td>
<td>[0.50]</td>
</tr>
<tr>
<td>2.00 – Complementary Studies Electives</td>
<td>[0.50]</td>
</tr>
<tr>
<td>2.00 - Co-op Work Terms</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. A fifth Co-op work term is optional and if completed, the total number of credits will equal 26.00.

See Program Guide for more information on restricted electives and their prerequisite requirements. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

The recommended program sequence is outlined below.

**Restrict Electives (see Program Guide for more information)**

The Engineering Program requires Water Resources Engineering students to complete the following combination of elective credits to complete their program:

- 1.00 credits from the WRE-1 Water Resources Engineering electives
- 1.00 credits from the WRE-2 Environmental and Water Resources electives
- 2.00 credits from Complementary Studies electives

Consult the Program Guide for further information on the prerequisite requirements specific to each elective. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.
Bachelor of Landscape Architecture (B.L.A.)

Landscape Architecture is the art and science of designing and conserving land and water for human use and enjoyment. As a profession, Landscape Architecture is concerned with two scales of planning and design.

The first scale is with the development of specific sites for residential, recreational, institutional, commercial and industrial projects. The second scale pertains to the regional landscape where the issues include management plans for forest, park and recreation areas, agricultural lands protection, gravel pit mining and restoration, hazard land studies, and visual resource analysis.

Program Information

Objectives of the Program

Landscape Architecture is a diverse and rewarding design profession. Landscape architects play an important role in shaping our environment, working in collaboration with other design professionals, specialists and the public. Students in the B.L.A. program attain professional knowledge and skill that prepares them to deal with problems that concern the interface between people and the environment. Program emphasis is on core professional knowledge domains that include landscape analysis, design, implementation, communication, history and professional practice. Additional required and elective courses in the arts and sciences provide a well-rounded education.

Graduates of the program have exciting careers in the public and private sector. As landscape architects, they design memorable places that are attractive, functional, and sustainable and that affect the way our cities, suburbs, rural and wilderness areas are planned, designed and managed.

Accreditation

The Bachelor of Landscape Architecture program is accredited by the Landscape Architecture Accreditation Council (LAAC) of the Canadian Society of Landscape Architects (CSLA). This accreditation is also recognized by the American Society of Landscape Architects (ASLA). Students of accredited landscape architecture programs have the educational qualifications to apply for membership in provincial and state professional associations in Canada and the United States after completion of the required number of years of professional practice and successful completion of required examinations.

Admission to the Landscape Architecture Program

Students wishing to enter the program of study leading to the Bachelor of Landscape Architecture degree should consult Section IV--Admission Information.

Degree

The degree granted for the successful completion of the program is the Bachelor of Landscape Architecture (B.L.A.).

Selection of Electives

All electives may be chosen independently although counselling with the BLA Program Counsellor is highly recommended. In selecting electives two approaches may be followed:
1) electives may be chosen from a variety of disciplines to achieve breadth of knowledge or, 2) all or most electives may be chosen in a subject area in order to pursue a particular field of interest in depth. Some of these fields might include agricultural and biological sciences, environmental studies, studio arts, geography, philosophy or sociology.

Students wishing to elect a permissible substitute shall do so in consultation with the BLA Program Counsellor. A substitute course will normally be in the same academic area as that listed in the Landscape Architecture Program.

Academic Advising

Students can consult the BLA Coordinator who is a faculty member that can address program issues and individual curriculum queries.

Computers

Expertise in many aspects of computer application is now a fundamental skill for the profession. Recognizing this, the school provides computer facilities in the building. If it is feasible we recommend that students acquire their own computer within the first two years of the program.

Field Trips

Participation in organized visits to site study areas and project sites is obligatory for all students taking certain courses in landscape architecture. To the extent that it is possible, students will be informed of the dates, destinations and cost of field trips prior to registration. Students who have reason to seek exemption from the requirement may apply to the director prior to registration for permission to substitute papers on appropriate topics.

Pre-Professional Experience

It is considered highly advisable that the prospective graduate prepares for later professional practice through summer employment in the landscape industry. Two summers spent in landscape related work followed by 1 summer in a professional office is considered to be a desirable sequence of employment.

Continuation of Study

Students are advised to consult the regulations for continuation of study within the program which are outlined in detail in Section VIII--Undergraduate Degree Regulations & Procedures.

Conditions for Graduation

In order to qualify for graduation from the 8 semester Honours B.L.A. program, the student must successfully complete all of the courses approved for the program (20.00 credits) and maintain a minimum 60.0% cumulative average.

Schedule of Studies

Major (Honours Program)

Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1500</td>
<td>0.50</td>
<td>Humans in the Natural World</td>
</tr>
<tr>
<td>LARC*1100</td>
<td>0.75</td>
<td>Introduction to Design and Communication Studio</td>
</tr>
<tr>
<td>LARC*1950</td>
<td>0.50</td>
<td>History of Cultural Form</td>
</tr>
<tr>
<td>One of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANTH*1150</td>
<td>0.50</td>
<td>Introduction to Anthropology</td>
</tr>
<tr>
<td>PHIL*1010</td>
<td>0.50</td>
<td>Introductory Philosophy: Social and Political Issues</td>
</tr>
<tr>
<td>PSYC*1000</td>
<td>0.50</td>
<td>Introduction to Psychology</td>
</tr>
<tr>
<td>SOC*1100</td>
<td>0.50</td>
<td>Sociology</td>
</tr>
<tr>
<td>0.50 electives</td>
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Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARC*2020</td>
<td>0.75</td>
<td>Foundational Design Studio</td>
</tr>
<tr>
<td>LARC*2230</td>
<td>0.50</td>
<td>Planting Design</td>
</tr>
<tr>
<td>LARC*2420</td>
<td>0.50</td>
<td>Materials and Techniques</td>
</tr>
<tr>
<td>PHIL*2070</td>
<td>0.50</td>
<td>Philosophy of the Environment</td>
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<td>0.50 electives</td>
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Semester 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARC*2100</td>
<td>0.50</td>
<td>Landscape and Site Analysis</td>
</tr>
<tr>
<td>LARC*2240</td>
<td>0.50</td>
<td>Plants in the Landscape</td>
</tr>
<tr>
<td>LARC*2410</td>
<td>0.50</td>
<td>Site Engineering</td>
</tr>
<tr>
<td>LARC*3040</td>
<td>0.75</td>
<td>Site Design Studio</td>
</tr>
<tr>
<td>0.50 electives</td>
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</table>

Semester 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARC*2820</td>
<td>0.50</td>
<td>Urban and Regional Planning</td>
</tr>
<tr>
<td>LARC*3050</td>
<td>0.75</td>
<td>Urban Design Studio</td>
</tr>
<tr>
<td>LARC*3430</td>
<td>0.50</td>
<td>Introduction to Landscape Construction</td>
</tr>
<tr>
<td>0.50 Social Science elective</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: A "Social Science" elective can be any course in the following areas: Anthropology, Economics, Geography, Women's Studies, International Development, Political Science, Psychology or Sociology.

Semester 5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARC*3060</td>
<td>0.75</td>
<td>Landscape Rehabilitation Design Studio</td>
</tr>
<tr>
<td>LARC*3440</td>
<td>0.75</td>
<td>Landscape Construction and Documentation</td>
</tr>
<tr>
<td>LARC*4610</td>
<td>0.50</td>
<td>Professional Practice</td>
</tr>
<tr>
<td>0.50 electives</td>
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<td></td>
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</table>

Semester 6

Choose one of the following three options:

Option 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>2.00 electives</td>
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Option 2

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<th>Course Code</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARC*4620</td>
<td>1.00</td>
<td>Landscape Architecture Internship</td>
</tr>
<tr>
<td>1.00 electives</td>
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</table>

Option 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange Program (2.00 credits)</td>
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Semester 7

<table>
<thead>
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<th>Course Code</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARC*3070</td>
<td>1.00</td>
<td>Urban and Community Design Studio</td>
</tr>
<tr>
<td>LARC*3320</td>
<td>0.50</td>
<td>Principles of Landscape Ecology</td>
</tr>
<tr>
<td>LARC*4510</td>
<td>0.50</td>
<td>Honours Thesis</td>
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<tr>
<td>0.50 electives</td>
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Semester 8

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARC*4090</td>
<td>0.50</td>
<td>Seminar</td>
</tr>
<tr>
<td>LARC*4710</td>
<td>1.00</td>
<td>Capstone Design Studio</td>
</tr>
<tr>
<td>0.50 electives</td>
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</tr>
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2019-2020 Undergraduate Calendar

Last Revision: July 4, 2019
Bachelor of Science (B.Sc.)

The University of Guelph offers general and honours programs leading to the B.Sc. degree.

The general program consists of a minimum of 15.00 credits (usually 30 semester courses) involving normally 6 semesters of study. The requirements for the honours program is a minimum of 20.00 credits (usually 40 semester courses) which may be obtained over 8 semesters of study. Some majors may require more than 20.00 credits.

The Three Semester System

Most of the B.Sc. programs operate on the three semester system. In this system each of the Fall, Winter and Summer semesters is of 12 weeks duration. Two semesters are equivalent to 1 academic year at a university on the traditional system. In the three semester system, students may vary their rate of progress towards graduation. However, since many science courses must be taken in a certain sequence and not all courses are offered each semester, most science students are required to proceed from semester to semester in restricted patterns. Furthermore, the majority of courses of the honours programs are offered only in the regular fall and winter semesters.

Additional information may be obtained from Admissions Services, Office of Registrarial Services. The three-semester system and the pass-by-course method of advancement allow considerable flexibility of program arrangement. In addition, a variety of program contents is available which the student may modify to meet individual requirements.

Transfer from One B.Sc. Program to Another

On entrance to the B.Sc. program, the student may elect to follow an intended area of specialization or to postpone this decision until a later semester. The choice of a particular program of study may be most effectively made at the end of Semester 3 or 4. Judicious selection of courses in each and every semester will allow the easiest transfer between programs without incurring the need for additional semesters of study. The program counsellor of the particular college from which it is anticipated that the majority of science courses will be taken should be consulted for advice.

Program Information

B.Sc. Program Requirements

Regulations 1-9 apply to all B.Sc. students.

1. Entry Credits

In general, the 4U /grade 12 credit or its equivalent is required in a subject area to allow entrance to the initial university course. Students who lack this requirement can remedy the deficiency by successful completion of:

BIOL*1020 for students lacking biology
CHEM*1060 for students lacking chemistry

If more than one of the above courses is taken, students are required to complete additional credits beyond the minimum total required for the degree.

2. 1st Year Science Core

All majors within the B.Sc. degree are required to complete the first year core as outlined within their major. The core consists of courses in biology, chemistry, physics, and mathematical science.

3. 1000 Level Credits

If more than 7.00 credits at the 1000 level are completed, students are required to complete additional credits beyond the minimum total required for the degree.

4. 3000 and 4000 Level Credits

There is a requirement for a minimum of 6.00 science credits at the 3000- and 4000-levels with a minimum of 2.00 credits at the 4000 level.

5. Science Credits

A minimum of 16.00 science credits (usually 32 courses) is required for the honours major program. The inclusion of a minor in a non-science area involves the reduction to 14.00 science credits. A minimum of 12.00 science credits is required for the three year general B.Sc. degree. Acceptable science courses means “acceptable to the B.Sc. Program Committee”. Lists of acceptable science courses are available at: https://www.uoguelph.ca/bsc/Approved_electives.

6. Liberal Education Requirement

All majors within the B.Sc. degree require a specified number of liberal education credits.

The goal of the liberal education requirement is to increase breadth by requiring credits that are outside the disciplines of science with a focus in at least one of the following areas:

- Policy, operational and management practices pertaining to a practical activity, or influence of social, cultural and economic environments on such activities.
- Personal or professional growth including ethical responsibility, leadership and communication.
- Development of historical, cultural, global, artistic, social, and language competencies.

A complete listing of acceptable courses can be found at: https://www.uoguelph.ca/bsc/.

7. Free Electives

All majors within the B.Sc. degree have a specified number of free electives. The free elective requirement can be fulfilled by any course on the B.Sc. approved science or liberal education elective list. Courses that are restricted from B.Sc. students are not eligible to fulfill the free elective requirement. This restriction is stated in the course description.

8. Double-Counting of Credits

A maximum of 2.50 credits required in a major program may be applied to meet the requirements of a minor or an additional major.

For a completed minor in a non B.Sc. area, students can apply up to 1.00 credits at the 3000/4000 level from their minor towards the 6.00 credits at the 3000/4000 level required for the degree.

Students cannot declare a major or minor in the three year general B.Sc. degree.

9. Continuation of Study

Students are advised to consult the regulations for continuation of study outlined in detail in Section VIII—Undergraduate Degree & Regulations.

General Program Requirements

The general B.Sc. degree requires the successful completion of 15.00 credits. Normally 2.50 credits (usually 5 courses) are taken in each semester so that the degree may be completed in 6 semesters. The general science program is designed to give a broad general training in biological science, chemistry, physics and mathematical science. This is achieved by requiring each student to take a minimum of 1.00 credits in each of the above areas and an additional 0.50 credits in three of the four above areas. The courses to be taken in semesters 4 to 6 may be selected to allow a broad study of the sciences from the list of approved electives for B.Sc. students.

Honours Program Requirements

In order to graduate from the honours program, students must fulfill all program requirements for the program and have achieved a 60%, or higher, cumulative average over all course attempts. Normally 2.50 credits (usually 5 courses) are taken in each semester so that the degree may be completed in generally 8 semesters. The following types of honours programs are offered:

Honours Major Programs

Major in a subject
Major in a subject with a minor or a second major

Honours Major

Majors permit a student to study science in greater depth than is permitted by the general program. The student is required to take a minimum of 1.00 credits (usually 2 courses) in each of biological science, chemistry, physics and mathematical science. In each of semesters 3 to 8, students select science credits so that the total program provides a broad science training with concentration in an area of physical science or biological science.

A major normally consists of various prescribed courses (minimum of 8.00 credits) and a number of elective courses to complete the requirements for the degree. The composition of science courses selected must contain a sufficient number (minimum of 6.00 credits) of 3000 and 4000 level courses including a grouping (minimum of 2.00 credits) at the 4000 level. A major program may be studied in conjunction with a minor in an area of science, humanities or social science.

Honours Minor

A minor is a group of courses which provides for exposure to and mastery of the fundamental principles of a subject. A minor consists of a minimum of 5.00 credits (normally 10 courses). It may also require courses from other areas to be taken along with the specified courses of the minor. A minor is taken in conjunction with a major.

Students should seek advice from the program counsellor of either the College of Biological Science or the College of Engineering and Physical Sciences dependent upon their primary area(s) of interest. Refer to B.Sc. Program Requirements: Regulation 6 Double-Counting of Credits.

Special Study Options

Study at Other Universities

Students contemplating study at another university for credit towards a Bachelor of Science degree at the University of Guelph should refer to the general regulations governing Letters of Permission in Section VIII—Degree Regulations & Procedures in this calendar. Students must obtain approval for the Letter of Permission prior to undertaking studies at another institution.

Study Abroad

The University of Guelph offers Study Abroad and Exchange opportunities for students to enrich their learning experience. Bachelor of Science students are encouraged to participate in any of the diverse options available. Courses taken while on exchange or study abroad may be used as electives or core requirements pending appropriate approvals.

For further information on the programs available, please refer to Section V—International Study. Students are advised to meet with the Centre for International Programs and B.Sc. Program Counsellor to discuss the feasibility of participating in an exchange or semester abroad.
Doctor of Veterinary Medicine

Students in the B.Sc. program who intend to apply for admission to the Doctor of Veterinary Medicine program should register for the Major Biological Science or Major Physical Science program, or the major of their choice. Prospective candidates for the D.V.M. program should consult the admission requirements for the program. Students may obtain assistance in selecting a program that will meet the requirements for the Doctor of Veterinary Program and for continuation in biological or physical science programs by consulting the appropriate Program Counsellor.

General Program (BSCG)

Continuation of Study

Students are advised to consult the regulations for continuation of study within the program which are outlined in detail in Section VIII—Undergraduate Degree Regulations & Procedures.

Conditions for Graduation

In order to qualify for graduation from the general program the student is required to attain a passing grade in a minimum of 15.00 required credits as outlined in the Total Course Requirements for all students in the General Science Program and have achieved a minimum cumulative average of 50%.

Total Course Requirements for all Students in the General Science Program

Total of 15.00 credits as follows:

1. 4.00 credits from the first year science core - 1.00 credits beyond the 4U/ grade 12 level in each of biological science, chemistry, mathematical science, physics. Note: A maximum of 7.00 credits at the 1000 level may be used towards the degree requirements.
2. An additional 0.50 credits from at least 3 of the following subject areas: biological science, biochemistry/chemistry, mathematical science, physics.
3. 6.50 additional credits selected from the list of approved sciences electives for the B.Sc. degree program of which 2.50 credits must be at the 3000 or 4000 level. Note: One of: BIOL*1020, CHEM*1060 may be counted towards the degree requirements, counting as 0.50 credits in science.
4. 2.00 credits - Liberal Education electives selected from the B.Sc. list of Liberal Education electives.
5. 1.00 credits in electives.

Recommended Schedule for Students in Biological Science Areas

Semester 1
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
CHEM*1040 [0.50] General Chemistry I
MATH*1080 [0.50] Elements of Calculus I
PHYS*1080 [0.50] Physics for Life Sciences
0.50 Liberal Education electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: http://www.bsc.uoguelph.ca/revisedss

Semester 2
BIOL*1070 [0.50] Discovering Biodiversity
CHEM*1050 [0.50] General Chemistry II
MATH*1120 [0.50] Calculus I
PHYS*1180 [0.50] Physics II for Sciences
One of:
PHYS*1100 [0.50] Introduction to Computer Applications
PHYS*1120 [0.50] Introduction to Computing
PHYS*1150 [0.50] Introduction to Programming
STAT*2040 [0.50] Statistics I
MATH*1190 [0.50] Elements of Calculus II
0.50 Liberal Education electives

* BIOL*1080 is a prerequisite for some courses in the biological sciences. Students are strongly recommended to also complete this course by the end of the third semester.

Semester 3 to 6
A minimum of 2.50 credits in each semester, including at least 2.00 acceptable science credits per semester. For details consult 'Total Course Requirements'.

Recommended Schedule for Students in Physical Science Areas

Semester 1
CHEM*1040 [0.50] General Chemistry I
IPS*1500 [1.00] Integrated Mathematics and Physics I
One of
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
0.50 Liberal Education electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: http://www.bsc.uoguelph.ca/revisedss

Semester 2
CHEM*1050 [0.50] General Chemistry II
IPS*1510 [1.00] Integrated Mathematics and Physics II
One of
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
0.50 Liberal Education electives

Semester 3 to 6
A minimum of 2.50 credits in each semester, including 2.00 acceptable science courses per semester. For details consult 'Total Course Requirements'.

Honours Programs (BSCH)

Honours Program Majors

The following honours majors are available:

Biological Sciences:
- 20.00 credits - Animal Biology (ABIO)
- 20.00 credits - Biochemistry (BIOC)
- 20.00 credits - Biodiversity (BIOD)
- 20.00 credits - Biological Science (BIOS)
- 20.00 credits - Bio-Medical Science (BIOM)
- 20.00 credits - Biomedical Toxicology (BTOX)
- 20.00 credits - Environmental Biology (ENVB)
- 20.00 credits - Food Science (FOOD)
- 20.00 credits - Human Genetics (HG)
- 20.00 credits - Marine and Freshwater Biology (MBF)
- 20.00 credits - Microbiology (MICR)
- 20.00 credits - Molecular Biology and Genetics (MBG)
- 20.00 credits - Neuroscience (NEUR)
- 20.00 credits - Nutritional and Nutraceutical Sciences (NANS)
- 20.00 credits - Plant Science (PLSC)
- 20.00 credits - Wildlife Biology and Conservation (WBC)
- 20.00 credits - Zoology (ZOOG)

Physical Sciences:
- 20.00 credits - Biological and Medical Physics (BMPH)
- 20.00 credits - Biological and Pharmaceutical Chemistry (BPCH)
- 20.00 credits - Chemical Physics (CHPHY)
- 20.00 credits - Chemistry (CHEM)
- 20.00 credits - Environmental Geomatics (EG)
- 20.00 credits - Mathematical Science (MSCI)
- 20.00 credits - Nanoscience (NANO)
- 20.00 credits - Physical Science (PSCI)
- 20.00 credits - Physics (PHYS)
- 20.00 credits - Theoretical Physics (THYP)

Co-operative Educational Programs:
- 21.50 credits - Biochemistry (Co-op) (BIOC:C)
- 22.00 credits - Biological and Medical Physics (Co-op) (BMPH:C)
- 21.50 credits - Biological and Pharmaceutical Chemistry (Co-op) (BPCH:C)
- 22.00 credits - Marine and Freshwater Biology (Co-op) (MBF:C)
- 21.50 credits - Biomedical Toxicology (Co-op) (BTOX:C)
- 22.00 credits - Chemical Physics (Co-op) (CHPHY:C)
- 21.50 credits - Chemistry (Co-op) (CHEM:C)
- 21.50 credits - Environmental Geomatics (Co-op) (EG:C)
- 21.50 credits - Food Science (Co-op) (FOOD:C)
- 22.00 credits - Nanoscience (NANO:C)
- 21.50 credits - Microbiology (Co-op) (MICR:C)
- 22.00 credits - Physics (Co-op) (PHYS:C)

Honours Program Minors

Minors are available in the following science areas with the particular credit requirements being given (additional minors are available from the College of Arts and the College of Social and Applied Human Sciences). A minor may include additional prerequisites - consult with the appropriate faculty advisor.

Biological Sciences:
- 5.00 credits - Biology (BIOL)
- 5.00 credits - Biochemistry (BIOC)
- 5.00 credits - Biotechnology (BIOT)
- 5.00 credits - Microbiology (MICR)
- 5.00 credits - Molecular Biology and Genetics (MBG)
- 5.00 credits - Neuroscience (NEUR)
- 5.00 credits - Nutritional and Nutraceutical Sciences (NANS)
- 5.00 credits - Plant Science (PLSC)
- 5.00 credits - Zoology (ZOOG)
Physical Sciences:
5.00 credits - Chemistry (CHEM)
5.00 credits - Physics (PHYS)

Environmental Sciences:
5.00 credits - Ecology (ECOL)
5.00 credits - Geographic Information Systems (GIS) and Environmental Analysis

Mathematical Sciences:
5.00 credits - Computing and Information Science (CIS)
5.00 credits - Mathematical Science (MSCI)
5.00 credits - Mathematics (MATH)
5.00 credits - Statistics (STAT)

Additional Disciplines:
5.00 credits - Business Economics (BECN)

Continuation of Study
Students are advised to consult the regulations for continuation of study within the program which are outlined in detail in Section VIII--Undergraduate Degree Regulations & Procedures.

Conditions for Graduation

Schedules 1 and 2
In order to qualify for graduation from the honors program, the student must fulfill all program requirements and have achieved 60%, or higher, cumulative average in all course attempts.

Note: A student registered in an honors program who has successfully completed all required courses and the specified total number of credits for the program but does not have a cumulative average of 60%, or higher, may apply to graduate from the general program.

Co-operative Education Program
Admission to the Co-operative Education program may be granted on entry to the University or by application normally before the conclusion of Semester 1. Application forms can be obtained from the Coop Education and Career Services website 

Conditions for Graduation from the B.Sc. Co-operative Education Program

Conditions for graduation are the same as the corresponding regular B.Sc. program. In addition, all work reports and work performance evaluations must have a grade of satisfactory or better.

Animal Biology (ABIO)

Department of Animal Biosciences, Ontario Agricultural College

Major (Honours Program)
Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor.

Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1050</td>
<td>[0.50]</td>
<td>Principles of Animal Care and Welfare</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>[0.50]</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>[0.50]</td>
<td>Elements of Calculus I</td>
</tr>
<tr>
<td>PHYS*1080</td>
<td>[0.50]</td>
<td>Physics for Life Sciences</td>
</tr>
</tbody>
</table>

0.50 Liberal Education electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: 

Credit Summary (20.00 Total Credits)

1.50 electives or restricted electives

Semester 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC*3040</td>
<td>[0.50]</td>
<td>Animal Reproduction</td>
</tr>
<tr>
<td>ANSC*3270</td>
<td>[0.50]</td>
<td>Animal Disorders</td>
</tr>
<tr>
<td>MBG*3060</td>
<td>[0.50]</td>
<td>Quantitative Genetics</td>
</tr>
</tbody>
</table>

1.00 electives or restricted electives

Semester 7

2.50 electives or restricted electives

Semester 8

2.50 electives or restricted electives

Restricted Electives

1. Students must complete 2.00 credits of Liberal Education electives ANSC*1210 is a Liberal Education course, 1.00 credit. 1.00 additional credits from Liberal Education courses are required. The list of liberal education electives for B.Sc. students can be found at: 

2. 0.50 credits is required from each of the following areas: Animal Nutrition, Animal Breeding & Genetics, and Animal Physiology & Behaviour. Students are encouraged to consult with the Faculty Advisor for help in tailoring their selection to meet personal and career interests.

Animal Nutrition & Genetics [0.50] Required

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC*4050</td>
<td>[0.50]</td>
<td>Biotechnology in Animal Science</td>
</tr>
<tr>
<td>MBG*4020</td>
<td>[0.50]</td>
<td>Genetics of Companion Animals</td>
</tr>
<tr>
<td>MBG*4030</td>
<td>[0.50]</td>
<td>Animal Breeding Methods and Applications</td>
</tr>
</tbody>
</table>

Animal Nutrition [0.50] Required

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC*3170</td>
<td>[0.50]</td>
<td>Nutrition of Fish and Crustacea</td>
</tr>
<tr>
<td>ANSC*3180</td>
<td>[0.50]</td>
<td>Wildlife Nutrition</td>
</tr>
<tr>
<td>ANSC*4260</td>
<td>[0.50]</td>
<td>Beef Cattle Nutrition</td>
</tr>
<tr>
<td>ANSC*4270</td>
<td>[0.50]</td>
<td>Dairy Cattle Nutrition</td>
</tr>
<tr>
<td>ANSC*4280</td>
<td>[0.50]</td>
<td>Poultry Nutrition</td>
</tr>
<tr>
<td>ANSC*4290</td>
<td>[0.50]</td>
<td>Swine Nutrition</td>
</tr>
<tr>
<td>ANSC*4560</td>
<td>[0.50]</td>
<td>Pet Nutrition</td>
</tr>
<tr>
<td>EGN*4020</td>
<td>[0.50]</td>
<td>Advanced Equine Nutrition</td>
</tr>
</tbody>
</table>

Animal Physiology & Behaviour [0.50] Required

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC*3900</td>
<td>[0.50]</td>
<td>Vertebrate Ethology</td>
</tr>
<tr>
<td>ANSC*4090</td>
<td>[0.50]</td>
<td>Applied Animal Behaviour</td>
</tr>
<tr>
<td>ANSC*4100</td>
<td>[0.50]</td>
<td>Applied Environmental Physiology and Animal Housing</td>
</tr>
<tr>
<td>ANSC*4350</td>
<td>[0.50]</td>
<td>Experiments in Animal Biology</td>
</tr>
<tr>
<td>ANSC*4470</td>
<td>[0.50]</td>
<td>Animal Metabolism</td>
</tr>
<tr>
<td>ANSC*4490</td>
<td>[0.50]</td>
<td>Applied Endocrinology</td>
</tr>
</tbody>
</table>

3. An additional 3.00 credits must be obtained by selecting courses from the above lists and from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC*3050</td>
<td>[0.50]</td>
<td>Aquaculture: Advanced Issues</td>
</tr>
<tr>
<td>ANSC*4610</td>
<td>[0.50]</td>
<td>Critical Analysis in Animal Science</td>
</tr>
<tr>
<td>ANSC*4650</td>
<td>[0.50]</td>
<td>Comparative Immunology</td>
</tr>
<tr>
<td>ANSC*4700</td>
<td>[0.50]</td>
<td>Research in Animal Biology I</td>
</tr>
<tr>
<td>ANSC*4710</td>
<td>[0.50]</td>
<td>Research in Animal Biology II</td>
</tr>
<tr>
<td>BIOC*3560</td>
<td>[0.50]</td>
<td>Structure and Function in Biochemistry</td>
</tr>
<tr>
<td>EGN*3050</td>
<td>[0.50]</td>
<td>Equine Exercise Physiology</td>
</tr>
<tr>
<td>MIRC*3230</td>
<td>[0.50]</td>
<td>Immunology</td>
</tr>
<tr>
<td>PATH*3610</td>
<td>[0.50]</td>
<td>Principles of Disease</td>
</tr>
<tr>
<td>POPM*3240</td>
<td>[0.50]</td>
<td>Epidemiology</td>
</tr>
<tr>
<td>POPM*4230</td>
<td>[0.50]</td>
<td>Animal Health</td>
</tr>
</tbody>
</table>

Biochemistry (BIOC)

Department of Molecular and Cellular Biology, College of Biological Science

A B.Sc. in Biochemistry offers a multidisciplinary curriculum that gives students broad exposure to the life sciences with specific attention paid to the physical and chemical nature of biomolecular systems. The lab-intensive experience in this program prepares students to pursue post-graduate research opportunities in many different life science related fields. Graduates are also positioned to be successful in obtaining entrance to a number of professional programs, as well as employment in industry and government.

X. Degree Programs, Bachelor of Science (B.Sc.)
Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. The major will require the completion of at least 20.00 credits as indicated below:

### Major (Honours Program)

#### Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*1090</td>
<td>0.50</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>0.50</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>0.50</td>
<td>Elements of Calculus I</td>
</tr>
<tr>
<td>PHYS*1080</td>
<td>0.50</td>
<td>Physics for Life Sciences</td>
</tr>
<tr>
<td></td>
<td>0.50</td>
<td>Liberal Education electives</td>
</tr>
</tbody>
</table>

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at https://www.uoguelph.ca/bse/revised_SS.

#### Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*1070</td>
<td>0.50</td>
<td>Discovering Biodiversity</td>
</tr>
<tr>
<td>BIOC*1080</td>
<td>0.50</td>
<td>Biological Concepts of Health</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>0.50</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>MATH*1090</td>
<td>0.50</td>
<td>Elements of Calculus II</td>
</tr>
<tr>
<td>PHYS*1070</td>
<td>0.50</td>
<td>Physics for Life Sciences II</td>
</tr>
</tbody>
</table>

#### Semester 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*2580</td>
<td>0.50</td>
<td>Introduction to Biochemistry</td>
</tr>
<tr>
<td>MBG*2040</td>
<td>0.50</td>
<td>Foundations in Molecular Biology and Genetics</td>
</tr>
<tr>
<td>MICR*2420</td>
<td>0.50</td>
<td>Introduction to Microbiology</td>
</tr>
<tr>
<td>STAT*2040</td>
<td>0.50</td>
<td>Statistics I</td>
</tr>
<tr>
<td></td>
<td>0.50</td>
<td>Liberal Education electives</td>
</tr>
</tbody>
</table>

#### Semester 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*3560</td>
<td>0.50</td>
<td>Structure and Function in Biochemistry</td>
</tr>
<tr>
<td>CHEM*2480</td>
<td>0.50</td>
<td>Analytical Chemistry I</td>
</tr>
<tr>
<td>CHEM*2700</td>
<td>0.50</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>MCB*2050</td>
<td>0.50</td>
<td>Molecular Biology of the Cell</td>
</tr>
<tr>
<td>MICR*2430</td>
<td>0.50</td>
<td>Methods in Microbial Culture and Physiology</td>
</tr>
</tbody>
</table>

#### Semester 5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*3570</td>
<td>0.75</td>
<td>Analytical Biochemistry</td>
</tr>
<tr>
<td>CHEM*2880</td>
<td>0.50</td>
<td>Physical Chemistry</td>
</tr>
<tr>
<td>CHEM*3750</td>
<td>0.50</td>
<td>Organic Chemistry II</td>
</tr>
<tr>
<td></td>
<td>0.50</td>
<td>Electives or restricted electives to a maximum of 2.75 total credits</td>
</tr>
</tbody>
</table>

#### Semester 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBG*3350</td>
<td>0.75</td>
<td>Laboratory Methods in Molecular Biology</td>
</tr>
<tr>
<td></td>
<td>0.50</td>
<td>Electives or restricted electives to a maximum of 2.75 total credits</td>
</tr>
</tbody>
</table>

#### Semester 7

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*4540</td>
<td>0.75</td>
<td>Enzymology</td>
</tr>
<tr>
<td></td>
<td>0.50</td>
<td>Electives or restricted electives to a maximum of 2.75 total credits</td>
</tr>
</tbody>
</table>

#### Restricted Electives

1. Students must take as part of their program: 4.00 credits from the following list, with at least 1.00 of these credits from BIOC*4520, BIOC*4580, MCB*4050.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*4520</td>
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</tr>
<tr>
<td>BIOC*4580</td>
<td>0.50</td>
</tr>
<tr>
<td>BIOL*3300</td>
<td>0.50</td>
</tr>
<tr>
<td>BIOM*3200</td>
<td>1.00</td>
</tr>
<tr>
<td>MBG*3040</td>
<td>0.50</td>
</tr>
<tr>
<td>MBG*3080</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*3010</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4010</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4050</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4500</td>
<td>1.00</td>
</tr>
<tr>
<td>MCB*4510</td>
<td>1.00</td>
</tr>
<tr>
<td>MCB*4600</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*3230</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*3330</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*4330</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*4530</td>
<td>0.50</td>
</tr>
<tr>
<td>PBIO*3110</td>
<td>0.50</td>
</tr>
<tr>
<td>PBIO*4750</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*2050</td>
<td>0.50</td>
</tr>
<tr>
<td>TOX*4590</td>
<td>0.50</td>
</tr>
</tbody>
</table>

2. Students must take as part of their program: 0.50 credits from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS*2030</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*2240</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*2330</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*2600</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*3080</td>
<td>0.50</td>
</tr>
</tbody>
</table>

### Credit Summary (20.00 Total Credits)

- 4.50 - First year science credits
- 7.75 - Required science courses semesters 3 - 8
- 4.50 - Restricted elective (# 1 and # 2 in restricted elective list)
- 1.00 - Liberal Education electives
- 2.25 - Free electives – any approved electives for B.Sc. students

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

### Minor (Honours Program)

A minor in Biochemistry consists of at least 5.00 course credits. The following courses are required:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*3560</td>
<td>0.50</td>
<td>Structure and Function in Biochemistry</td>
</tr>
<tr>
<td>BIOC*3570</td>
<td>0.75</td>
<td>Analytical Biochemistry</td>
</tr>
<tr>
<td>BIOC*4540</td>
<td>0.75</td>
<td>Enzymology</td>
</tr>
<tr>
<td>CHEM*2480</td>
<td>0.50</td>
<td>Analytical Chemistry I</td>
</tr>
<tr>
<td>CHEM*2700</td>
<td>0.50</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>MBG*2040</td>
<td>0.50</td>
<td>Foundations in Molecular Biology and Genetics</td>
</tr>
<tr>
<td>MICR*2420</td>
<td>0.50</td>
<td>Introduction to Microbiology</td>
</tr>
</tbody>
</table>

In addition, at least 1.50 credits must be chosen from the following courses, with at least 1.00 credits from the first three courses listed:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*4520</td>
<td>0.50</td>
<td>Metabolic Processes</td>
</tr>
<tr>
<td>BIOC*4580</td>
<td>0.50</td>
<td>Membrane Biochemistry</td>
</tr>
<tr>
<td>MBG*3350</td>
<td>0.75</td>
<td>Laboratory Methods in Molecular Biology</td>
</tr>
<tr>
<td>MCB*4050</td>
<td>0.50</td>
<td>Protein and Nucleic Acid Structure</td>
</tr>
<tr>
<td>MICR*3230</td>
<td>0.50</td>
<td>Immunology</td>
</tr>
<tr>
<td>MICR*3330</td>
<td>0.50</td>
<td>World of Viruses</td>
</tr>
<tr>
<td>TOX*4590</td>
<td>0.50</td>
<td>Biochemical Toxicology</td>
</tr>
</tbody>
</table>

### Biochemistry (Co-op) (BIOC:C)

Department of Molecular and Cellular Biology, College of Biological Science

A B.Sc. in Biochemistry offers a multidisciplinary curriculum that gives students broad exposure to the life sciences with specific attention paid to the physical and chemical nature of biomolecular systems. The lab-intensive experience in this program prepares students to pursue post-graduate research opportunities in many different life science related fields. Graduates are also positioned to be successful in obtaining entrance to a number of professional programs, as well as employment in industry and government.

#### Program Requirements

The Co-op program in Biochemistry is a four and a half year program, including four work terms. Students must complete a Fall (Sequence B only), Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Biochemistry Academic and Co-op Work Term Schedule – Sequence A

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>COOP*1100</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1000 Work Term I</td>
<td>Academic Semester 4</td>
</tr>
<tr>
<td>3</td>
<td>Academic Semester 5</td>
<td>COOP*2000 Work Term II</td>
<td>COOP*3000 Work Term III</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Biochemistry Academic and Co-op Work Term Schedule – Sequence B

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>COOP*1100</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1000 Work Term I</td>
<td>Academic Semester 4</td>
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<td>Academic Semester 5</td>
<td>COOP*2000 Work Term II</td>
<td>COOP*3000 Work Term III</td>
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<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with regard to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (21.50 Total Credits)*

4.50 - First year science credits
7.75 - Required science courses semesters 3 - 8
4.50 - Restricted elective (# 1 and #2 in restricted elective list)
1.00 - Liberal Education electives
2.25 - Free electives – any approved electives for B.Sc. students
1.50 - Co-op Work Terms

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Note: A minimum of three Co-op work terms including a Summer, Fall (Sequence B only), and Winter are necessary to complete the Co-op requirement. *A fourth Co-op work term is optional and if completed, the total number of credits will equal 22.00.

The recommended program sequence is outlined below.

Sequence A

Semester 1 - Fall
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
CHEM*1040 [0.50] General Chemistry I
MATH*1080 [0.50] Elements of Calculus I
PHYS*1080 [0.50] Physics for Life Sciences

0.50 Liberal Education electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at https://www.uoguelph.ca/bsc/revised_SS

Semester 2 - Winter
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
CHEM*1050 [0.50] General Chemistry II
MATH*1090 [0.50] Elements of Calculus II
PHYS*1070 [0.50] Physics for Life Sciences II

Semester Summer
No academic semester or work term

Semester 3 - Fall
BIOL*2580 [0.50] Introduction to Biochemistry
CHEM*2480 [0.50] Analytical Chemistry I
CHEM*2880 [0.50] Physical Chemistry
MBG*2040 [0.50] Foundations in Molecular Biology and Genetics

0.50 Liberal Education electives

Winter Semester
COOP*1100 [0.50] Co-op Work Term I

Semester 4 - Summer
BIOL*3570 [0.75] Analytical Biochemistry
CHEM*2700 [0.50] Organic Chemistry I
MICR*2420 [0.50] Introduction to Microbiology
STAT*2040 [0.50] Statistics I electives or restricted electives to a maximum of 2.75 total credits

Semester 5 - Fall
BIOL*3560 [0.50] Structure and Function in Biochemistry
CHEM*2700 [0.50] Organic Chemistry II
MCB*2050 [0.50] Molecular Biology of the Cell
MCIR*2430 [0.50] Methods in Microbial Culture and Physiology

0.50 electives or restricted electives

Winter Semester
COOP*2000 [0.50] Co-op Work Term II

Semester 6 - Winter
MBG*3350 [0.75] Laboratory Methods in Molecular Biology electives or restricted electives to a maximum of 2.75 total credits

Semester 7 - Winter
BIOL*4540 [0.75] Enzymology

Electives or restricted electives to a maximum of 2.75 total credits

Summer Semester
COOP*4000 [0.50] Co-op Work Term IV

Semester 8 - Fall
2.50 electives or restricted electives

Restricted Electives

1. Students must take as part of their program: 4.00 credits from the following list, with at least 1.00 of these credits from BIOC*4520, BIOC*4580, MCB*4050.

   - BIOC*4520 [0.50] Metabolic Processes
   - BIOC*4580 [0.50] Membrane Biochemistry
   - BIOC*4590 [0.50] Biophysics
   - BIOC*4591 [0.50] Applied Bioinformatics
   - BIOM*3200 [0.10] Biomedical Physiology
   - MCB*3040 [0.50] Molecular Biology of the Gene
   - MCB*3080 [0.50] Molecular Genetics
   - MCB*4010 [0.50] Advanced Cell Biology
   - MCB*4050 [0.50] Protein and Nucleic Acid Structure
   - MCB*4500 [1.00] Research Project in Molecular & Cellular Biology I
   - MCB*4510 [1.00] Research Project in Molecular & Cellular Biology II
   - MCB*4600 [0.50] Topics in Molecular and Cellular Biology
   - MCB*4700 [0.50] Immunology
   - MCB*3330 [0.50] World of Viruses
   - MCB*4330 [0.50] Molecular Virology
   - MCB*4530 [0.50] Immunology II
   - PBO*3110 [0.50] Crop Physiology
   - PBO*3470 [0.50] Genetic Engineering of Plants
   - STAT*2050 [0.50] Statistics II
   - TOX*4590 [0.50] Biochemical Toxicology

2. Students must take as part of their program: 0.50 credits from the following list:

   - PHYS*2030 [0.50] Biophysics of Excitable Cells
   - PHYS*2240 [0.50] Thermal Physics
   - PHYS*2330 [0.50] Electricity and Magnetism I
   - PHYS*2600 [0.50] General Astronomy
   - PHYS*3080 [0.50] Energy

Sequence B

Semester 1 - Fall
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
CHEM*1040 [0.50] General Chemistry I
MATH*1080 [0.50] Elements of Calculus I
PHYS*1080 [0.50] Physics for Life Sciences

0.50 Liberal Education electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at https://www.uoguelph.ca/bsc/revised_SS

Semester 2 - Winter
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
CHEM*1050 [0.50] General Chemistry II
MATH*1090 [0.50] Elements of Calculus II
PHYS*1070 [0.50] Physics for Life Sciences II

Semester Summer
No academic semester or work term

Semester 3 - Fall
BIOL*2580 [0.50] Introduction to Biochemistry
CHEM*2480 [0.50] Analytical Chemistry I
CHEM*2880 [0.50] Physical Chemistry
MBG*2040 [0.50] Foundations in Molecular Biology and Genetics

0.50 Liberal Education electives

Winter Semester
COOP*1100 [0.50] Co-op Work Term I

Semester 4 - Summer
BIOL*3570 [0.75] Analytical Biochemistry
CHEM*2700 [0.50] Organic Chemistry I
MICR*2420 [0.50] Introduction to Microbiology
STAT*2040 [0.50] Statistics I electives or restricted electives to a maximum of 2.75 total credits

Semester 5 - Fall
BIOL*3560 [0.50] Structure and Function in Biochemistry
CHEM*2700 [0.50] Organic Chemistry II
MCB*2050 [0.50] Molecular Biology of the Cell
MCIR*2430 [0.50] Methods in Microbial Culture and Physiology

0.50 electives or restricted electives

Winter Semester
COOP*2000 [0.50] Co-op Work Term II

Semester 6 - Winter
MBG*3350 [0.75] Laboratory Methods in Molecular Biology electives or restricted electives to a maximum of 2.75 total credits

Semester 7 - Winter
BIOL*4540 [0.75] Enzymology

Electives or restricted electives to a maximum of 2.75 total credits

Summer Semester
COOP*4000 [0.50] Co-op Work Term IV

Semester 8 - Fall
2.50 electives or restricted electives

Restricted Electives

1. Students must take as part of their program: 4.00 credits from the following list, with at least 1.00 of these credits from BIOC*4520, BIOC*4580, MCB*4050.

   - BIOC*4520 [0.50] Metabolic Processes
   - BIOC*4580 [0.50] Membrane Biochemistry
   - BIOC*4590 [0.50] Biophysics
   - BIOC*4591 [0.50] Applied Bioinformatics
   - BIOM*3200 [0.10] Biomedical Physiology
   - MCB*3040 [0.50] Molecular Biology of the Gene
   - MCB*3080 [0.50] Molecular Genetics
   - MCB*4010 [0.50] Advanced Cell Biology
   - MCB*4050 [0.50] Protein and Nucleic Acid Structure
   - MCB*4500 [1.00] Research Project in Molecular & Cellular Biology I
   - MCB*4510 [1.00] Research Project in Molecular & Cellular Biology II
   - MCB*4600 [0.50] Topics in Molecular and Cellular Biology
   - MCB*4700 [0.50] Immunology
   - MCB*3330 [0.50] World of Viruses
   - MCB*4330 [0.50] Molecular Virology
   - MCB*4530 [0.50] Immunology II
   - PBO*3110 [0.50] Crop Physiology
   - PBO*3470 [0.50] Genetic Engineering of Plants
   - STAT*2050 [0.50] Statistics II
   - TOX*4590 [0.50] Biochemical Toxicology

2. Students must take as part of their program: 0.50 credits from the following list:

   - PHYS*2030 [0.50] Biophysics of Excitable Cells
   - PHYS*2240 [0.50] Thermal Physics
   - PHYS*2330 [0.50] Electricity and Magnetism I
   - PHYS*2600 [0.50] General Astronomy
   - PHYS*3080 [0.50] Energy

X. Degree Programs, Bachelor of Science (B.Sc.)
Summer Semester

COOP*3000 [0.50] Co-op Work Term III

Semester 6 - Fall

CHEM*3750 [0.50] Organic Chemistry II

2.00 electives or restricted electives

Semester 7 - Winter

BIOL*4540 [0.75] Enzymology

MBG*3350 [0.75] Laboratory Methods in Molecular Biology

1.00 electives or restricted electives

Summer Semester

COOP*4000 [0.50] Co-op Work Term IV

Semester 8 - Fall

2.50 electives or restricted electives

Restricted Electives

1. Students must take as part of their program: 4.00 credits from the following list, with at least 1.00 of these credits from BIO*4520, BIO*4580, MCB*4050.

- BIO*4520 [0.50] Metabolic Processes
- BIO*4580 [0.50] Membrane Biochemistry
- BIO*5330 [0.50] Applied Bioinformatics
- BIOM*3200 [1.00] Biomedical Physiology
- MBG*3040 [0.50] Molecular Biology of the Gene
- MBG*3080 [0.50] Bacterial Genetics
- MCB*3010 [0.50] Dynamics of Cell Function and Signaling
- MCB*4010 [0.50] Advanced Cell Biology
- MCB*4050 [1.00] Protein and Nucleic Acid Structure
- MCB*4500 [1.00] Research Project in Molecular & Cellular Biology

2. Students must take as part of their program: 0.50 credits from the following list:

- PHYS*2030 [0.50] Biophysics of Excitable Cells
- PHYS*2240 [0.50] Thermal Physics
- PHYS*2330 [0.50] Electricity and Magnetism I
- PHYS*2600 [0.50] General Astronomy
- PHYS*3080 [0.50] Energy

Biodiversity (BIOD)

Department of Integrative Biology, College of Biological Science

The Major in Biodiversity offers a broad education in the diversity and evolution of life while providing a more specialized understanding of biology at the level of the organism. It is the most flexible of the majors offered by the Department of Integrative Biology and as such, it allows students the opportunity to design a customized program around their interests. The major qualifies students for postgraduate work in biology, botany, zoology, and other life sciences and provides a sound science background for students wishing to pursue professional life science degrees or careers in teaching, government service or the private sector.

Biodiversity impacts every aspect of our planet. To maximize a student’s exposure to biodiversity we strongly encourage students to consider an international exchange in their fifth semester. An increase in global awareness of the diverse issues facing biodiversity from different economic, social, environmental and biological landscapes will help students to critically think, analyze and recognize the inherent complexities within the field.

Major (Honours Program)

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. A minimum total of 20.00 credits required to complete the major.

Semester 1

- BIOL*1070 [0.50] Discovering Biodiversity
- CHEM*1040 [0.50] General Chemistry I
- MATH*1080 [0.50] Elements of Calculus I
- PHYS*1080 [0.50] Physics for Life Sciences

0.50 Liberal Education electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at https://www.uoguelph.ca/bsc/revised_SS

Semester 2

- BIOL*1080 [0.50] Biological Concepts of Health
- BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
- CHEM*1050 [0.50] General Chemistry II
- PHYS*1070 [0.50] Physics for Life Sciences II

0.50 electives or restricted electives

Semester 3

- BIOL*2580 [0.50] Introduction to Biochemistry
- MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
- MCB*2420 [0.50] Introduction to Microbiology
- ZOO*2090 [0.50] Vertebrate Structure and Function

0.50 electives or restricted electives

Semester 4

- BIOL*2600 [0.50] Ecology
- BIOL*2400 [0.50] Evolution
- STAT*2230 [0.50] Biostatistics for Integrative Biology
- ZOO*2700 [0.50] Invertebrate Morphology & Evolution

0.50 electives or restricted electives

Semester 5

- 2.50 electives or restricted electives

Or Study Abroad*

Semester 6

- BOT*3710 [0.50] Plant Diversity and Evolution
- ENVS*3090 [0.50] Insect Diversity and Biology
- IBIO*3100 [0.50] Interpreting Biodiversity I

1.00 electives or restricted electives

Semester 7

- IBIO*4100 [1.00] Interpreting Biodiversity II

1.50 electives or restricted electives

Semester 8

- 2.50 electives or restricted electives

* Restricted Electives

The major in Biodiversity is a flexible program that allows students, in consultation with faculty advisors, to pursue their own interests and design a customized program of study. For example, students may wish to select their electives to focus on a particular taxonomic group such as microbes, plants, invertebrates, or vertebrates, and/or one of the three areas of research strength in the Department of Integrative Biology: physiology, ecology, or evolution.

1. At least 1.00 credits of Liberal Education electives are required. The list of Liberal Education electives for B.Sc. students can be found at: https://www.uoguelph.ca/bsc

2. A minimum of 0.50 credits from:
   - BOT*2100 [0.50] Life Strategies of Plants
   - BOT*3050 [0.50] Plant Functional Ecology
   - ZOO*3600 [0.50] Comparative Animal Physiology I

3. A minimum of 0.50 credits from:
   - BOT*3310 [0.50] Plant Growth and Development
   - BOT*3410 [0.50] Plant Anatomy
   - ZOO*3050 [0.50] Developmental Biology

4. A minimum of 0.50 credits from the following list. Biodiversity students are strongly encouraged to take at least one field course. Students should keep in mind that some of these courses have prerequisites that are not required courses for the BIOD major and should plan their programs accordingly.

- BIOL*4410 [0.75] Field Ecology
- BIOL*4610 [0.75] Arctic Ecology
- BIOL*4700 [0.50] Field Biology
- BIOL*4710 [0.25] Field Biology
- BIOL*4800 [0.50] Field Ecology
- BIOL*4810 [0.25] Field Biology
- IBIO*4500 [1.00] Research in Integrative Biology I
- IBIO*4510 [1.00] Research in Integrative Biology II
- IBIO*4521/2 [2.00] Thesis in Integrative Biology
- ZOO*4170 [0.50] Experimental Comparative Animal Physiology
- ZOO*4300 [0.75] Marine Biology and Oceanography

Other field or research courses with approval of faculty advisor.

** Study Abroad can include an exchange, international letter of permission, semester abroad or field school. Full details on the institutions and experiences available, along with application deadlines and admission requirements can be found on the University of Guelph, Centre for International Programs website: https://www.uoguelph.ca/cip/

Credit Summary (20.00 Total Credits)

- 4.00 - First year science credits
- 6.50 - Required science courses semesters 3 - 8
- 1.50 - Restricted elective (# 2, 3 and 4 in restricted elective list)
- 4.00 - Approved Science electives
- 1.00 - Liberal Education (#1 in restricted electives)

2019-2020 Undergraduate Calendar

Last Revision: July 4, 2019
3.00 - Free electives - any approved elective for B.Sc. students.

*Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

### Biological and Medical Physics (BMPH)

#### Department of Physics, College of Engineering and Physical Sciences

#### Major (Honours Program)

The program emphasizes the application of physics to biology and medicine. It provides an excellent background for careers in the expanding interdisciplinary research laboratories of government and industry, as well as a starting point for a career in medical physics. Completion of the program at an appropriate level will qualify a student to pursue post-graduate studies in biophysics, medical physics and related areas of physics.

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. This major requires the completion of 20.00 credits as follows:

**Semester 1**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>Introduction to Molecular and Cellular Biology</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>General Chemistry I</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CIS*1300</td>
<td>Programming</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

1.00 credits from: IPS*1500, or (MATH*1080, PHYS*1080) or (MATH*1200, PHYS*1080)

* IPS*1500 is recommended

**Semester 2**

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>BIOL*1080</td>
<td>Biological Concepts of Health</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>General Chemistry II</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MATH*1160</td>
<td>Linear Algebra I</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

1.00 credits from: IPS*1510, or (MATH*1090, PHYS*1070) or (MATH*1210, PHYS*1010)

* IPS*1510 is recommended

**Semester 3**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>MATH*2200</td>
<td>Advanced Calculus I</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MATH*2270</td>
<td>Applied Differential Equations</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*2240</td>
<td>Thermal Physics</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*2330</td>
<td>Electricity and Magnetism I</td>
<td>[0.50]</td>
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</table>

0.50 Liberal Education electives

**Semester 4**

<table>
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<th>Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>BIOC*2580</td>
<td>Introduction to Biochemistry</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*2030</td>
<td>Biophysics of Excitable Cells</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*2180</td>
<td>Experimental Techniques in Physics</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*2310</td>
<td>Mechanics</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*2340</td>
<td>Electricity and Magnetism II</td>
<td>[0.50]</td>
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</tbody>
</table>

**Semester 5**

<table>
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<th>Code</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>IPS*3000</td>
<td>Science Communication</td>
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</tr>
<tr>
<td>PHYS*3130</td>
<td>Mathematical Physics</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*3230</td>
<td>Quantum Mechanics I</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

1.00 electives **

**Semester 6**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NANO*3600</td>
<td>Computational Methods in Materials Science</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*3510</td>
<td>Intermediate Laboratory</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*4040</td>
<td>Quantum Mechanics II</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*4540</td>
<td>Molecular Biophysics</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

0.50 electives **

**Semester 7**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS*3170</td>
<td>Radioactivity and Radiation Interactions</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*4500</td>
<td>Advanced Physics Laboratory</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

One of:

- PHYS*4001 [0.50] Research in Physics
- 0.50 electives

1.00 electives **

**Semester 8**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS*4070</td>
<td>Clinical Applications of Physics in Medicine</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

One of:

- PHYS*4002 [0.50] Research in Physics
- 0.50 electives **

1.50 electives **

Note: PHYS*4001/2 will be projects in biological or medical physics, some of which may be in areas outside the Department of Physics.

** At least 1.00 credits of Liberal Education electives are required. In addition, students are required to complete 1.50 credits from either List A or List B as follows:

#### List A: Biological Physics stream

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*3560</td>
<td>Structure and Function in Biochemistry</td>
<td>[0.50]</td>
</tr>
<tr>
<td>BIOL*4580</td>
<td>Membrane Biochemistry</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MGB*2040</td>
<td>Foundations in Molecular Biology and Genetics</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MCB*2050</td>
<td>Molecular Biology of the Cell</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MCB*4050</td>
<td>Protein and Nucleic Acid Structure</td>
<td>[0.50]</td>
</tr>
<tr>
<td>NANO*4100</td>
<td>Biological Nanomaterials</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*3000</td>
<td>Optics: Fundamentals and Applications</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

#### List B: Medical Physics stream

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM*2000</td>
<td>Concepts in Human Physiology</td>
<td>[0.50]</td>
</tr>
<tr>
<td>ENGG*4040</td>
<td>Medical Imaging Modalities</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MGB*2040</td>
<td>Foundations in Molecular Biology and Genetics</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PATH*3610</td>
<td>Principles of Disease</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*3000</td>
<td>Optics: Fundamentals and Applications</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*4130</td>
<td>Subatomic Physics</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

#### Credit Summary (20.00 Total Credits)

- 5.00 - First year science credits
- 9.50 - Required science courses semesters 3 – 8
- 1.50 - Restricted electives (from List A OR List B)
- 1.00 - Liberal Education electives
- 3.00 - Free electives - any approved elective for B.Sc. students.

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

### Biological and Medical Physics (Co-op) (BMPH:C)

#### Department of Physics, College of Engineering and Physical Sciences

The program emphasizes the application of physics to biology and medicine. It provides an excellent background for careers in the expanding interdisciplinary research laboratories of government and industry, as well as a starting point for a career in medical physics. Completion of the program at an appropriate level will qualify a student to pursue post-graduate studies in biophysics, medical physics and related areas of physics.

#### Program Requirements

The Co-op program in Biological and Medical Physics is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

#### Biological and Medical Physics Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td>COOP*1000 Work Term I</td>
</tr>
<tr>
<td>3</td>
<td>Academic Semester 5</td>
<td>COOP*2000 Work Term II</td>
<td>COOP*3000 Work Term III</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
</tr>
<tr>
<td>5</td>
<td>COOP*5000 Work Term V</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

#### Credit Summary (22.00 Total Credits)*

- 5.00 - First year science credits
- 9.50 - Required science courses semesters 3 – 8
- 1.50 - Restricted electives (from List A OR List B)
- 1.00 - Liberal Education electives
- 3.00 - Free electives - any approved elective for B.Sc. students.
- 2.00 - Co-op Work Terms

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 22.50.

The recommended program sequence is outlined below.
## Major (Honours Program)

### Semester 1 - Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>0.50</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>0.50</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>CIS*1300</td>
<td>0.50</td>
<td>Programming</td>
</tr>
<tr>
<td></td>
<td>1.00 credits from: IPS<em>1500, or (MATH</em>1080, PHYS<em>1080) or (MATH</em>1200, PHYS*1080)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* IPS*1500 is recommended</td>
<td></td>
</tr>
</tbody>
</table>

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: [https://www.uoguelph.ca/bsc/revised_SS](https://www.uoguelph.ca/bsc/revised_SS)

### Semester 2 - Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1080</td>
<td>0.50</td>
<td>Biological Concepts of Health</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>0.50</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>MATH*1160</td>
<td>0.50</td>
<td>Linear Algebra I</td>
</tr>
<tr>
<td></td>
<td>1.00 credits from: IPS<em>1510, or (MATH</em>1090, PHYS<em>1070) or (MATH</em>1210, PHYS*1010)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* IPS*1510 is recommended</td>
<td></td>
</tr>
</tbody>
</table>

### Semester 3 - Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP*1100</td>
<td>0.00</td>
<td>Introduction to Co-operative Education</td>
</tr>
<tr>
<td>MATH*2200</td>
<td>0.50</td>
<td>Advanced Calculus I</td>
</tr>
<tr>
<td>MATH*2270</td>
<td>0.50</td>
<td>Applied Differential Equations</td>
</tr>
<tr>
<td>PHYS*2240</td>
<td>0.50</td>
<td>Thermal Physics</td>
</tr>
<tr>
<td>PHYS*2330</td>
<td>0.50</td>
<td>Electricity and Magnetism I</td>
</tr>
<tr>
<td></td>
<td>0.50 Liberal Education electives</td>
<td></td>
</tr>
</tbody>
</table>

### Semester 4 - Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*2580</td>
<td>0.50</td>
<td>Introduction to Biochemistry</td>
</tr>
<tr>
<td>PHYS*2030</td>
<td>0.50</td>
<td>Biophysics of Excitable Cells</td>
</tr>
<tr>
<td>PHYS*2180</td>
<td>0.50</td>
<td>Experimental Techniques in Physics</td>
</tr>
<tr>
<td>PHYS*2310</td>
<td>0.50</td>
<td>Mechanics</td>
</tr>
<tr>
<td>PHYS*2340</td>
<td>0.50</td>
<td>Electricity and Magnetism II</td>
</tr>
</tbody>
</table>

### Summer Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP*1000</td>
<td>0.50</td>
<td>Co-op Work Term I</td>
</tr>
</tbody>
</table>

### Semester 5 - Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS*3130</td>
<td>0.50</td>
<td>Mathematical Physics</td>
</tr>
<tr>
<td>PHYS*3230</td>
<td>0.50</td>
<td>Quantum Mechanics I</td>
</tr>
<tr>
<td></td>
<td>1.50 electives ***</td>
<td></td>
</tr>
</tbody>
</table>

### Winter Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP*2000</td>
<td>0.50</td>
<td>Co-op Work Term II</td>
</tr>
<tr>
<td>(8-month work term in conjunction with COOP*3000)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP*3000</td>
<td>0.50</td>
<td>Co-op Work Term III</td>
</tr>
<tr>
<td>(8-month work term in conjunction with COOP*2000)</td>
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### Semester 6 - Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>IPS*3000</td>
<td>0.50</td>
<td>Science Communication</td>
</tr>
<tr>
<td>PHYS*3170</td>
<td>0.50</td>
<td>Radioactivity and Radiation Interactions</td>
</tr>
<tr>
<td></td>
<td>1.50 electives ***</td>
<td></td>
</tr>
</tbody>
</table>

### Semester 7 - Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NANO*3600</td>
<td>0.50</td>
<td>Computational Methods in Materials Science</td>
</tr>
<tr>
<td>PHYS*3510</td>
<td>0.50</td>
<td>Intermediate Laboratory</td>
</tr>
<tr>
<td>PHYS*4040</td>
<td>0.50</td>
<td>Quantum Mechanics II</td>
</tr>
<tr>
<td>PHYS*4540</td>
<td>0.50</td>
<td>Molecular Biophysics</td>
</tr>
<tr>
<td></td>
<td>0.50 electives ***</td>
<td></td>
</tr>
</tbody>
</table>

### Summer Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP*4000</td>
<td>0.50</td>
<td>Co-op Work Term IV</td>
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</table>

### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP*5000</td>
<td>0.50</td>
<td>Co-op Work Term V</td>
</tr>
</tbody>
</table>

### Semester 8 - Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS*4070</td>
<td>0.50</td>
<td>Clinical Applications of Physics in Medicine</td>
</tr>
<tr>
<td>PHYS*4500</td>
<td>0.50</td>
<td>Advanced Physics Laboratory</td>
</tr>
<tr>
<td></td>
<td>1.50 electives ***</td>
<td></td>
</tr>
</tbody>
</table>

Students are required to complete 1.50 credits from either List A or List B as follows:

### List A: Biological Physics stream

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*3560</td>
<td>0.50</td>
<td>Structure and Function in Biochemistry</td>
</tr>
<tr>
<td>BIOC*4580</td>
<td>0.50</td>
<td>Membrane Biochemistry</td>
</tr>
<tr>
<td>MBBG*2040</td>
<td>0.50</td>
<td>Foundations in Molecular Biology and Genetics</td>
</tr>
<tr>
<td>MCB*2050</td>
<td>0.50</td>
<td>Molecular Biology of the Cell</td>
</tr>
<tr>
<td>MCB*4050</td>
<td>0.50</td>
<td>Protein and Nucleic Acid Structure</td>
</tr>
<tr>
<td>NANO*4100</td>
<td>0.50</td>
<td>Biological Nanomaterials</td>
</tr>
<tr>
<td>PHYS*3000</td>
<td>0.50</td>
<td>Optics: Fundamentals and Applications</td>
</tr>
</tbody>
</table>

### List B: Medical Physics stream

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM*2000</td>
<td>0.50</td>
<td>Concepts in Human Physiology</td>
</tr>
</tbody>
</table>

### Biological and Pharmaceutical Chemistry (BPCCH)

#### Department of Chemistry, College of Engineering and Physical Sciences

### Major (Honours Program)

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. This major will require the completion of 20.00 credits as indicated below:

#### Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>0.50</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>0.50</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>IPS*1500</td>
<td>1.00</td>
<td>Integrated Mathematics and Physics I</td>
</tr>
<tr>
<td></td>
<td>0.50 Liberal Education electives</td>
<td></td>
</tr>
</tbody>
</table>

Students who are lacking one 4U /grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: [https://www.uoguelph.ca/bsc/revised_SS](https://www.uoguelph.ca/bsc/revised_SS)

#### Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM*1050</td>
<td>0.50</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>IPS*1510</td>
<td>1.00</td>
<td>Integrated Mathematics and Physics II</td>
</tr>
<tr>
<td></td>
<td>One of</td>
<td></td>
</tr>
<tr>
<td>BIOL*1070</td>
<td>0.50</td>
<td>Discovering Biodiversity</td>
</tr>
<tr>
<td>BIOL*1080</td>
<td>0.50</td>
<td>Biological Concepts of Health</td>
</tr>
<tr>
<td></td>
<td>0.50 Liberal Education electives</td>
<td></td>
</tr>
</tbody>
</table>

#### Semester 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*2580</td>
<td>0.50</td>
<td>Introduction to Biochemistry</td>
</tr>
<tr>
<td>CHEM*2060</td>
<td>0.50</td>
<td>Structure and Bonding</td>
</tr>
<tr>
<td>CHEM*2880</td>
<td>0.50</td>
<td>Physical Chemistry</td>
</tr>
<tr>
<td></td>
<td>One of</td>
<td></td>
</tr>
<tr>
<td>MBBG*2040</td>
<td>0.50</td>
<td>Foundations in Molecular Biology and Genetics</td>
</tr>
<tr>
<td>STAT*2040</td>
<td>0.50</td>
<td>Statistics I</td>
</tr>
<tr>
<td></td>
<td>0.50 electives or restricted electives</td>
<td></td>
</tr>
</tbody>
</table>

#### Semester 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM*2070</td>
<td>0.50</td>
<td>Structure and Spectroscopy</td>
</tr>
<tr>
<td>CHEM*2700</td>
<td>0.50</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>CHEM*2400</td>
<td>0.75</td>
<td>Analytical Chemistry I</td>
</tr>
<tr>
<td>MCB*2420</td>
<td>0.50</td>
<td>Introduction to Microbiology</td>
</tr>
<tr>
<td></td>
<td>One of</td>
<td></td>
</tr>
<tr>
<td>MBBG*2040</td>
<td>0.50</td>
<td>Foundations in Molecular Biology and Genetics</td>
</tr>
<tr>
<td>STAT*2040</td>
<td>0.50</td>
<td>Statistics I</td>
</tr>
</tbody>
</table>

#### Semester 5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*3570</td>
<td>0.75</td>
<td>Analytical Biochemistry</td>
</tr>
<tr>
<td>CHEM*3750</td>
<td>0.50</td>
<td>Organic Chemistry II</td>
</tr>
<tr>
<td></td>
<td>One of</td>
<td></td>
</tr>
<tr>
<td>CHEM*3640</td>
<td>0.50</td>
<td>Chemistry of the Elements I **</td>
</tr>
<tr>
<td></td>
<td>0.50 electives or restricted electives *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>One of</td>
<td></td>
</tr>
<tr>
<td>TOX*3300</td>
<td>0.50</td>
<td>Analytical Toxicology ***</td>
</tr>
<tr>
<td></td>
<td>0.50 electives or restricted electives *</td>
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</tr>
<tr>
<td></td>
<td>Electives or restricted electives to a maximum of 2.75 total credits in this semester*</td>
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</tr>
<tr>
<td>*** TOX<em>3300 is a substitute for CHEM</em>3430 in Semester 6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Semester 6

Select either Option A or Option B

##### Option A (at Guelph)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>BIOC*3560</td>
<td>0.50</td>
<td>Structure and Function in Biochemistry</td>
</tr>
<tr>
<td>CHEM*3430</td>
<td>0.50</td>
<td>Analytical Chemistry II: Instrumental Analysis</td>
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<tr>
<td>CHEM*3650</td>
<td>0.50</td>
<td>Chemistry of the Elements II</td>
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<tr>
<td>CHEM*3760</td>
<td>0.50</td>
<td>Organic Chemistry III</td>
</tr>
<tr>
<td></td>
<td>0.50 electives or restricted electives *</td>
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</tbody>
</table>

##### Option B (at Seneca)

2.50 credits from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>XSEN*3030</td>
<td>0.50</td>
<td>Pharmacology and Applied Toxicology</td>
</tr>
<tr>
<td>XSEN*3040</td>
<td>0.50</td>
<td>Occupational Health and Chemistry</td>
</tr>
<tr>
<td>XSEN*3060</td>
<td>0.50</td>
<td>Pharmaceutical Analysis - Advanced</td>
</tr>
<tr>
<td>XSEN*3070</td>
<td>0.50</td>
<td>Pharmaceutical Product Formulations</td>
</tr>
<tr>
<td>XSEN*3090</td>
<td>0.50</td>
<td>Biopharmaceuticals</td>
</tr>
<tr>
<td>XSEN*3200</td>
<td>0.50</td>
<td>Pharmaceutical Organic Chemistry</td>
</tr>
<tr>
<td>XSEN*3210</td>
<td>0.50</td>
<td>Introduction to Pharmaceutical Manufacturing</td>
</tr>
</tbody>
</table>
Note: All XSEN courses are taught at the Seneca@York campus of Seneca College in Toronto.

Semester 7
One of:
CHEM*4730 [0.50] Synthetic Organic Chemistry
CHEM*4740 [0.50] Topics in Bio-Organo-Chemistry
2.00 electives or restricted electives *

Semester 8
2.50 electives or restricted electives *

* Restricted Electives

**Students are advised to pay particular attention to pre-requisite requirements when choosing individual courses, and seek advice as needed.

1. 0.50 credits from the following:
   MCB*2050 [0.50] Molecular Biology of the Cell
   TOX*2000 [0.50] Principles of Toxicology

2. A minimum of 1.50 credits at the 4000 level and 2.50 credits at the 3000/4000 level

   from the following list:
   BIOC*3560 [0.50] Structure and Function in Biochemistry
   BIOC*4520 [0.50] Metabolic Processes
   BIOC*4540 [0.50] Enzymology **
   BIOC*4580 [0.50] Membrane Biochemistry
   BIOM*3090 [0.50] Principles of Pharmacology **
   BIOM*3200 [1.00] Biomedical Physiology
   BIOM*4090 [0.50] Pharmacology **
   CHEM*3360 [0.50] Environmental Chemistry and Toxicology
   CHEM*3440 [0.50] Analytical Chemistry III: Analytical Instrumentation
   CHEM*3640 [0.50] Chemistry of the Elements I
   CHEM*3650 [0.50] Chemistry of the Elements II **
   CHEM*3760 [0.50] Organic Chemistry III
   CHEM*4010 [0.50] Chemistry and Industry
   CHEM*4400 [0.50] Advanced Topics in Analytical Chemistry
   CHEM*4630 [0.50] Bioinorganic Chemistry **
   CHEM*4720 [0.50] Organic Reactivity **
   CHEM*4730 [0.50] Synthetic Organic Chemistry **
   CHEM*4740 [0.50] Topics in Bio-Organic Chemistry
   CHEM*4900 [1.00] Chemistry Research Project I **
   CHEM*4910 [1.00] Chemistry Research Project II **
   MBG*3040 [0.50] Molecular Biology of the Gene **
   MBG*3350 [0.75] Laboratory Methods in Molecular Biology **
   MCB*4050 [0.50] Protein and Nucleic Acid Structure **
   MIRC*3230 [0.50] Immunology
   NUTR*3210 [0.50] Fundamentals of Nutrition
   PATH*3610 [0.50] Principles of Disease
   TOX*4590 [0.50] Biochemical Toxicology **
   XSEN*3030 [0.50] Pharmacology and Applied Toxicology
   XSEN*3040 [0.50] Occupational Health and Chemistry
   XSEN*3060 [0.50] Pharmaceutical Analysis - Advanced
   XSEN*3070 [0.50] Pharmaceutical Product Formulations
   XSEN*3090 [0.50] Biopharmaceuticals
   XSEN*3200 [0.50] Pharmaceutical Organic Chemistry
   XSEN*3210 [0.50] Introduction to Pharmaceutical Manufacturing

Credit Summary (20.00 Total Credits)*
4.00 - First year science credits
6.50 - Required science courses semesters 3 – 8
5.00 - Restricted electives (#1 and 2 in restricted electives list)
0.50 - Approved Science electives
1.00 - Liberal Education electives
3.00 - Free electives - any approved elective for B.Sc. students. (could be less if restricted electives do not count as science)

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Biological and Pharmaceutical Chemistry Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>COOP*1100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1000 Work Term I</td>
<td>Academic Semester 4</td>
</tr>
<tr>
<td>3</td>
<td>Academic Semester 5</td>
<td>Academic Semester 6</td>
<td>COOP*2000 Work Term II</td>
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<td>4</td>
<td>COOP*3000 Work Term III</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
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<tr>
<td>5</td>
<td>Academic Semester 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (21.50 Total Credits)*
4.00 - First year science credits
6.00 - Required science courses semesters 3 – 8
5.50 - Restricted electives (#1 and #2 in restricted electives list)
0.50 - Approved Science electives
1.00 - Liberal Education electives
3.00 - Free electives - any approved elective for B.Sc. students. (could be less if restricted electives do not count as science)
1.50 - Co-op Work Terms

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Note: A minimum of three Co-op work terms including a Sumner, Fall, and Winter are necessary to complete the Co-op requirement. *A fourth Co-op work term is optional and if completed, the total number of credits will equal 22.00.

The recommended program sequence is outlined below.

Major (Honours Program)

Semester 1 - Fall
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
CHEM*1040 [0.50] General Chemistry I
IPS*1500 [1.00] Integrated Mathematics and Physics I
0.50 Liberal Education electives

Students who are lacking one 4U/grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: https://www.uoguelph.ca/bsc/revised_SS

Semester 2 - Winter
CHEM*1050 [0.50] General Chemistry II
COOP*1100 [0.00] Introduction to Co-operative Education
IPS*1510 [1.00] Integrated Mathematics and Physics II

One of
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
0.50 Liberal Education electives

Semester 3 - Fall
BIOL*2580 [0.50] Introduction to Biochemistry
CHEM*2060 [0.50] Structure and Bonding
CHEM*2400 [0.75] Analytical Chemistry I
CHEM*2880 [0.50] Physical Chemistry
0.50 electives or restricted electives to a maximum of 2.75 total credits in this semester*

Semester 4 - Winter
COOP*1000 [0.50] Co-op Work Term I

Semester 5 - Fall
CHEM*2070 [0.50] Structure and Spectroscopy
CHEM*2700 [0.50] Organic Chemistry I
CHEM*3430 [0.50] Analytical Chemistry II: Instrumental Analysis
STAT*2040 [0.50] Statistics I
0.50 electives or restricted electives *

Semester 6 - Winter
CHEM*2400 [0.50] Analytical Chemistry II
CHEM*3430 [0.50] Analytical Chemistry III
0.50 Liberal Education electives

Semester 7 - Fall
CHEM*3650 [0.50] Organic Chemistry III
CHEM*4010 [0.50] Chemistry and Industry
CHEM*4400 [0.50] Advanced Topics in Analytical Chemistry
CHEM*4630 [0.50] Bioinorganic Chemistry **
CHEM*4720 [0.50] Organic Reactivity **
CHEM*4730 [0.50] Synthetic Organic Chemistry **
CHEM*4740 [0.50] Topics in Bio-Organic Chemistry
CHEM*4900 [1.00] Chemistry Research Project I **
CHEM*4910 [1.00] Chemistry Research Project II **
MBG*3040 [0.50] Molecular Biology of the Gene **
MBG*3350 [0.75] Laboratory Methods in Molecular Biology **
MCB*4050 [0.50] Protein and Nucleic Acid Structure **
MIRC*3230 [0.50] Immunology
NUTR*3210 [0.50] Fundamentals of Nutrition
PATH*3610 [0.50] Principles of Disease
TOX*4590 [0.50] Biochemical Toxicology **
XSEN*3030 [0.50] Pharmacology and Applied Toxicology
XSEN*3040 [0.50] Occupational Health and Chemistry
XSEN*3060 [0.50] Pharmaceutical Analysis - Advanced
XSEN*3070 [0.50] Pharmaceutical Product Formulations
XSEN*3090 [0.50] Biopharmaceuticals
XSEN*3200 [0.50] Pharmaceutical Organic Chemistry
XSEN*3210 [0.50] Introduction to Pharmaceutical Manufacturing

Biological and Pharmaceutical Chemistry (Co-op) (BPCH:C)

Department of Chemistry, College of Engineering and Physical Sciences

Program Requirements
The Co-op program in Biological and Pharmaceutical Chemistry is a four and a half year program, including four work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Last Revision: July 4, 2019
2019-2020 Undergraduate Calendar
**Chemistry of the Elements I** 0.50 electives or restricted electives *
**Chemistry of the Elements II** 0.50 electives or restricted electives to a maximum of 2.75 total credits in this semester*

Semester 6 - Winter

Select either Option A or Option B

**Option A (at Guelph)**

BIOC*3560 [0.50] Structure and Function in Biochemistry

CHEM*3650 [0.50] Chemistry of the Elements II

CHEM*3760 [0.50] Organic Chemistry III

1.00 electives or restricted electives *

**Option B (at Seneca)**

XSEN*3030 [0.50] Pharmacology and Applied Toxicology

XSEN*3040 [0.50] Occupational Health and Chemistry

XSEN*3060 [0.50] Pharmaceutical Analysis - Advanced

XSEN*3070 [0.50] Pharmaceutical Product Formulations

XSEN*3090 [0.50] Biopharmaceuticals

XSEN*3200 [0.50] Pharmaceutical Organic Chemistry

XSEN*3210 [0.50] Introduction to Pharmaceutical Manufacturing

Note: All XSEN courses are taught at the Seneca@York campus of Seneca College in Toronto.

Summer Semester

COOP*2000 [0.50] Co-op Work Term II

Fall Semester

COOP*3000 [0.50] Co-op Work Term III

Semester 7 - Winter

2.50 electives or restricted electives *

Summer Semester

COOP*4000 [0.50] Co-op Work Term IV

Semester 8 - Fall

One of:

CHEM*4730 [0.50] Synthetic Organic Chemistry

CHEM*4740 [0.50] Topics in Bio-Organic Chemistry

2.00 electives or restricted electives *

**Restricted Electives**

**Students are advised to pay particular attention to pre-requisite requirements when choosing individual courses, and seek advice as needed.**

1. MIRC*2420 [0.50] Introduction to Microbiology

2. 1.00 credits from the following:

   - MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
   - MCB*2050 [0.50] Molecular Biology of the Cell
   - TOX*2000 [0.50] Principles of Toxicology

3. A minimum of 1.50 credits at the 4000 level and 2.50 credits at the 3000/4000 level from the following list:

   - BIOC*3560 [0.50] Structure and Function in Biochemistry
   - BIOC*4520 [0.50] Metabolic Processes
   - BIOC*4540 [0.50] Enzymology **
   - BIOC*4580 [0.50] Membrane Biochemistry
   - BIOL*3090 [0.50] Principles of Pharmacology **
   - BIOL*3200 [1.00] Biomedical Physiology
   - BIOL*4090 [0.50] Pharmacology **
   - CHEM*3360 [0.50] Environmental Chemistry and Toxicology
   - CHEM*3440 [0.50] Analytical Chemistry III: Analytical Instrumentation
   - CHEM*3640 [0.50] Chemistry of the Elements I
   - CHEM*3650 [0.50] Chemistry of the Elements II **
   - CHEM*3760 [0.50] Organic Chemistry III
   - CHEM*4010 [0.50] Chemistry and Industry
   - CHEM*4400 [0.50] Advanced Topics in Analytical Chemistry
   - CHEM*4630 [0.50] Bioinorganic Chemistry **
   - CHEM*4720 [0.50] Organic Reactivity **
   - CHEM*4730 [0.50] Synthetic Organic Chemistry **
   - CHEM*4740 [0.50] Topics in Bio-Organic Chemistry
   - CHEM*4900 [1.00] Chemistry Research Project I **
   - CHEM*4910 [1.00] Chemistry Research Project II **
   - MBG*3040 [0.50] Molecular Biology of the Gene **
   - MBG*3350 [0.75] Laboratory Methods in Molecular Biology **
   - MCB*4050 [0.50] Protein and Nuclear Acid Structure **
   - MIRC*3230 [0.50] Immunology
   - NUTR*3210 [0.50] Fundamentals of Nutrition
   - PATH*3610 [0.50] Principles of Disease
   - TOX*4590 [0.50] Biochemical Toxicology **
   - XSEN*3030 [0.50] Pharmacology and Applied Toxicology

   - XSEN*3040 [0.50] Occupational Health and Chemistry
   - XSEN*3060 [0.50] Pharmaceutical Analysis - Advanced
   - XSEN*3070 [0.50] Pharmaceutical Product Formulations
   - XSEN*3090 [0.50] Biopharmaceuticals
   - XSEN*3200 [0.50] Pharmaceutical Organic Chemistry
   - XSEN*3210 [0.50] Introduction to Pharmaceutical Manufacturing

**Biological Science (BIOS)**

**College of Biological Science**

**Major (Honours Program)**

The Biological Science major offers the opportunity to study a wide range of topics within biological science. The major is one of the most flexible within the B.Sc. program. After the core sciences in first and second year, students can tailor the degree to create a major all their own. With the wide breadth of courses offered, students can choose to focus their studies in one area of biological science or create a unique skill set and combination of courses not currently offered in any one of our majors. Students can also add a minor in either an area of science, arts or social science.

With this flexibility, students in the Biological Science major are encouraged to seek out study abroad opportunities through the Centre for International Programs. With a high number of elective spaces within the major, students can incorporate a study abroad and still meet the degree requirements within four years. Students who wish to pursue this option should start researching and planning in semesters 3 and 4.

Students may enter this major in Semester I or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. This major will require the completion of 20.00 credits as indicated below:

**Schedule of Studies**

**Semester 1**

BIOC*1090 [0.50] Introduction to Molecular and Cellular Biology

CHEM*1040 [0.50] General Chemistry I

MATH*1080 [0.50] Elements of Calculus I

PHYS*1080 [0.50] Physics for Life Sciences

0.50 Liberal Education electives

**Semester 2**

BIOC*1070 [0.50] Discovering Biodiversity

BIOC*1080 [0.50] Biological Concepts of Health

CHEM*1050 [0.50] General Chemistry II

PHYS*1070 [0.50] Physics for Life Sciences II

0.50 Liberal Education electives

**Semester 3**

BIOC*2400 [0.50] Evolution

One of:

   - BIOC*2580 [0.50] Introduction to Biochemistry
   - MBG*2040 [0.50] Foundations in Molecular Biology and Genetics

1.00 electives or restricted electives *

0.50 Liberal Education elective

**Semester 4**

STAT*2040 [0.50] Statistics I

One of:

   - BIOC*2580 [0.50] Introduction to Biochemistry
   - MBG*2040 [0.50] Foundations in Molecular Biology and Genetics

1.00 electives or restricted electives *

0.50 Liberal Education elective

**Semester 5**

2.50 electives or restricted electives *

**Students are encouraged to consider study abroad options†**

**Semester 6**

2.50 electives or restricted electives *

**Students are encouraged to consider study abroad options†**

**Semester 7 and 8**

2.50 electives or restricted electives *

†Students interested in studying abroad need to apply in the year prior to going abroad. Students need to contact the Centre for International Programs to confirm admission requirements and submit an application. Study abroad requires approval from the appropriate individuals and is pending available space at the host institution.

**Restricted Electives**

**Note:** Some courses may require additional prerequisites.

1. At least 2.00 credits of Liberal Education electives are required. The list of Liberal Education electives for B.Sc. students can be found at: https://www.ogsuelph.ca/bsc/

2. A minimum of 0.50 credits in Ecology:

   - BIOL*2060 [0.50] Ecology
1. A minimum of 0.50 credits in Mathematical or Computational Science:

- CIS*1000 [0.50] Introduction to Computer Applications
- CIS*1200 [0.50] Introduction to Computing
- MATH*1090 [0.50] Elements of Calculus II
- STAT*2050 [0.50] Statistics II

2. A minimum of 0.50 credits in Physiology:

- BIOM*3200 [1.00] Biomedical Physiology
- BOT*2100 [0.50] Life Strategies of Plants
- HK*2810 [0.50] Human Physiology I - Concepts and Principles
- ZOO*3600 [0.50] Comparative Animal Physiology I

3. 5.50 additional Biological Science courses of which 4.00 must be at the 3000 or 4000 level. The list of approved science electives is posted at http://www.bsc.uoguelph.ca/.

Credit Summary (20.00 Total Credits)

1. 4.00 - First-year science core
2. 3.50 - Required science courses semesters 3 - 8 (# 2, 3 and 4 in restricted elective list)
3. 5.50 - Approved Biological Science electives of which 4.00 must be 3000/4000 level (# 5 in restricted elective list)
4. 3.00 - Approved Science electives of which 2.00 credits must be 3000/4000 level* May include 1 of BIOL*1020, CHEM*1060
5. 2.00 - Liberal Education electives
6. 2.00 - Electives

*Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Biology (BIOL)

College of Biological Science

Minor (Honours Program)

A minor in Biology consists of a minimum of 5.00 credits including the following courses: BIOL*1070 [0.50] Discovering Biodiversity BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology MBG*2040 [0.50] Foundations in Molecular Biology and Genetics One of:

- BIOL*2060 [0.50] Ecology
- BIOL*3050 [0.50] Plant Functional Ecology

Bio-Medical Science (BIOM)

Department of Biomedical Sciences and Department of Human Health and Nutritional Sciences

This joint program of the Department of Human Health and Nutritional Sciences and the Department of Biomedical Sciences provides students with a broad and integrated foundational overview of human and animal health through the study of function (biochemistry and physiology), structure (anatomy and histology), and paraclinical sciences (epidemiology and pharmacology). The program prepares students well for more advanced studies or applied training in many health-related fields including clinical practice, business, government, research and education. Through the use of electives, students may structure a program emphasizing aspects of health and disease. For more information on recommended electives contact the Faculty Advisor of the major.

In addition, this program is designed to partially meet the current requirements for entry into medical schools in Ontario (a student interested in meeting these requirements should check the present admission requirements for the medical schools); as well as entry into the DVM program of the Ontario Veterinary College.

Live animals and/or animal tissues are used for teaching purposes in some courses in the Bio-Medical Science Major. This must be accepted by students admitted to the program. Acceptance will be competitive based on available spaces. Students with an average below 70% will not be considered for admission to the major. All decisions will be made at the end of June.

Major (Honours Program)

A minimum of 20.00 credits is required.

Semester 1

- BIOL*1080 [0.50] Biological Concepts of Health
- CHEM*1040 [0.50] General Chemistry I
- MATH*1080 [0.50] Elements of Calculus I
- PHYS*1080 [0.50] Physics for Life Sciences

0.50 electives or restricted electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: https://www.uoguelph.ca/bsc/revised_SS

Semester 2

- BIOL*1070 [0.50] Discovering Biodiversity
- BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
- CHEM*1050 [0.50] General Chemistry II
- PHYS*1070 [0.50] Physics for Life Sciences II

0.50 electives or restricted electives

Semester 3 (see admission statement above)

- MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
- STAT*2040 [0.50] Statistics I

1.00 electives or restricted electives

Semester 4

- MCB*2050 [0.50] Molecular Biology of the Cell
- NUTR*3210 [0.50] Fundamentals of Nutrition

One of:

- BIOM*3200 [1.00] Biomedical Physiology
- HK*2810 [0.50] Human Physiology I - Concepts and Principles

Electives or restricted electives to a maximum of 2.50 total credits in this semester.

Note: If HK*2810 is selected, then HK*3810 must be taken in Semester 5.

Semester 5

- BIOC*3560 [0.50] Structure and Function in Biochemistry

Electives or restricted electives to a maximum of 2.75 total credits in this semester.

Note: As part of the electives or restricted electives, students must select HK*3810 in semester 5 if HK*2810 was selected in semester 4.

Semester 6

- BIOM*3090 [0.50] Principles of Pharmacology
- PATH*3610 [0.50] Principles of Disease
- POPM*3240 [0.50] Epidemiology

Electives or restricted electives to a maximum of 2.75 total credits in this semester.

Semester 7

2.50 electives or restricted electives

Semester 8

2.50 electives or restricted electives

Restricted Electives

1. Anatomy Elective - [1 of (BIOM*3010, BIOM*3040, HK*3401/2, HK*3501/2]

2. Immunology Elective - ANSC*4650 or MIRC*3230

3. Advanced Study Electives - 2.00 credits from BIOM*4030, BIOM*4050, BIOM*4070, BIOM*4090, BIOM*4110, BIOM*4150, BIOM*4180, BIOM*4300, BIOM*4500, BIOM*4510, BIOM*4521/2, HK*4070, HK*4230, HK*4340, HK*4360, HK*4371/2, HK*4441/2, HK*4460, NUTR*4320, NUTR*4360, NUTR*4510, TOX*4000

4. At least 2.00 credits of Liberal Education electives are required. The list of Liberal Education electives for B.Sc. students can be found at: https://www.uoguelph.ca/bsc/

Credit Summary (20.00 Total Credits)

1. 4.00 - First-year science credits
2. 5.75 - Required science courses semesters 3 – 8 (with HK 2810,3810) or 5.50 (with BIOM 3200)
3. 4.00 - Restricted elective (with HK 3401/2 or HK 3501/2) 3.75 (with BIOM 3010, BIOM 3040) (Restricted elective #1, #2 and #3)
4. 2.25 – 2.75 Approved Science electives depending on which anatomy and physiology courses are completed above.

2.00 - Liberal Education electives
2.00 - Free electives - any approved elective for B.Sc. students.
Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

**Biomedical Toxicology (BTOX)**

**Interdisciplinary Program, Departments of Biomedical Sciences, Chemistry, School of Environmental Sciences, Molecular and Cellular Biology**

**Major (Honours Program)**

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. A minimum of 20.00 credits are required for graduation.

**Semester 1**

<table>
<thead>
<tr>
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<th>Credits</th>
<th>Description</th>
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<tr>
<td>BIOL*1090</td>
<td>[0.50]</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>[0.50]</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>[0.50]</td>
<td>Elements of Calculus I</td>
</tr>
<tr>
<td>PHYS*1080</td>
<td>[0.50]</td>
<td>Physics for Life Sciences</td>
</tr>
</tbody>
</table>

0.50 Liberal Education electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: [https://www.yorku.ca/bsc/revised_SS](https://www.yorku.ca/bsc/revised_SS).

**Semester 2**

<table>
<thead>
<tr>
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<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1080</td>
<td>[0.50]</td>
<td>Biological Concepts of Health</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>[0.50]</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>PHYS*1070</td>
<td>[0.50]</td>
<td>Physics for Life Sciences II</td>
</tr>
<tr>
<td>STAT*2040</td>
<td>[0.50]</td>
<td>Statistics I</td>
</tr>
</tbody>
</table>

0.50 Liberal Education electives

**Semester 3**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*2580</td>
<td>[0.50]</td>
<td>Introduction to Biochemistry</td>
</tr>
<tr>
<td>MBG*2040</td>
<td>[0.50]</td>
<td>Foundations in Molecular and Genetics</td>
</tr>
<tr>
<td>TOX*2000</td>
<td>[0.50]</td>
<td>Principles of Toxicology</td>
</tr>
</tbody>
</table>

1.00 elective or Liberal Education electives

**Semester 4**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM*3200</td>
<td>[1.00]</td>
<td>Biomedical Physiology</td>
</tr>
<tr>
<td>CHEM*2480</td>
<td>[0.50]</td>
<td>Analytical Chemistry I</td>
</tr>
<tr>
<td>CHEM*2700</td>
<td>[0.50]</td>
<td>Organic Chemistry I</td>
</tr>
</tbody>
</table>

0.50 electives or restricted electives*

**Semester 5**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*3560</td>
<td>[0.50]</td>
<td>Structure and Function in Biochemistry</td>
</tr>
<tr>
<td>MCB*2050</td>
<td>[0.50]</td>
<td>Molecular Biology of the Cell</td>
</tr>
<tr>
<td>NUTR*3120</td>
<td>[0.50]</td>
<td>Fundamentals of Nutrition</td>
</tr>
<tr>
<td>TOX*3000</td>
<td>[0.50]</td>
<td>Analytical Toxicology</td>
</tr>
</tbody>
</table>

0.50 electives or restricted electives*

**Semester 6**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM*3990</td>
<td>[0.50]</td>
<td>Principles of Pharmacology</td>
</tr>
<tr>
<td>PATH*3610</td>
<td>[0.50]</td>
<td>Principles of Disease</td>
</tr>
<tr>
<td>TOX*3360</td>
<td>[0.50]</td>
<td>Environmental Chemistry and Toxicology</td>
</tr>
</tbody>
</table>

One of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM*3040</td>
<td>[0.75]</td>
<td>Medical Embryology</td>
</tr>
<tr>
<td>MBG*3350</td>
<td>[0.75]</td>
<td>Laboratory Methods in Molecular Biology *</td>
</tr>
</tbody>
</table>

Electives or restricted electives to a maximum of 2.75 total credits in this semester

**Semester 7**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUTR*4510</td>
<td>[0.50]</td>
<td>Toxicology, Nutrition and Food</td>
</tr>
<tr>
<td>TOX*4000</td>
<td>[0.50]</td>
<td>Medical Toxicology</td>
</tr>
<tr>
<td>TOX*4590</td>
<td>[0.50]</td>
<td>Biochemical Toxicology</td>
</tr>
</tbody>
</table>

1.00 electives or restricted electives*

**Semester 8**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM*4090</td>
<td>[0.50]</td>
<td>Pharmacology</td>
</tr>
<tr>
<td>TOX*4100</td>
<td>[0.50]</td>
<td>Toxicological Pathology</td>
</tr>
<tr>
<td>TOX*4200</td>
<td>[0.50]</td>
<td>Topics in Toxicology</td>
</tr>
</tbody>
</table>

1.00 electives or restricted electives*

**Restricted Electives**

At least 1.50 credits must be completed from the following list of allowable courses.

**Students are advised to pay particular attention to pre-requisite requirements when choosing individual courses, and seek advice as needed.**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC*4650</td>
<td>[0.50]</td>
<td>Comparative Immunology</td>
</tr>
<tr>
<td>BIOM*3040</td>
<td>[0.75]</td>
<td>Medical Embryology</td>
</tr>
<tr>
<td>BIOM*4050</td>
<td>[0.50]</td>
<td>Biomedical Aspects of Aging</td>
</tr>
<tr>
<td>BIOM*4070</td>
<td>[0.50]</td>
<td>Medical Histology</td>
</tr>
<tr>
<td>BIOM*4150</td>
<td>[0.50]</td>
<td>Cancer Biology</td>
</tr>
<tr>
<td>CHEM*3750</td>
<td>[0.50]</td>
<td>Organic Chemistry II</td>
</tr>
<tr>
<td>CHEM*3760</td>
<td>[0.50]</td>
<td>Organic Chemistry III</td>
</tr>
<tr>
<td>CHEM*4740</td>
<td>[0.50]</td>
<td>Topics in Bio-Organic Chemistry</td>
</tr>
<tr>
<td>MBG*3040</td>
<td>[0.50]</td>
<td>Molecular Biology of the Gene</td>
</tr>
<tr>
<td>MBG*3350</td>
<td>[0.75]</td>
<td>Laboratory Methods in Molecular Biology</td>
</tr>
<tr>
<td>MBG*4270</td>
<td>[0.50]</td>
<td>DNA Replication, Recombination and Repair</td>
</tr>
</tbody>
</table>

**Credit Summary (20.00 Total Credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCB*4010</td>
<td>[0.50]</td>
<td>Advanced Cell Biology</td>
</tr>
<tr>
<td>MICR*3320</td>
<td>[0.50]</td>
<td>Immunology</td>
</tr>
<tr>
<td>NUTR*4090</td>
<td>[0.50]</td>
<td>Functional Foods and Nutraceuticals</td>
</tr>
<tr>
<td>NUTR*4320</td>
<td>[0.50]</td>
<td>Nutrition and Metabolic Control of Disease</td>
</tr>
<tr>
<td>PATH*3040</td>
<td>[0.50]</td>
<td>Principles of Parasitology</td>
</tr>
<tr>
<td>POPM*3240</td>
<td>[0.50]</td>
<td>Epidemiology</td>
</tr>
<tr>
<td>POPM*4040</td>
<td>[0.50]</td>
<td>Epidemiology of Food-borne Diseases</td>
</tr>
<tr>
<td>STAT*2050</td>
<td>[0.50]</td>
<td>Statistics II</td>
</tr>
<tr>
<td>STAT*3510</td>
<td>[0.50]</td>
<td>Environmental Risk Assessment</td>
</tr>
<tr>
<td>TOX*4900</td>
<td>[1.00]</td>
<td>Toxicology Research Project I</td>
</tr>
<tr>
<td>TOX*4910</td>
<td>[1.00]</td>
<td>Toxicology Research Project II</td>
</tr>
</tbody>
</table>

**4.00 - First year science credits**

10.75 - Required science courses semesters 3 – 8

1.50 - Restricted electives

1.50 - Liberal Education electives

2.25 - Free electives - any approved elective for B.Sc. students

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

**Biomedical Toxicology (Co-op) (BTOX:C)**

**Interdisciplinary Program, Departments of Biomedical Sciences, Chemistry, School of Environmental Sciences, Molecular and Cellular Biology**

**Program Requirements**

The Co-op program in Biomedical Toxicology is a four and a half year program, including four work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: [https://www.recruityorkph.ca/ceca/](https://www.recruityorkph.ca/ceca/)). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

**Biomedical Toxicology Academic and Co-op Work Term Schedule**

<table>
<thead>
<tr>
<th>Year</th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Semester 3</th>
<th>Semester 4</th>
<th>Semester 5</th>
<th>Semester 6</th>
<th>Semester 7</th>
<th>Semester 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>COOP*1000 Work Term I</td>
<td>COOP*1000 Work Term II</td>
<td>COOP*2000 Work Term III</td>
<td>COOP*3000 Work Term IV</td>
<td>COOP*4000 Work Term V</td>
<td>COOP*4000 Work Term VI</td>
</tr>
<tr>
<td>Winter</td>
<td>Off</td>
<td>Off</td>
<td>COOP*1000 Work Term I</td>
<td>COOP*1000 Work Term II</td>
<td>COOP*2000 Work Term III</td>
<td>COOP*3000 Work Term IV</td>
<td>COOP*4000 Work Term V</td>
<td>COOP*4000 Work Term VI</td>
</tr>
<tr>
<td>Summer</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

**Credit Summary (21.50 Total Credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>[0.50]</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>[0.50]</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>[0.50]</td>
<td>Elements of Calculus I</td>
</tr>
<tr>
<td>PHYS*1080</td>
<td>[0.50]</td>
<td>Physics for Life Sciences</td>
</tr>
</tbody>
</table>

0.50 Liberal Education electives

2019-2020 Undergraduate Calendar  
Last Revision: July 4, 2019
Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule for this major found at: https://www.uoguelph.ca/bsc/revised_SS

Semester 2 - Winter
BIOL*1080 [0.50] Biological Concepts of Health
CHEM*1050 [0.50] General Chemistry II
COOP*1100 [0.00] Introduction to Co-operative Education
PHYS*1070 [0.50] Physics for Life Sciences II
STAT*2040 [0.50] Statistics I
0.50 Liberal Education electives

Semester 3 - Fall
BIOC*2580 [0.50] Introduction to Biochemistry
CHEM*2480 [0.50] Analytical Chemistry I
MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
TOX*2000 [0.50] Principles of Toxicology
0.50 Liberal Education electives

Winter Semester
COOP*1000 [0.50] Co-op Work Term I

Summer Semester
COOP*2000 [0.50] Co-op Work Term II

Semester 4 - Fall
BIOC*3560 [0.50] Structure and Function in Biochemistry
MCB*2050 [0.50] Molecular Biology of the Cell
NUTR*3210 [0.50] Fundamentals of Nutrition
TOX*3300 [0.50] Analytical Toxicology
0.50 electives or restricted electives

Semester 5 - Winter
CHEM*2700 [0.50] Organic Chemistry I
BIOM*3200 [1.00] Biomedical Physiology
TOX*3360 [0.50] Environmental Chemistry and Toxicology
0.50 electives or restricted electives*

Summer Semester
COOP*3000 [0.50] Co-op Work Term III

Fall Semester
COOP*4000 [0.50] Co-op Work Term IV

Semester 6 - Winter
BIOM*3090 [0.50] Principles of Pharmacology
PATH*3610 [0.50] Principles of Disease
One of:
   BIOM*3040 [0.75] Medical Embryology
   MBG*3350 [0.75] Laboratory Methods in Molecular Biology *
Electives or restricted electives to a maximum of 2.75 total credits in this semester

Semester 7 - Fall
NUTR*4510 [0.50] Toxicology, Nutrition and Food
TOX*4000 [0.50] Medical Toxicology
TOX*4590 [0.50] Biochemical Toxicology
One of:
   BIOM*4090 [0.50] Pharmacology
   TOX*4900 [1.00] Toxicology Research Project I
1.00 electives or restricted electives*

Semester 8- Winter
BIOM*4090 [0.50] Pharmacology (if not taken in Semester 7)
TOX*4100 [0.50] Toxicological Pathology
TOX*4200 [0.50] Topics in Toxicology
* Restricted Electives
At least 1.50 credits must be completed from the following list of allowable courses.
**Students are advised to pay particular attention to pre-requisite requirements when choosing individual courses, and seek advice as needed.
   ANSC*4650 [0.50] Comparative Immunology
   BIOM*3040 [0.75] Medical Embryology
   BIOM*4050 [0.50] Biomedical Aspects of Aging
   BIOM*4070 [0.50] Biomedical Histology
   BIOM*4150 [0.50] Cancer Biology
   CHEM*3750 [0.50] Organic Chemistry II
   CHEM*3760 [0.50] Organic Chemistry III
   CHEM*4740 [0.50] Topics in Bio-Organic Chemistry
   MBG*3040 [0.50] Molecular Biology of the Gene
   MBG*3350 [0.75] Laboratory Methods in Molecular Biology
   MBG*4270 [0.50] DNA Replication, Recombination and Repair
   MCB*4010 [0.50] Advanced Cell Biology
   MCR*3230 [0.50] Immunology
   NUTR*4090 [0.50] Functional Foods and Nutraceuticals
   NUTR*4320 [0.50] Nutrition and Metabolic Control of Disease
   PATH*3040 [0.50] Principles of Parasitology
   POPM*3240 [0.50] Epidemiology
   POPM*4040 [0.50] Epidemiology of Food-borne Diseases
   STAT*2050 [0.50] Statistics II
   STAT*3510 [0.50] Environmental Risk Assessment
   TOX*4900 [1.00] Toxicology Research Project I
   TOX*4910 [1.00] Toxicology Research Project II

Biotechnology (BIOT)
Department of Molecular and Cellular Biology, College of Biological Science

Minor (Honours Program)
A minimum of 5.00 credits is required including:
   BIOC*3560 [0.50] Structure and Function in Biochemistry
   MCB*2040 [0.50] Foundations in Molecular Biology and Genetics
   MCR*2420 [0.50] Introduction to Microbiology
   MCR*2430 [0.50] Methods in Microbial Culture and Physiology
   0.50 credits from:
      ENGG*2660 [0.50] Biological Engineering Systems I
      ENGG*3830 [0.50] Bio-Process Engineering
      FOOD*2410 [0.50] Introduction to Food Processing
      FOOD*2420 [0.50] Introduction to Food Microbiology
      FOOD*2620 [0.50] Food Engineering Principles
   1.00 credits from:
      ECON*1050 [0.50] Introductory Microeconomics
      ECON*1100 [0.50] Introductory Macroeconomics
      ECON*2100 [0.50] Economic Growth and Environmental Quality
      ECON*2310 [0.50] Intermediate Microeconomics
      ECON*2410 [0.50] Intermediate Macroeconomics
      MCS*1000 [0.50] Introductory Marketing
   A minimum of 1.50 credits from:
      ANSC*4050 [0.50] Biotechnology in Animal Science
      BIOC*4540 [0.75] Enzymology
      BIOL*3300 [0.50] Applied Bioinformatics
      FOOD*3270 [0.50] Industrial Microbiology
      MBG*3660 [0.50] Genomics
      MBG*4240 [0.50] Applied Molecular Genetics in Medicine and Biotechnology
      MCB*4050 [0.50] Protein and Nucleic Acid Structure
      MCR*3230 [0.50] Immunology
      PBO*3750 [0.50] Plant Tissue Culture
      PBO*4750 [0.50] Genetic Engineering of Plants

Business Economics (BECN)
Department of Economics and Finance, Gordon S. Lang School of Business and Economics

Interdisciplinary study in Business Economics is offered as a minor in the honours program. Students in this program will be counselled by the Department of Economics and Finance. It is possible for students to pursue a more intensive program in the area of business and economics; see the heading Economics (ECON) or Mathematical Economics (MAEC) in the B.A. degree and the heading Management Economics (MEF) in the B.Comm. degree.

Minor (Honours Program)
A minimum of 5.00 credits is required, including:
   ACCT*1220 [0.50] Introductory Financial Accounting
   ACCT*2230 [0.50] Management Accounting
   ECON*1050 [0.50] Introductory Microeconomics
   ECON*1100 [0.50] Introductory Macroeconomics
   ECON*2310 [0.50] Intermediate Microeconomics
   ECON*2410 [0.50] Intermediate Macroeconomics
   ECON*2560 [0.50] Introduction to Finance
   One of:
      IPS*1500 [1.00] Integrated Mathematics and Physics I
      MATH*1030 [0.50] Business Mathematics
      MATH*1080 [0.50] Elements of Calculus I
      MATH*1200 [0.50] Calculus I
   One of:
      ECON*2740 [0.50] Economic Statistics
      PSYC*1010 [0.50] Making Sense of Data in Psychological Research
      SOAN*2120 [0.50] Introductory Methods
      STAT*2040 [0.50] Statistics I
      STAT*2060 [0.50] Statistics for Business Decisions
      STAT*2080 [0.50] Introductory Applied Statistics I
      STAT*2120 [0.50] Probability and Statistics for Engineers
   One of:
      ECON*3660 [0.50] Investments
      ECON*4400 [0.50] Managerial Economics
Semester 8
One of:
- CHEM*3870 [0.50] Molecular Spectroscopy
- CHEM*4880 [0.50] Topics in Advanced Physical Chemistry
One of:
- CHEM*4900 [1.00] Chemistry Research Project I + PHYS*4002 and 0.50 electives
One of:
- IPS*3000 [0.50] Science Communication
0.50 electives +
0.50 electives
+ Students must complete either (PHYS*4001, PHYS*4002 in semester 7 and 8) or (CHEM*4900 in semester 8).
+ One of CHEM*3870 or CHEM*4880 is required for graduation.
A minimum of 1.00 credits of Liberal Education electives is required for completion of this program. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

Credit Summary (22.00 Total Credits)
5.00 - First year science credits
11.50 - Required science courses semesters 3 – 8
1.00 - Liberal Education electives
2.50 - Free electives - any approved elective for B.Sc. students

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Chemical Physics (Co-op) (CHPY:C)

Administered by the Office of the Dean, College of Engineering and Physical Sciences on behalf of the Department of Chemistry and the Department of Physics

Program Requirements
The Co-op program in Chemical Physics is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: [https://www.recruituoguelph.ca/cecs/](https://www.recruituoguelph.ca/cecs/)). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Chemical Physics Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1100</td>
<td>Academic Semester 4</td>
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<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>COOP*3000 Work Term III</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>COOP*4000 Work Term IV</td>
<td>COOP*5000 Work Term V</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (22.00 Total Credits)*
5.00 - First year science credits
10.50 - Required science courses semesters 3 – 8
0.50 – Approved science electives
1.00 - Liberal Education electives
3.00 - Free electives - any approved elective for B.Sc. students
2.00 - Co-op Work Terms

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 22.50.

The recommended program sequence is outlined below.

Major (Honours Program)

Semester 1 - Fall
- CHEM*1040 [0.50] General Chemistry I
- CIS*1300 [0.50] Programming
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPS*1500</td>
<td>1.00</td>
<td>Integrated Mathematics and Physics I</td>
</tr>
<tr>
<td>BIOL*1070</td>
<td>0.50</td>
<td>Discovering Biodiversity</td>
</tr>
<tr>
<td>IPS*1510</td>
<td>1.00</td>
<td>Integrated Mathematics and Physics II</td>
</tr>
<tr>
<td>MATH*1160</td>
<td>0.50</td>
<td>Linear Algebra I</td>
</tr>
<tr>
<td>BIOL*1090</td>
<td>0.50</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
</tbody>
</table>

Students who are lacking one 4U /grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: [https://www.uoguelph.ca/bsc/revised_SS](https://www.uoguelph.ca/bsc/revised_SS)

### Semester 2 - Winter

**CHEM*1050** [0.50] General Chemistry II

**IPS*1510** [1.00] Integrated Mathematics and Physics II

**MATH*1160** [0.50] Linear Algebra I

**BIOL*1070** [0.50] Discovering Biodiversity

**BIOL*1090** [0.50] Introduction to Molecular and Cellular Biology

### Semester 3 - Fall

**CHEM*2060** [0.50] Structure and Bonding

**COOP*1100** [0.00] Introduction to Co-operative Education

**MATH*2200** [0.50] Advanced Calculus I

**MATH*2270** [0.50] Applied Differential Equations

**PHYS*2330** [0.50] Electricity and Magnetism I

0.50 Liberal Education electives

### Semester 4 - Winter

**CHEM*2070** [0.50] Structure and Spectroscopy

**CHEM*2480** [0.50] Analytical Chemistry I

**PHYS*2180** [0.50] Experimental Techniques in Physics

**PHYS*2341** [0.50] Mechanics

**PHYS*2340** [0.50] Electricity and Magnetism II

### Summer Semester

**COOP*1000** [0.50] Co-op Work Term I

### Fall Semester

**COOP*2000** [0.50] Co-op Work Term II

### Semester 5 - Winter

**CHEM*3430** [0.50] Analytical Chemistry II: Instrumental Analysis

**CHEM*3870** [0.50] Molecular Spectroscopy + 0.50 electives *

**CIS*2500** [0.50] Intermediate Programming 0.50 electives *

1.00 electives*

### Summer Semester

**COOP*3000** [0.50] Co-op Work Term III

### Semester 6 - Fall

**CHEM*3860** [0.50] Quantum Chemistry

**IPS*3000** [0.50] Science Communication

**PHYS*3130** [0.50] Mathematical Physics

**PHYS*3230** [0.50] Quantum Mechanics I

**CHEM*3820** [0.50] Thermodynamics and Kinetics

**PHYS*2240** [0.50] Thermal Physics

### Winter Semester

**COOP*4000** [0.50] Co-op Work Term IV (8-month work term in conjunction with COOP*5000)

### Summer Semester

**COOP*5000** [0.50] Co-op Work Term V (8-month work term in conjunction with COOP*4000)

### Semester 7** - Fall

**CHEM*3440** [0.50] Analytical Chemistry III: Analytical Instrumentation

**PHYS*4240** [0.50] Statistical Physics II

**CHEM*3640** [0.50] Chemistry of the Elements I

**CHEM*3750** [0.50] Organic Chemistry II 0.50 electives *

1.00 electives *

### Semester 8** - Winter

**NANO*3600** [0.50] Computational Methods in Materials Science

**PHYS*3000** [0.50] Optics: Fundamentals and Applications

**PHYS*4040** [0.50] Quantum Mechanics II

**CHEM*3870** [0.50] Molecular Spectroscopy +

0.50 electives *

* A minimum of 1.00 credits of Liberal Education electives is required for completion of this program. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

** A minimum of 2.00 credits in science courses at the 4000 level is required for graduation.

+ One of CHEM*3870 or CHEM*4880 is required for graduation.

### Chemistry (CHEM)

**Department of Chemistry, College of Engineering and Physical Sciences**

**Major (Honours Program)**

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. The major will require the completion of 20.00 credits as indicated below:

#### Semester 1

**BIOI*1090** [0.50] Introduction to Molecular and Cellular Biology

**CHEM*1040** [0.50] General Chemistry I

**IPS*1510** [1.00] Integrated Mathematics and Physics II

0.50 Liberal Education electives

Students who are lacking one 4U /grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: [https://www.uoguelph.ca/bsc/revised_SS](https://www.uoguelph.ca/bsc/revised_SS)

#### Semester 2

**CHEM*1050** [0.50] General Chemistry II

**IPS*1510** [1.00] Integrated Mathematics and Physics II

**MATH*1160** [0.50] Linear Algebra I

**BIOL*1090** [0.50] Discovering Biodiversity

**BIOL*1090** [0.50] Biological Concepts of Health

### Semester 3

**BIOC*2580** [0.50] Introduction to Biochemistry

**CHEM*2060** [0.50] Structure and Bonding

**CHEM*2400** [0.75] Analytical Chemistry I

**MATH*2270** [0.50] Applied Differential Equations

Electives to a maximum of 2.75 total credits in this semester *

**CHEM*2290** [0.50] Quantum Mechanics I

**CHEM*3430** [0.50] Analytical Chemistry II: Instrumental Analysis

1.00 electives* or restricted electives**

#### Semester 5

**CHEM*2820** [0.50] Thermodynamics and Kinetics

**CHEM*3640** [0.50] Chemistry of the Elements I

**CHEM*3750** [0.50] Organic Chemistry II

**CHEM*3860** [0.50] Quantum Chemistry

0.50 electives*

**CHEM*3870** [0.50] Molecular Spectroscopy +

**CHEM*4880** [0.50] Topics in Advanced Physical Chemistry + 0.50 electives *

* A minimum of 1.00 credits of Liberal Education electives is required for completion of this program. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

** A minimum of 2.00 credits in science courses at the 4000 level is required for graduation.

+ One of CHEM*3870 or CHEM*4880 is required for graduation.

#### Semester 7 and 8

**CHEM*3440** [0.50] Analytical Chemistry III: Analytical Instrumentation

3.00 Chemistry or Biochemistry**

1.50 electives*

* Selection of electives is subject to the following:

1. At least 1.00 credits of Liberal Education electives are required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

2. Approval of the Faculty Advisor must be obtained for the selection of courses not listed as restrictive electives.

3. Options for an "Area of Focus" or a minor are available. Subject areas include Biochemistry, Computing and Information Science, Earth Sciences, Environmental Sciences, Mathematical Sciences, and Physics. Please consult with your Faculty Advisor for more detail.

** At least 3.00 credits from the 3000/4000 level as follows:

1. 1.50 comprising of (CHEM*3870 or CHEM*4880), (CHEM*4620 or CHEM*4630), (CHEM*4720 or CHEM*4730)

2. 1.50 chosen from CHEM*3870, CHEM*4010, CHEM*4400, BIOC*4520, BIOC*4540, BIOC*4580, CHEM*4620, CHEM*4630, CHEM*4720, CHEM*4730, CHEM*4740, CHEM*4880, CHEM*4900, CHEM*4910, MCB*4050, MCB*4080, TOX*4590

Last Revision: July 4, 2019

19-20 Undergraduate Calendar
Note:
1. Some of these courses may have to be taken in Semester 6.
2. Some of these courses are offered only in alternate years, and some have additional prerequisites for which the student must plan ahead, with the assistance of the faculty advisor.

Credit Summary (20.00 Total Credits)
4.50 - First year science credits
7.25 - Required science courses semesters 3 – 8
3.00 - Restricted electives (#1 and 2 in restricted electives list)
1.25 – Approved science electives
1.00 - Liberal Education electives
3.00 - Free electives - any approved elective for B.Sc. students.

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Minor (Honours Program)
A minor in Chemistry consists of at least 5.00 credits including the following courses:
CHEM*1040 [0.50] General Chemistry I
CHEM*1050 [0.50] General Chemistry II

Of the additional 4.00 credits, students will select Chemistry courses (CHEM) at the 2000 level or above including a minimum of 1.00 credits at the 3000 or 4000 level. BIOC*2580 can be counted towards this specialization.

Chemistry (Co-op) (CHEM:C)

Department of Chemistry, College of Engineering and Physical Sciences

Program Requirements
The Co-op program in Chemistry is a four and a half year program including four work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Chemistry Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>COOP*1100</td>
</tr>
<tr>
<td></td>
<td>Academic Semester 2</td>
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<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1000 Work Term I</td>
<td>Academic Semester 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>COOP*3000 Work Term III</td>
</tr>
<tr>
<td></td>
<td>Academic Semester 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
</tr>
<tr>
<td></td>
<td>Academic Semester 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (21.50 Total Credits)*
4.50 - First year science credits
7.25 - Required science courses semesters 3 – 8
3.00 - Restricted electives (#1 and 2 in restricted electives list)
1.25 – Approved science electives
1.00 - Liberal Education electives
3.00 - Free electives - any approved elective for B.Sc. students.
1.50 - Co-op Work Terms

Note: A minimum of three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fourth Co-op work term is optional and if completed, the total number of credits will equal 22.00. The recommended program sequence is outlined below.

Major (Honours Program)

Semester 1 - Fall
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
CHEM*1040 [0.50] General Chemistry I
IPS*1500 [1.00] Integrated Mathematics and Physics I
0.50 Liberal Education electives

Students who are lacking one 4U /grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: https://www.uoguelph.ca/bsc/revised_SS

Semester 2 - Winter
CHEM*1050 [0.50] General Chemistry II
COOP*1100 [0.00] Introduction to Co-operative Education
IPS*1510 [1.00] Integrated Mathematics and Physics II
MATH*1160 [0.50] Linear Algebra I
One of
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health

Semester 3 - Fall
BIOC*2580 [0.50] Introduction to Biochemistry
CHEM*2060 [0.50] Structure and Bonding
CHEM*2400 [0.75] Analytical Chemistry I
MATH*2270 [0.50] Applied Differential Equations

Electives to a maximum of 2.75 total credits in this semester *

Winter Semester
COOP*1000 [0.50] Co-op Work Term I

Semester 4 - Summer
CHEM*2070 [0.50] Structure and Spectroscopy
CHEM*2700 [0.50] Organic Chemistry I
CHEM*3430 [0.50] Analytical Chemistry II: Instrumental Analysis

1.00 electives *

Semester 5 - Fall
CHEM*2820 [0.50] Thermodynamics and Kinetics
CHEM*3640 [0.50] Chemistry of the Elements I
CHEM*3750 [0.50] Organic Chemistry II
CHEM*3860 [0.50] Quantum Chemistry

0.50 electives *

Semester 6 - Winter
CHEM*3650 [0.50] Chemistry of the Elements II
CHEM*3760 [0.50] Organic Chemistry III

1.50 electives* or restricted electives**

Summer Semester
COOP*2000 [0.50] Co-op Work Term II

Fall Semester
COOP*3000 [0.50] Co-op Work Term III

Semester 7 - Winter
2.50 electives* or restricted electives**

Summer Semester
COOP*4000 [0.50] Co-op Work Term IV

Semester 8 - Fall
CHEM*3440 [0.50] Analytical Chemistry III: Analytical Instrumentation

2.00 electives* or restricted electives**

* selection of electives is subject to the following:
  1. At least 1.00 credits of Liberal Education electives are required. The list of Liberal Education electives for B.Sc. students can be found at: https://www.uoguelph.ca/bsc/
  2. Approval of the Faculty Advisor must be obtained for the selection of courses not listed as restricted electives.
  3. Options for an “Area of Focus” or a minor are available. Subject areas include Biochemistry, Computing and Information Science, Earth Sciences, Environmental Sciences, Mathematical Sciences, and Physics. Please consult with your Faculty Advisor for more detail.

** 3.00 credits from the 3000/4000 level as follows:
  1. 1.50 comprising of (CHEM*3870 or CHEM*4880), (CHEM*4620 or CHEM*4630), (CHEM*4720 or CHEM*4730)
  2. 1.50 chosen from CHEM*3870, CHEM*4010, CHEM*4400, BIOC*4520, BIOC*4540, BIOC*4580, CHEM*4620, CHEM*4630, CHEM*4720, CHEM*4730, CHEM*4740, CHEM*4880, CHEM*4900, CHEM*4910, MCB*4050, MCB*4080, TOX*4590

Note:
Some of these courses are offered only in alternate years, and some have additional prerequisites for which the student must plan ahead, with the assistance of the faculty advisor.

Computing and Information Science (CIS)

School of Computer Science, College of Engineering and Physical Sciences
A knowledge of Computing is a complement to most areas of study. The Minor in Computing and Information Science is directed towards students who wish to supplement their studies in another area with some experience in Computing. Students interested in pursuing a Major in Computing can do so through the Bachelor of Computing Degree Program.

Minor (Honours Program)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS*1300</td>
<td>0.50</td>
<td>Programming</td>
</tr>
<tr>
<td>CIS*1910</td>
<td>0.50</td>
<td>Discrete Structures in Computing I</td>
</tr>
<tr>
<td>CIS*2170</td>
<td>0.75</td>
<td>User Interface Design</td>
</tr>
<tr>
<td>CIS*2430</td>
<td>0.50</td>
<td>Object Oriented Programming</td>
</tr>
<tr>
<td>CIS*2500</td>
<td>0.50</td>
<td>Intermediate Programming</td>
</tr>
<tr>
<td>CIS*2520</td>
<td>0.50</td>
<td>Data Structures</td>
</tr>
<tr>
<td>CIS*2750</td>
<td>0.75</td>
<td>Software Systems Development and Integration</td>
</tr>
</tbody>
</table>

**Ecology (ECOL)**

Department of Integrative Biology, College of Biological Science

This minor provides a foundation in the principles and methods of ecology. It introduces the knowledge and skills necessary for work in conservation, environmental science, education, resource management, ecological consulting, or nature interpretation.

Minor (Honours Program)

A minimum of 5.00 credits is required to complete the minor, which must include:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*2060</td>
<td>0.50</td>
<td>Ecology</td>
</tr>
<tr>
<td>BIOL*3010</td>
<td>0.50</td>
<td>Laboratory and Field Work in Ecology</td>
</tr>
<tr>
<td>BIOL*3060</td>
<td>0.50</td>
<td>Populations, Communities &amp; Ecosystems</td>
</tr>
<tr>
<td>BIOL*4110</td>
<td>1.00</td>
<td>Ecological Methods</td>
</tr>
<tr>
<td>BIOL*4120</td>
<td>0.50</td>
<td>Evolutionary Ecology</td>
</tr>
</tbody>
</table>

Of the remaining 2.00 required credits, students will select from the following:

At least one of:

- BIOL*2400 [0.50] Evolution
- BIOL*3020 [0.50] Population Genetics

At least one of:

- BOT*2100 [0.50] Life Strategies of Plants
- ZOO*2090 [0.50] Vertebrate Structure and Function

One of:

- GEOG*1220 [0.50] Human Impact on the Environment
- GEOG*1300 [0.50] Introduction to the Biophysical Environment

**Environmental Biology (ENVB)**

School of Environmental Sciences, Ontario Agricultural College

The Honours B.Sc. program in Environmental Biology combines a broad education in the life sciences with a more specialized understanding of the biological consequences of interactions between humans and the environment. This major prepares students for post-graduate work in environmental biology and related life sciences and provides a strong foundation for students wishing to pursue careers in teaching, government service or the private sector.

Major (Honours Program)

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. This major requires the completion of 20.00 credits. A minimum of 16.00 of these 20.00 must be science credits.

**Semester 1**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1070</td>
<td>0.50</td>
<td>Discovering Biodiversity</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>0.50</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>ENVS*1100</td>
<td>0.50</td>
<td>Fundamentals of Environmental Sciences</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>0.50</td>
<td>Elements of Calculus I</td>
</tr>
<tr>
<td>PHYS*1080</td>
<td>0.50</td>
<td>Physics for Life Sciences</td>
</tr>
</tbody>
</table>

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: [https://www.uoguelph.ca/bsc/revised_SS](https://www.uoguelph.ca/bsc/revised_SS)

**Semester 2**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>0.50</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>0.50</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>PHYS*1070</td>
<td>0.50</td>
<td>Physics for Life Sciences II</td>
</tr>
<tr>
<td>CIS*1200</td>
<td>0.50</td>
<td>Introduction to Computing</td>
</tr>
<tr>
<td>CIS*1500</td>
<td>0.50</td>
<td>Introduction to Programming</td>
</tr>
<tr>
<td>MATH*1090</td>
<td>0.50</td>
<td>Elements of Calculus II</td>
</tr>
<tr>
<td>STAT*2040</td>
<td>0.50</td>
<td>Statistics I</td>
</tr>
</tbody>
</table>

0.50 Liberal Education elective

**Semester 3**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*2580</td>
<td>0.50</td>
<td>Introduction to Biochemistry</td>
</tr>
<tr>
<td>STAT*2040</td>
<td>0.50</td>
<td>Statistics I (if not taken in semester 2)</td>
</tr>
<tr>
<td>TOX*2000</td>
<td>0.50</td>
<td>Principles of Toxicology</td>
</tr>
</tbody>
</table>

1.0 electives or restricted electives chosen from lists A, B, C and/or D or Liberal Education elective (or 1.50 if STAT*2040 was taken in semester 2)

**Semester 4**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*2060</td>
<td>0.50</td>
<td>Ecology</td>
</tr>
<tr>
<td>ENVS*2090</td>
<td>0.50</td>
<td>Problem Solving in Environmental Biology</td>
</tr>
<tr>
<td>MG5*2040</td>
<td>0.50</td>
<td>Foundations in Molecular Biology and Genetics</td>
</tr>
</tbody>
</table>

1.00 electives or restricted electives chosen from lists A, B, C and/or D

**Semester 5**

2.50 electives or restricted electives chosen from lists A, B, C and/or D.

**Semester 6**

2.50 electives or restricted electives chosen from lists A, B, C and/or D

**Semester 7**

ENVS*4001 [0.50] Project in Environmental Sciences

2.00 electives or restricted electives chosen from lists A, B, C and/or D

Students contemplating graduate studies are encouraged to take ENVS*4410 in semester 7 and ENVS*4420 or ENVS*4430 in 8.

**Semester 8**

ENVS*4000 [0.50] Toxological Risk Assessment

ENVS*4002 [0.50] Project in Environmental Sciences

1.5 electives or restricted electives chosen from lists A, B, C and/or D

**Restricted Electives**

1. A minimum of 1.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

2. Select a minimum of 6.00 credits from the following lists of restricted electives during Semesters 3-8. 2.00 credits must be completed from List A. 1.00 credit must be completed from List B. A minimum 3.00 credits must be completed from List C.

3. Students should note that some restricted electives are prerequisites for other restricted electives. Students should consult the most recent undergraduate calendar for specific requirements.

**List A - Environmental Processes**

Minimum of 2.00 credits from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*2400</td>
<td>0.50</td>
</tr>
<tr>
<td>BIOL*3020</td>
<td>0.50</td>
</tr>
<tr>
<td>BOT*2100</td>
<td>0.50</td>
</tr>
<tr>
<td>ZOO*2090</td>
<td>0.50</td>
</tr>
</tbody>
</table>

List B - Organismal Biology

Minimum of 1.00 credits from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOT*2100</td>
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</tr>
<tr>
<td>BOT*3050</td>
<td>0.50</td>
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<tr>
<td>ENVS*2080</td>
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<td>ENVS*3090</td>
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<tr>
<td>ENVS*4230</td>
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<tr>
<td>MICR*3090</td>
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</tr>
<tr>
<td>ZOO*4070</td>
<td>0.50</td>
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</table>

List C -

Students in the Environmental Biology Major are required to take a minimum 3.00 restricted elective credits from any of the following lists:

**Forestry**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENVS*3230</td>
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<tr>
<td>ENVS*3250</td>
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<tr>
<td>ENVS*3270</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*4350</td>
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</table>

**Soil/Aquatic Systems**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVS*3060</td>
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<tr>
<td>ENVS*3080</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*3310</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*4090</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*4160</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*4320</td>
<td>1.00</td>
</tr>
<tr>
<td>ENVS*4390</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Environmental Toxicology/Pollutants**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*4350</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*3290</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*4180</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*4190</td>
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</tr>
<tr>
<td>ENVS*4370</td>
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</tr>
</tbody>
</table>

Last Revision: July 4, 2019

2019-2020 Undergraduate Calendar
List D - Independent Research and Study Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO*4610</td>
<td>Arctic Ecology</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*3030</td>
<td>Conservation Field Course</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*4260</td>
<td>Field Entomology</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*4410</td>
<td>Introduction to Advanced Independent Research</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*4420</td>
<td>Advanced Independent Research</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*4430</td>
<td>Advanced Independent Research</td>
<td>1.00</td>
</tr>
<tr>
<td>ENVS*4510</td>
<td>Topics in Environmental Sciences</td>
<td>0.50</td>
</tr>
</tbody>
</table>

**Credit Summary (20.00 Total Credits)**

4.00 - B.Sc. core credits
5.00 - Required credits for the Major (4.50 if STAT*2040 is taken in Semester 2)
6.00 - Restricted elective credits for the Major (some restricted electives do not count as science electives towards degree therefore additional science electives may be required)
1.00 - Approved Science electives (1.50 if STAT 2040 is taken in semester 2)
1.00 - Liberal Education electives (#1 in restricted elective list)
3.00 - Free electives - any approved elective for B.Sc. students.

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

**Environmental Geomatics (EG)**

Department of Geography, Environment and Geomatics, College of Social and Applied Human Sciences

This program provides opportunities for study of the processes and properties of the biophysical environment and a core foundation in the analytical techniques (i.e. Geographical Information Science and Remote Sensing) used for their interpretation, analysis and presentation.

Graduates of the program will have unique specialty in the application of spatial technologies to the study and assessment of biophysical and Earth surface processes.

**Major (Honours Program)**

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult with a B.Sc. Faculty Advisor in the Department of Geography, Environment and Geomatics. All students are encouraged to consult with the advisor on a regular basis.

The major will require the completion of 20.00 credits as indicated below:

**Semester 1**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO*1070</td>
<td>Discovering Biodiversity</td>
<td>0.50</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>General Chemistry I</td>
<td>0.50</td>
</tr>
<tr>
<td>GEOG*1350</td>
<td>Earth: Hazards and Global Change</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*1080</td>
<td>Physics for Life Sciences</td>
<td>0.50</td>
</tr>
<tr>
<td>One of:</td>
<td></td>
<td>0.50</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>Elements of Calculus I</td>
<td>0.50</td>
</tr>
<tr>
<td>MATH*1200</td>
<td>Calculus I</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Students who are lacking one 4U /grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: https://www.uoguelph.ca/bse/revised_SS

**Semester 2**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>BIO*1090</td>
<td>Introduction to Molecular and Cellular Biology</td>
<td>0.50</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>General Chemistry II</td>
<td>0.50</td>
</tr>
<tr>
<td>GEOG*1300</td>
<td>Introduction to the Biophysical Environment</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*1070</td>
<td>Physics for Life Sciences II</td>
<td>0.50</td>
</tr>
</tbody>
</table>

0.50 Liberal Education electives* (GEOG*1220 is recommended)

**Semester 3**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
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<tbody>
<tr>
<td>ENVS*2240</td>
<td>Fundamentals of Environmental Geology</td>
<td>0.50</td>
</tr>
<tr>
<td>GEOG*2000</td>
<td>Geomorphology</td>
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</tr>
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</table>

**Environment Geomatics Academic and Co-op Work Term Schedule**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
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<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
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</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1100</td>
<td>Academic Semester 4</td>
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<tr>
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<td>Academic Semester 5</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 6</td>
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<tr>
<td>4</td>
<td>COOP*3000 Work Term III</td>
<td>COOP*4000 Work Term IV</td>
<td>Off</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Last Revision: July 4, 2019
To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (21.50 Total Credits)*
4.50 - First year science credits
9.00 - Required science courses semesters 3 – 8
1.00 - Required social science courses semesters 3 – 8
2.50 - Approved Science electives
1.00 - Liberal Education electives
2.00 - Free electives - any approved elective for B.Sc. students.
1.50 - Co-op Work Terms

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at 3000 or 4000 level.

Note: A minimum of three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fourth Co-op work term is optional and if completed, the total number of credits will equal 22.00.

The recommended program sequence is outlined below.

Major (Honours Program)

Semester 1 - Fall
BIOI*1070 [0.50] Discovering Biodiversity
CHEM*1040 [0.50] General Chemistry I
GEOG*1350 [0.50] Earth: Hazards and Global Change
PHYS*1080 [0.50] Physics for Life Sciences
One of:
MATH*1080 [0.50] Elements of Calculus I
MATH*1220 [0.50] Calculus I
Students who are lacking one 4U /grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: https://www.uoguelph.ca/bsc/revised_SS

Semester 2 - Winter
BIOI*1090 [0.50] Introduction to Molecular and Cellular Biology
CHEM*1050 [0.50] General Chemistry II
GEOG*1300 [0.50] Introduction to the Biophysical Environment
PHYS*1070 [0.50] Physics for Life Sciences II
0.50 Liberal Education electives

Semester 3 - Fall
COOP*1100 [0.00] Introduction to Co-operative Education
ENVY*2240 [0.50] Fundamentals of Environmental Geology
GEOG*2000 [0.50] Geomorphology
GEOG*2420 [0.50] The Earth From Space
GEOG*2480 [0.50] Mapping and GIS
STAT*2040 [0.50] Statistics I

Semester 4 - Winter
GEOG*2110 [0.50] Climate and the Biophysical Environment
GEOG*2210 [0.50] Environment and Resources
GEOG*3420 [0.50] Remote Sensing of the Environment
One of:
CIS*1200 [0.50] Introduction to Computing
CIS*1500 [0.50] Introduction to Programming
MATH*1210 [0.50] Calculus II
MATH*1090 [0.50] Elements of Calculus II
0.50 approved Science electives

Summer Semester
COOP*1000 [0.50] Co-op Work Term I

Semester 5 - Fall
GEOG*3000 [0.50] Fluvial Processes
GEOG*3110 [0.50] Biotic and Natural Resources
GEOG*3480 [0.50] GIS and Spatial Analysis
0.50 approved Science electives
0.50 Liberal Education electives

Winter Semester
COOP*2000 [0.50] Co-op Work Term II

Semester 6 - Summer
GEOG*3610 [0.50] Environmental Hydrology
GEOG*4990 [0.50] Independent Study in Geography
One of:
GEOG*3020 [0.50] Global Environmental Change
GEOG*3210 [0.50] Management of the Biophysical Environment

Fall Semester
COOP*3000 [0.50] Co-op Work Term III

Winter Semester
COOP*4000 [0.50] Co-op Work Term IV

Semester 7 - Fall
GEOG*4110 [1.00] Environmental Systems Analysis
1.50 electives, at least 1.00 from approved Science electives

Semester 8 - Winter
GEOG*4150 [0.50] Catchment Processes
GEOG*4480 [1.00] Applied Geomatics
1.00 electives, at least 0.50 from approved Science electives

Food Science (FOOD)

Department of Food Science, Ontario Agricultural College

Major (Honours Program)

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor.

Semester 1 - Fall
BIOI*1090 [0.50] Introduction to Molecular and Cellular Biology
CHEM*1040 [0.50] General Chemistry I
MATH*1080 [0.50] Elements of Calculus I
PHYS*1080 [0.50] Physics for Life Sciences
0.50 Liberal Education electives

Semester 2 - Winter
BIOI*1080 [0.50] Biological Concepts of Health
CHEM*1050 [0.50] General Chemistry II
MATH*1090 [0.50] Elements of Calculus II
PHYS*1070 [0.50] Physics for Life Sciences II
0.50 Liberal Education electives

Semester 3 - Fall
BIOC*2580 [0.50] Introduction to Biochemistry
CHEM*2880 [0.50] Physical Chemistry
FOOD*2150 [0.50] Introduction to Nutritional and Food Science
MICR*2420 [0.50] Introduction to Microbiology
0.50 electives

Semester 4 - Winter
FOOD*2100 [0.50] Communication in Food Science
FOOD*2620 [0.50] Food Engineering Principles
NUTR*3210 [0.50] Fundamentals of Nutrition
STAT*2040 [0.50] Statistics I
0.50 electives

Semester 5 - Fall
FOOD*3030 [0.50] Food Chemistry I
FOOD*3160 [0.75] Food Processing I
FOOD*3230 [0.75] Food Microbiology
0.50 electives

Semester 6 - Winter
FOOD*3040 [0.50] Food Chemistry II
FOOD*3170 [0.50] Food Processing II
FOOD*3260 [0.50] Industrial Microbiology
FOOD*3700 [0.50] Sensory Evaluation of Foods
0.50 electives

Semester 7 - Fall
FOOD*4190 [0.50] Advanced Food Analysis
FOOD*4260 [0.50] Food Product Development I
1.50 electives

Semester 8 - Winter
FOOD*4270 [0.50] Food Product Development II
2.00 electives

Notes:
1. ENGL*1200 is recommended for those students needing to improve their English grammar.
2. FOOD*2150 could be replaced by FOOD*210 with permission of department advisor.
3. Of the 6.50 electives credits:
a. A least 2.00 credits must be Liberal Education electives.

b. At least 2.00 must be from list of Restricted electives.
c. At least 1.00 must be from additional Science electives (1.50 if MCS*3010 is chosen as a Restricted Elective).

**Restricted Electives:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD*4070</td>
<td>[0.50]</td>
<td>Food Packaging</td>
</tr>
<tr>
<td>FOOD*4090</td>
<td>[0.50]</td>
<td>Functional Foods and Nutraceuticals</td>
</tr>
<tr>
<td>FOOD*4110</td>
<td>[0.50]</td>
<td>Meat and Poultry Processing</td>
</tr>
<tr>
<td>FOOD*4220</td>
<td>[0.50]</td>
<td>Topics in Food Science</td>
</tr>
<tr>
<td>FOOD*4230</td>
<td>[0.50]</td>
<td>Research in Food Science</td>
</tr>
<tr>
<td>FOOD*4310</td>
<td>[0.50]</td>
<td>Food Safety Management Systems</td>
</tr>
<tr>
<td>FOOD*4400</td>
<td>[0.50]</td>
<td>Dairy Processing</td>
</tr>
<tr>
<td>FOOD*4520</td>
<td>[0.50]</td>
<td>Utilization of Cereal Grains for Human Food</td>
</tr>
<tr>
<td>MCS*3010</td>
<td>[0.50]</td>
<td>Quality Management</td>
</tr>
<tr>
<td>POPM*4040</td>
<td>[0.50]</td>
<td>Epidemiology of Food-borne Diseases</td>
</tr>
</tbody>
</table>

**Credit Summary (20.00 Total Credits)**

- 4.00 - 1st year science required
- 9.50 - Required in semesters 3-8
- 2.00 - Restricted electives
- 2.00 - Liberal Education electives
- 1.00 or 1.50 - Additional Science electives (See Note 3 above)
- 1.00 or 1.50 - Free electives (See Note 3 above)

Students not in the Food Science Major who are seeking further study in Food Science are encouraged to consider the Certificate in Food Science. See Special Study Opportunities, Chapter XI of the Calendar.

**Food Science (Co-op) (FOOD:C)**

**Department of Food Science, Ontario Agricultural College**

**Program Requirements**

The Co-op program in Food Science is a five year program, including four work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Food Science Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td>COOP*1000 Work Term I</td>
</tr>
<tr>
<td>3</td>
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<td>Academic Semester 6</td>
<td>COOP*2000 Work Term II</td>
</tr>
<tr>
<td>4</td>
<td>COOP*3000 Work Term III</td>
<td>COOP*4000 Work Term IV</td>
<td>Off</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

**Credit Summary (21.50 Total Credits)**

- 4.00 - First year science required
- 9.50 - Required in semesters 3-8
- 2.00 - Restricted electives
- 2.00 - Liberal Education electives
- 1.00 or 1.50 - Additional Science electives (1.50 if MCS*3010 is chosen as a Restricted Elective)
- 1.00 or 1.50 - Free electives (1.00 if MCS*3010 is chosen as a Restricted Elective)
- 1.50 - Co-op Work Terms

**Note:** A minimum of three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fourth Co-op work term is optional and if completed, the total number of credits will equal 22.00. Students not in the Food Science Major who are seeking further study in Food Science are encouraged to consider the Certificate in Food Science. See Special Study Opportunities, Chapter XI of the Calendar.

The recommended program sequence is outlined below.

**Major (Honours Program)**

**Semester 1 - Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>[0.50]</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>[0.50]</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>[0.50]</td>
<td>Elements of Calculus I</td>
</tr>
<tr>
<td>PHYS*1080</td>
<td>[0.50]</td>
<td>Physics for Life Sciences</td>
</tr>
<tr>
<td>0.50 Liberal Education electives</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: CJS*1200, rather than an Liberal Education credit is recommended for those needing to improve their computer skills.

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: [https://www.uoguelph.ca/bsc/revised_SS](https://www.uoguelph.ca/bsc/revised_SS)

**Semester 2 - Winter**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1080</td>
<td>[0.50]</td>
<td>Biological Concepts of Health</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>[0.50]</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>MATH*1090</td>
<td>[0.50]</td>
<td>Elements of Calculus II</td>
</tr>
<tr>
<td>PHYS*1070</td>
<td>[0.50]</td>
<td>Physics for Life Sciences</td>
</tr>
<tr>
<td>0.50 Liberal Education electives</td>
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</table>

**Summer Semester**

Off

**Semester 3 - Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*2580</td>
<td>[0.50]</td>
<td>Introduction to Biochemistry</td>
</tr>
<tr>
<td>CHEM*2880</td>
<td>[0.50]</td>
<td>Physical Chemistry</td>
</tr>
<tr>
<td>COOP*1100</td>
<td>[0.00]</td>
<td>Introduction to Co-operative Education</td>
</tr>
<tr>
<td>FOOD*2150</td>
<td>[0.50]</td>
<td>Introduction to Nutritional and Food Science</td>
</tr>
<tr>
<td>MICR*2420</td>
<td>[0.50]</td>
<td>Introduction to Microbiology</td>
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<tr>
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**Semester 4 - Winter**

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD*2100</td>
<td>[0.50]</td>
<td>Communication in Food Science</td>
</tr>
<tr>
<td>FOOD*2620</td>
<td>[0.50]</td>
<td>Food Engineering Principles</td>
</tr>
<tr>
<td>NUTR*3210</td>
<td>[0.50]</td>
<td>Fundamentals of Nutrition</td>
</tr>
<tr>
<td>STAT*3040</td>
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<td>Statistics I</td>
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<tr>
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**Summer Semester**

COOP*1000 [0.50] Co-op Work Term I

**Semester 5 - Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD*3030</td>
<td>[0.50]</td>
<td>Food Chemistry I</td>
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<tr>
<td>FOOD*3160</td>
<td>[0.75]</td>
<td>Food Processing I</td>
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<td>FOOD*3230</td>
<td>[0.75]</td>
<td>Food Microbiology</td>
</tr>
<tr>
<td>0.50 electives</td>
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</table>

**Semester 6 - Winter**

<table>
<thead>
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<th>Credits</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>FOOD*3040</td>
<td>[0.50]</td>
<td>Food Chemistry II</td>
</tr>
<tr>
<td>FOOD*3170</td>
<td>[0.50]</td>
<td>Food Processing II</td>
</tr>
<tr>
<td>FOOD*3260</td>
<td>[0.50]</td>
<td>Industrial Microbiology</td>
</tr>
<tr>
<td>FOOD*3700</td>
<td>[0.50]</td>
<td>Sensory Evaluation of Foods</td>
</tr>
<tr>
<td>0.50 electives</td>
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</tr>
</tbody>
</table>

**Summer Semester**

Optional

**Fall Semester**

COOP*2000 [0.50] Co-op Work Term II

**Winter Semester**

COOP*3000 [0.50] Co-op Work Term III

**Semester 7 - Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>FOOD*4190</td>
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<td>Advanced Food Analysis</td>
</tr>
<tr>
<td>FOOD*4260</td>
<td>[0.50]</td>
<td>Food Product Development I</td>
</tr>
<tr>
<td>1.50 electives</td>
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**Semester 8 - Winter**

<table>
<thead>
<tr>
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<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD*4270</td>
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<td>Food Product Development II</td>
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<tr>
<td>2.00 electives</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. ENGL*1200 is recommended for those students needing to improve their English grammar.
2. FOOD*2150 could be replaced by FOOD*2010 with permission of department advisor.

**Restricted Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD*4070</td>
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<td>Food Packaging</td>
</tr>
<tr>
<td>FOOD*4090</td>
<td>[0.50]</td>
<td>Functional Foods and Nutraceuticals</td>
</tr>
<tr>
<td>FOOD*4110</td>
<td>[0.50]</td>
<td>Meat and Poultry Processing</td>
</tr>
<tr>
<td>FOOD*4220</td>
<td>[0.50]</td>
<td>Topics in Food Science</td>
</tr>
<tr>
<td>FOOD*4230</td>
<td>[0.50]</td>
<td>Research in Food Science</td>
</tr>
<tr>
<td>FOOD*4310</td>
<td>[0.50]</td>
<td>Food Safety Management Systems</td>
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<tr>
<td>FOOD*4400</td>
<td>[0.50]</td>
<td>Dairy Processing</td>
</tr>
<tr>
<td>FOOD*4520</td>
<td>[0.50]</td>
<td>Utilization of Cereal Grains for Human Food</td>
</tr>
</tbody>
</table>
### Credit Summary (20.00 Total Credits)

#### Semester 1
- **BIOL*1080** [0.50] Biological Concepts of Health
- **CHEM*1040** [0.50] General Chemistry I
- **MATH*1080** [0.50] Elements of Calculus I
- **PHYS*1080** [0.50] Physics for Life Sciences

#### Semester 2
- **BIOL*1070** [0.50] Discovering Biodiversity
- **CHEM*1050** [0.50] General Chemistry II
- **PHYS*1070** [0.50] Physics for Life Sciences

#### Semester 3
- **BIOL*2580** [0.50] Introduction to Biophysical Environment
- **BIOL*2240** [0.50] Mapping and GIS
- **MBG*2040** [0.50] Foundations in Molecular Biology and Genetics
- **STAT*2040** [0.50] Statistics I

#### Semester 4
- **HK*2270** [0.50] Principles of Human Biomechanics
- **MBG*3210** [0.50] Fundamentals of Nutrition

#### Semester 5
- **HK*3600** [0.75] Applied Human Kinetics I
- **HK*3810** [0.75] Human Physiology II - Integrated Systems

#### Semester 6
- **HK*3401** [0.75] Human Anatomy: Dissection
- **HK*3501** [0.75] Human Anatomy: Prosection

#### Semester 7
- **BIOL*3560** [0.50] Structure and Function in Biochemistry
- **HK*3100** [0.50] Neuromuscular Physiology
- **HK*4600** [0.75] Applied Human Kinetics II

#### Semester 8
- **HK*4550** [0.50] Human Cardio-respiratory Physiology
- **NUTR*4210** [0.50] Nutrition, Exercise and Energy Metabolism

#### Restricted Electives
- 1. A minimum of 2.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)
- 2. A minimum of 1.00 credits of restricted electives are required which must be selected from HK*4XXX, NUTR*4XXX (must be an approved B.Sc. Science Elective).

### Major (Honours Program)

**B.Sc. students who were not admitted directly into the Human Kinetics major from high school and subsequently wish to transfer to the specialization must apply directly to the Department of Human Health and Nutritional Sciences.**

#### Semester 1
- **BIOL*1080** [0.50] Biological Concepts of Health
- **CHEM*1040** [0.50] General Chemistry I
- **MATH*1080** [0.50] Elements of Calculus I
- **PHYS*1080** [0.50] Physics for Life Sciences

#### Semester 2
- **BIOL*1070** [0.50] Discovering Biodiversity
- **CHEM*1050** [0.50] General Chemistry II
- **PHYS*1070** [0.50] Physics for Life Sciences

#### Semester 3
- **BIOL*2580** [0.50] Introduction to Biophysical Environment
- **HK*2270** [0.50] Principles of Human Biomechanics
- **MBG*2040** [0.50] Foundations in Molecular Biology and Genetics
- **STAT*2040** [0.50] Statistics I

#### Semester 4
- **HK*2810** [0.50] Human Physiology I - Concepts and Principles
- **MCB*2050** [0.50] Molecular Biology of the Cell
- **NUTR*3210** [0.50] Fundamentals of Nutrition

#### Semester 5
- **HK*3600** [0.75] Applied Human Kinetics I
- **HK*3810** [0.75] Human Physiology II - Integrated Systems
- **NUTR*3360** [0.50] Lifestyle Genomics

#### Semester 6
- **HK*3401** [0.75] Human Anatomy: Dissection
- **HK*3501** [0.75] Human Anatomy: Prosection

#### Semester 7
- **BIOL*3560** [0.50] Structure and Function in Biochemistry
- **HK*3100** [0.50] Neuromuscular Physiology
- **HK*4600** [0.75] Applied Human Kinetics II

#### Semester 8
- **HK*4550** [0.50] Human Cardio-respiratory Physiology
- **NUTR*4210** [0.50] Nutrition, Exercise and Energy Metabolism

### Marine and Freshwater Biology (MFB)

#### Department of Integrative Biology, College of Biological Science

The Marine and Freshwater Biology major capitalizes on Guelph’s recognized excellence in aquatic research and provides a broad perspective on aquatic environments based on the physical as well as the biological sciences. In this major, students will build upon core courses in ecology, evolution, genetics, and physiology of aquatic biota as they study freshwater and marine environments and work with aquatic organisms experimentally in the field and in the lab. They will have the opportunity to perform independent research projects under a variety of field and laboratory conditions to enhance their learning experience. The major prepares students for post-graduate work in the aquatic sciences, and provides a sound scientific background for students wishing to pursue careers in academia, government service, private sector (e.g., NGOs, fisheries, aquaculture, biotechnology, consulting), conservation, education and research.

#### Major (Honours Program)

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. A minimum total of 20.00 credits is required to complete the major.

#### Semester 1
- **BIOL*1070** [0.50] Discovering Biodiversity
- **CHEM*1040** [0.50] General Chemistry I
- **MATH*1080** [0.50] Elements of Calculus I
- **PHYS*1080** [0.50] Physics for Life Sciences

#### Semester 2
- **BIOL*1070** [0.50] Discovering Biodiversity
- **CHEM*1040** [0.50] General Chemistry I
- **MATH*1080** [0.50] Elements of Calculus I
- **PHYS*1080** [0.50] Physics for Life Sciences

#### Semester 3
- **HK*2810** [0.50] Human Physiology I - Concepts and Principles
- **MCB*2050** [0.50] Molecular Biology of the Cell
- **NUTR*3210** [0.50] Fundamentals of Nutrition

#### Semester 4
- **HK*2810** [0.50] Human Physiology I - Concepts and Principles
- **NUTR*3210** [0.50] Fundamentals of Nutrition

#### Semester 5
- **HK*3600** [0.75] Applied Human Kinetics I
- **HK*3810** [0.75] Human Physiology II - Integrated Systems
- **NUTR*3360** [0.50] Lifestyle Genomics

#### Semester 6
- **HK*3401** [0.75] Human Anatomy: Dissection
- **HK*3501** [0.75] Human Anatomy: Prosection

#### Semester 7
- **BIOL*3560** [0.50] Structure and Function in Biochemistry
- **HK*3100** [0.50] Neuromuscular Physiology
- **HK*4600** [0.75] Applied Human Kinetics II

#### Semester 8
- **HK*4550** [0.50] Human Cardio-respiratory Physiology
- **NUTR*4210** [0.50] Nutrition, Exercise and Energy Metabolism

### Restrictions

**1.** A minimum of 2.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

**2.** A minimum of 1.00 credits of restricted electives are required which must be selected from HK*4XXX, NUTR*4XXX (must be an approved B.Sc. Science Elective).
### Marine and Freshwater Biology (Co-op) (MFB:C)

**Department of Integrative Biology, College of Biological Science**

The Marine and Freshwater Biology major capitalizes on Guelph’s recognized excellence in aquatic research and provides a broad perspective on aquatic environments based on the physical as well as biological sciences. In this major, you will build upon core courses in ecology, evolution, genetics, and physiology of aquatic biota as you study freshwater and marine environments and work with aquatic organisms experimentally in the field and in the lab. You will have the opportunity to perform independent research projects under a variety of field and laboratory conditions to enhance your learning experience. Work placements enable students to gain knowledge, skills and values appropriate for work with individuals and groups in a variety of settings. The major prepares students for post-graduate work in the aquatic sciences, and provides a sound scientific background for students wishing to pursue careers in academia, government service, private sector (e.g., NGOs, fisheries, aquaculture, biotechnology, consulting), conservation, education and research.

**Program Requirements**

The Co-op program in Marine and Freshwater Biology is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must complete the academic work schedule as outlined below (also found on the Co-operative Education website: [https://www.recruit.guelph.ca/cecs/](https://www.recruit.guelph.ca/cecs/)). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

### Marine and Freshwater Biology Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1100</td>
<td>COOP*1000 Work Term I</td>
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<tr>
<td>3</td>
<td>Academic Semester 5</td>
<td>COOP*2000 Work Term II</td>
<td>COOP*3000 Work Term III</td>
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<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

### Credit Summary (20.00 Total Credits)*

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>COOP*5000 Work Term V</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

### Major (Honours Program)

#### Semester 1 - Fall

- BIOL*1070 [0.50] Discovering Biodiversity
- CHEM*1040 [0.50] General Chemistry I
- MATH*1080 [0.50] Elements of Calculus I
- PHYS*1080 [0.50] Physics for Life Sciences

#### Semester 2 - Winter

- BIOL*1080 [0.50] Biological Concepts of Health
- BIOL*2000 [0.50] Evolution
- COOP*1100 [0.00] Introduction to Co-operative Education
- ZOO*2090 [0.50] Vertebrate Structure and Function

#### Semester 3 - Fall

- BIOL*2060 [0.50] Ecology
- BIOL*2400 [0.50] Evolution
- COOP*1100 [0.00] Introduction to Co-operative Education
- ZOO*2090 [0.50] Vertebrate Structure and Function

#### Semester 4 - Winter

- BIOL*2450 [0.50] Introduction to Biochemistry
- MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
- STAT*2230 [0.50] Biostatistics for Integrative Biology
- ZOO*3700 [0.50] Invertebrate Morphology & Evolution

#### Summer Semester

- COOP*1000 [0.50] Co-op Work Term I

#### Semester 5 - Fall

- BIOL*3450 [0.50] Introduction to Aquatic Environments
- ZOO*3600 [0.50] Comparative Animal Physiology I
- ZOO*3610 [0.25] Lab Studies in Animal Physiology I
- ZOO*3700 [0.50] Integrative Biology of Invertebrates

Electives to a maximum of 2.75 total credits in this semester.

#### Semester 6 - Fall

- BIOL*3450 [0.50] Limnology of Natural and Polluted Waters
- IBIO*4600 [1.00] Integrative Marine and Freshwater Research

#### Semester 7 - Winter

- BIOL*3060 [0.50] Populations, Communities & Ecosystems
- ZOO*3050 [0.50] Developmental Biology

#### Semester 8 - Winter

- BHON*4000 [0.50] Health Promotion & Education
- BIOL*4350 [0.50] Physiology of Life Sciences
- ZOO*4030 [0.50] Aquatic Ecology & Conservation
- ZOO*4040 [0.50] Aquatic Conservation & Policy

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 22.50

The recommended program sequence is outlined below.

#### Credit Summary (22.00 Total Credits)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>COOP*5000 Work Term V</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

### Major (Honours Program)

#### Semester 1 - Fall

- BIOL*1070 [0.50] Discovering Biodiversity
- CHEM*1040 [0.50] General Chemistry I
- MATH*1080 [0.50] Elements of Calculus I
- PHYS*1080 [0.50] Physics for Life Sciences

#### Semester 2 - Winter

- BIOL*1080 [0.50] Biological Concepts of Health
- BIOL*2000 [0.50] Evolution
- COOP*1100 [0.00] Introduction to Co-operative Education
- ZOO*2090 [0.50] Vertebrate Structure and Function

#### Semester 3 - Fall

- BIOL*2060 [0.50] Ecology
- BIOL*2400 [0.50] Evolution
- COOP*1100 [0.00] Introduction to Co-operative Education
- ZOO*2090 [0.50] Vertebrate Structure and Function

#### Semester 4 - Winter

- BIOL*2450 [0.50] Introduction to Biochemistry
- MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
- STAT*2230 [0.50] Biostatistics for Integrative Biology
- ZOO*3700 [0.50] Invertebrate Morphology & Evolution

#### Summer Semester

- COOP*1000 [0.50] Co-op Work Term I

#### Semester 5 - Fall

- BIOL*3450 [0.50] Introduction to Aquatic Environments
- ZOO*3600 [0.50] Comparative Animal Physiology I
- ZOO*3610 [0.25] Lab Studies in Animal Physiology I
- ZOO*3700 [0.50] Integrative Biology of Invertebrates

Electives to a maximum of 2.75 total credits in this semester.

#### Semester 6 - Fall

- BIOL*3450 [0.50] Limnology of Natural and Polluted Waters
- IBIO*4600 [1.00] Integrative Marine and Freshwater Research

#### Semester 7 - Winter

- BIOL*3060 [0.50] Populations, Communities & Ecosystems
- ZOO*3050 [0.50] Developmental Biology

#### Semester 8 - Winter

- BHON*4000 [0.50] Health Promotion & Education
- BIOL*4350 [0.50] Physiology of Life Sciences
- ZOO*4030 [0.50] Aquatic Ecology & Conservation
- ZOO*4040 [0.50] Aquatic Conservation & Policy

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 22.50

The recommended program sequence is outlined below.

#### Credit Summary (22.00 Total Credits)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>COOP*5000 Work Term V</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>
X. Degree Programs, Bachelor of Science (B.Sc.)

511

ZOO*3620 [0.50] Comparative Animal Physiology II
ZOO*3630 [0.25] Lab Studies in Animal Physiology II
Electives or restricted electives to a maximum of 2.75 total credits in this semester.

** Summer Semester **

COOP*4000 [0.50] Co-op Work Term IV

** Full Semester **

COOP*5000 [0.50] Co-op Work Term V

** Semester 8 - Winter **

BIOL*4010 [0.50] Adaptional Physiology
ZOO*4330 [0.50] Biology of Fishes
ZOO*4570 [0.50] Marine Ecological Processes
1.00 electives or restricted electives

* CIS*1200 is recommended for those needing to improve their computer skills

Electives

A minimum of 1.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

Mathematical Science (MSCI)

Department of Mathematics & Statistics, College of Engineering and Physical Sciences

Major (Honours Program)

Knowledge of Mathematics and Statistics is crucial for understanding our world. This unique program provides a core of both mathematics and statistics with a choice of a Mathematics stream or a Statistics stream. This major also requires the completion of an area of emphasis as listed. Students are encouraged to speak with a Program Counsellor when choosing courses for the selected stream and area of emphasis.

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. A total of 20.00 credits is required to complete the Major which includes at least 10.00 credits in Mathematics & Statistics, 0.50 credits in Computing and Information Science, and an additional 2.50 credits in an area of emphasis.

Note: Students majoring in Mathematical Science cannot minor in Mathematics or Statistics.

** Semester 1 **

CHEM*1040 [0.50] General Chemistry I
MATH*1160 [0.50] Linear Algebra I
One of ***

BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
1.00 credits from: IPS*1500, or (MATH*1080, PHYS*1080) or (MATH*1200, PHYS*1080)

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: [https://www.uoguelph.ca/bsc/revised_SS](https://www.uoguelph.ca/bsc/revised_SS)

** Semester 2 **

CHEM*1050 [0.50] General Chemistry II
STAT*2040 [0.50] Statistics I
One of ***

BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
1.00 credits from: IPS*1510, or (PHYS*1010 and 0.50 credits from : MATH*1090, MATH*1210)

** Semester 3 **

MATH*2200 [0.50] Advanced Calculus I
STAT*3100 [0.50] Introductory Mathematical Statistics I
One of:

CIS*1300 [0.50] Programming
CIS*1500 [0.50] Introduction to Programming
1.00 electives or restricted electives

** Semester 4 **

MATH*2130 [0.50] Numerical Methods
STAT*2050 [0.50] Statistics II
1.00 electives or restricted electives

** Semester 5 **

2.50 electives or restricted electives

** Semester 6 **

2.50 electives or restricted electives

** Semester 7 **

2.50 electives or restricted electives

** Semester 8 **

MATH*4440 [0.50] Case Studies in Mathematics and Statistics
2.00 electives or restricted electives

* Students entering the major in first year are strongly advised to take IPS*1500 or (MATH*1200, PHYS*1080). Students declaring the Energy and Mass Transfer, the Electricity and Systems, or the Signal Processing Area of Emphasis should take (MATH*1200, PHYS*1080).

** Students entering the major in first year are strongly advised to take IPS*1510 or (MATH*1210, PHYS*1010). Students declaring the Energy and Mass Transfer, the Electricity and Systems, or the Signal Processing Area of Emphasis should take (MATH*1210, PHYS*1010).

*** BIOL*1070 and BIOL*1090 are recommended if taking either the BINF or the BBM Area of Emphasis

RESTRICTED ELECTIVES

1. A minimum of 1.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

2. 5.50 credits from either the Mathematics Stream or the Statistics Stream as follows:

** Mathematics Stream: **

MATH*2000 [0.50] Proofs, Sets, and Numbers
MATH*2210 [0.50] Advanced Calculus II
MATH*2270 [0.50] Applied Differential Equations
MATH*3160 [0.50] Linear Algebra II
MATH*3200 [0.50] Real Analysis
3.00 additional credits in MATH or STAT at the 3000 level or above of which at least 1.50 credits must be MATH at the 4000 level

** Statistics Stream: **

STAT*3110 [0.50] Introductory Mathematical Statistics II
STAT*3240 [0.50] Applied Regression Analysis
0.50 additional credits in MATH at 2000 level or above
1.00 additional credits in MATH or STAT at the 2000 level or above
3.00 additional credits in MATH or STAT at the 3000 level or above of which at least 1.50 credits must be STAT at the 4000 level

AREAS OF EMPHASIS

Students are required to complete one of the following Areas of Emphasis. Each Area of Emphasis is 2.50 credits from a single field of study.

** BIOINFORMATICS (BINF) **

The following credits must be taken:

BIOL*2400 [0.50] Evolution
BIOL*3020 [0.50] Population Genetics
BIOL*3040 [0.50] Methods in Evolutionary Biology
BIOL*3300 [0.50] Applied Bioinformatics
MBG*2040 [0.50] Foundations in Molecular Biology and Genetics

** BIOMATHEMATICAL OR BIOSTATISTICAL MODELLING (BBM) **

The following credits must be taken:

BINF*2060 [0.50] Ecology
BIOL*2400 [0.50] Evolution
BIOL*3060 [0.50] Populations, Communities & Ecosystems
BIOL*3130 [0.50] Conservation Biology
BIOL*4150 [0.50] Wildlife Conservation and Management

** COMPUTER SCIENCE (CS) **

The following credits must be taken:

CIS*2430 [0.50] Object Oriented Programming
CIS*2500 [0.50] Intermediate Programming
CIS*2520 [0.50] Data Structures
at least 1.00 credits from:
CIS*3110 [0.50] Operating Systems I
CIS*3190 [0.50] Software for Legacy Systems
CIS*3490 [0.50] The Analysis and Design of Computer Algorithms
CIS*3530 [0.50] Data Base Systems and Concepts

Note: CIS*2750 is recommended in addition to the Area of Emphasis requirements for students interested in Computer Science

** ECONOMICS (ECON) **

The following credits must be taken:

ECON*1050 [0.50] Introductory Microeconomics
ECON*1100 [0.50] Introductory Macroeconomics
ECON*2310 [0.50] Intermediate Microeconomics
at least 1.00 credits from:
ECON*3100 [0.50] Game Theory
ECON*3710 [0.50] Advanced Microeconomics
ECON*4710 [0.50] Advanced Topics in Microeconomics

Note: ECON*1050 and ECON*1100 are approved Liberal Education electives for B.Sc. students

** ENERGY AND MASS TRANSFER (EMT) **

The following credits must be taken:

ENGG*1210 [0.50] Engineering Mechanics I
Microbiology programs are designed to give students a good understanding of microorganisms, including diversity, ecology, physiology, molecular genetics, current approaches in bacterial genomics/proteomics, and microbial associations with animal hosts and the environments. Such knowledge will provide the basis for further work with microbes in medicine, agricultural industries (including biotechnology, pharmaceuticals, food and beverage) and the environment (surveillance and bioremediation).

Students can take the B.Sc. program with a Major in Microbiology, or combine the minor with another major. Students should plan their programs in consultation with the microbiology faculty advisor. As course offerings may change during the program, students are strongly encouraged to review their plans at least once a year with their advisors, and to check the departmental website for program news.

**Major (Honours Program)**

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor.

**Semester 1**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>Introduction to Molecular and Cellular Biology</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>General Chemistry I</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>Elements of Calculus I</td>
<td>[0.50]</td>
</tr>
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<td>PHYS*1080</td>
<td>Physics for Life Sciences</td>
<td>[0.50]</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>0.50 Liberal Education electives</strong></td>
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**Semester 2**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1070</td>
<td>Discovering Biodiversity</td>
<td>[0.50]</td>
</tr>
<tr>
<td>BIOL*1080</td>
<td>Biological Concepts of Health</td>
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<tr>
<td>CHEM*1050</td>
<td>General Chemistry II</td>
<td>[0.50]</td>
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<tr>
<td>PHYS*1070</td>
<td>Physics for Life Sciences II</td>
<td>[0.50]</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>0.50 Liberal Education electives</strong></td>
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**Semester 3**

<table>
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<td>BIOC*2500</td>
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<td>Foundations in Molecular Biology and Genetics</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MCB*2420</td>
<td>Introduction to Microbiology</td>
<td>[0.50]</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>0.50 Liberal Education electives</strong></td>
<td></td>
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</table>

**Semester 4**

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<tbody>
<tr>
<td>BIOC*3560</td>
<td>Structure and Function in Biochemistry</td>
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<tr>
<td>MCB*2050</td>
<td>Molecular Biology of the Cell</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MCB*2430</td>
<td>Methods in Microbial Culture and Physiology</td>
<td>[0.50]</td>
</tr>
<tr>
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**Semester 5**

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<td>MBG*3480</td>
<td>Bacterial Genetics</td>
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<tr>
<td>MCB*3420</td>
<td>Microbial Diversity and Ecology</td>
<td>[0.50]</td>
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<tr>
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**Semester 6**

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<td>Laboratory Methods in Molecular Biology</td>
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<td>MCB*3260</td>
<td>Microbial Adaptation</td>
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<tr>
<td>MCB*3430</td>
<td>Advanced Methods in Microbiology</td>
<td>[0.75]</td>
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<td><strong>A minimum of 0.50 electives or restricted electives</strong></td>
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**Semester 7**

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**Semester 8**

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<td><strong>2.50 electives or restricted electives which can include MCB*4510</strong></td>
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**Restricted Electives**

1. A minimum of 2.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)
2. 3.50 restricted elective credits of which 1.00 credits must be at the 4000 level.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*4540</td>
<td>Enzymology</td>
<td>[0.75]</td>
</tr>
<tr>
<td>BIOC*4580</td>
<td>Membrane Biochemistry</td>
<td>[0.50]</td>
</tr>
<tr>
<td>ENYS*3290</td>
<td>Waterborne Disease Ecology</td>
<td>[0.50]</td>
</tr>
<tr>
<td>FOOD*3230</td>
<td>Food Microbiology</td>
<td>[0.75]</td>
</tr>
<tr>
<td>FOOD*3240</td>
<td>Food Microbiology</td>
<td>[0.50]</td>
</tr>
<tr>
<td>FOOD*3260</td>
<td>Industrial Microbiology</td>
<td>[0.50]</td>
</tr>
<tr>
<td>FOOD*3270</td>
<td>Industrial Microbiology</td>
<td>[0.50]</td>
</tr>
<tr>
<td>FOOD*4400</td>
<td>Dairy Processing</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MCB*3010</td>
<td>Dynamics of Cell Function and Signaling</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MCB*4500</td>
<td>Research Project in Molecular &amp; Cellular Biology</td>
<td>[1.00]</td>
</tr>
<tr>
<td>MCB*4510</td>
<td>Research Project in Molecular &amp; Cellular Biology</td>
<td>[1.00]</td>
</tr>
<tr>
<td>MCB*4600</td>
<td>Topics in Molecular and Cell Biology</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MIR*3090</td>
<td>Mycology</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MIR*3220</td>
<td>Plant Microbiology</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>
To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (21.50 Total Credits)*

4.00 - First year science core
6.50 - Required science courses semesters 3 - 8
3.50 - Restricted electives (#2 in restricted electives list)
2.00 - Approved Science electives
2.00 - Liberal Education electives (#1 in restricted electives list)
2.00 - Free electives - any approved electives for B.Sc. students.

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Minor (Honours Program)

The minor in Microbiology consists of the following 5.00 credits including:

BIOC*3560 [0.50] Structure and Function in Biochemistry
MICR*2420 [0.50] Introduction to Microbiology
MICR*2430 [0.50] Methods in Microbial Culture and Physiology

A minimum of 2.50 credits from:

FOOD*3230 [0.75] Food Microbiology
FOOD*3240 [0.50] Food Microbiology
FOOD*3260 [0.50] Industrial Microbiology
FOOD*3270 [0.50] Industrial Microbiology
MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
MBG*3380 [0.50] Bacterial Genetics
MBG*3350 [0.75] Laboratory Methods in Molecular Biology
MICR*3090 [0.50] Mycology
MICR*3220 [0.50] Plant Microbiology
MICR*3230 [0.50] Immunology
MICR*3260 [0.50] Microbial Adaptation
MICR*3330 [0.50] World of Viruses
MICR*3420 [0.50] Microbial Diversity and Ecology
MICR*3430 [0.50] Advanced Methods in Microbiology

1.00 credits from:

MICR*4010 [0.50] Pathogenic Microbiology
MICR*4330 [0.50] Molecular Virology
MICR*4430 [0.50] Medical Virology
MICR*4520 [0.50] Microbial Cell Biology
MICR*4530 [0.50] Immunology II

Microbiology (Co-op) (MICR:C)

Department of Molecular and Cellular Biology, College of Biological Science

Microbiology programs are designed to give students a good understanding of microorganisms, including diversity, ecology, physiology, molecular genetics, current approaches in bacterial genomics/proteomics, and microbial associations with animal hosts and the environments. Such knowledge will provide the basis for further work with microbes in medicine, agricultural industries (including biotechnology, pharmaceuticals, food and beverage) and the environment (surveillance and bioremediation).

Program Requirements

The Co-op program in Microbiology is a five year program, including four work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.uoguelph.ca/bsc/coop/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Microbiology Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
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</tr>
<tr>
<td>2</td>
<td>Academic Semester 3 COOP*1100</td>
<td>Academic Semester 4</td>
<td>COOP*1000 Work Term I</td>
</tr>
<tr>
<td>3</td>
<td>Academic Semester 5</td>
<td>Academic Semester 6</td>
<td>COOP*2000 Work Term II</td>
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<tr>
<td>4</td>
<td>COOP*3000 Work Term III</td>
<td>COOP*4000 Work Term IV</td>
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<td>5</td>
<td>Academic Semester 7</td>
<td>Academic Semester 8</td>
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</table>
## Semester 7 - Fall

2.50 electives or restricted electives which can include MCB*4500

## Semester 8 - Winter

2.50 electives or restricted electives which can include MCB*4510

### Restricted Electives

1. A minimum of 2.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

2. 3.50 restricted elective credits of which 1.00 credits must be at the 4000 level.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*4540</td>
<td>Enzymology</td>
<td>0.75</td>
</tr>
<tr>
<td>BIOC*4580</td>
<td>Membrane Biochemistry</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*3290</td>
<td>Waterborne Disease Ecology</td>
<td>0.50</td>
</tr>
<tr>
<td>FOOD*3230</td>
<td>Food Microbiology</td>
<td>0.75</td>
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<tr>
<td>FOOD*3240</td>
<td>Food Microbiology</td>
<td>0.50</td>
</tr>
<tr>
<td>FOOD*3260</td>
<td>Industrial Microbiology</td>
<td>0.50</td>
</tr>
<tr>
<td>FOOD*3270</td>
<td>Industrial Microbiology</td>
<td>0.50</td>
</tr>
<tr>
<td>FOOD*4400</td>
<td>Dairy Processing</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*3010</td>
<td>Dynamics of Cell Function and Signaling</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4500</td>
<td>Research Project in Molecular &amp; Cellular Biology I</td>
<td>1.00</td>
</tr>
<tr>
<td>MCB*4510</td>
<td>Research Project in Molecular &amp; Cellular Biology II</td>
<td>1.00</td>
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<tr>
<td>MCB*4600</td>
<td>Topics in Molecular and Cellular Biology</td>
<td>0.50</td>
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<tr>
<td>MICR*3090</td>
<td>Microbiology</td>
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<td>MICR*3220</td>
<td>Plant Microbiology</td>
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<tr>
<td>MICR*3230</td>
<td>Immunology</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*3330</td>
<td>World of Viruses</td>
<td>0.50</td>
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<tr>
<td>MICR*4010</td>
<td>Pathogenic Microbiology</td>
<td>0.50</td>
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<tr>
<td>MICR*4330</td>
<td>Molecular Virology</td>
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<tr>
<td>PATH*3040</td>
<td>Principles of Parasitology</td>
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### Molecular Biology and Genetics (MBG)

#### Department of Molecular and Cellular Biology, College of Biological Science

The B.Sc. program with a Major in Molecular Biology and Genetics is a broadly based program in genetics including related areas of cell and molecular biology. In consultation with the Faculty Advisor, students can choose a general program or can focus their courses in areas such as molecular biology, cell biology, developmental biology, genetics, or agricultural genetics. The program qualifies students for postgraduate training in cell or molecular biology and genetics including clinical genetics and genetic counselling, and provides an excellent background for careers in biotechnology, toxicology, agriculture and medical research. Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor.

#### Major (Honours Program)

A total of 20.00 credits is required to complete the major.

**Semester 1**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL*1090</td>
<td>Introduction to Molecular and Cellular Biology</td>
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<tr>
<td>CHEM*1040</td>
<td>General Chemistry I</td>
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<tr>
<td>MATH*1080</td>
<td>Elements of Calculus I</td>
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<tr>
<td>PHYS*1080</td>
<td>Physics for Life Sciences</td>
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0.50 Liberal Education electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at [https://www.uoguelph.ca/bsc/revised_SS](https://www.uoguelph.ca/bsc/revised_SS).

**Semester 2**

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>BIOL*1070</td>
<td>Discovering Diversity</td>
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<tr>
<td>BIOL*1080</td>
<td>Biological Concepts of Health</td>
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</tr>
<tr>
<td>CHEM*1050</td>
<td>General Chemistry II</td>
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</tr>
<tr>
<td>PHYS*1070</td>
<td>Physics for Life Sciences II</td>
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0.50 Liberal Education electives

**Semester 3**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOC*2580</td>
<td>Introduction to Biochemistry</td>
<td>0.50</td>
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<tr>
<td>MBG*2040</td>
<td>Foundations in Molecular Biology and Genetics</td>
<td>0.50</td>
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<tr>
<td>MICR*2420</td>
<td>Introduction to Microbiology</td>
<td>0.50</td>
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<tr>
<td>STAT*2040</td>
<td>Statistics I</td>
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0.50 Liberal Education electives

**Semester 4**

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<th>Title</th>
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<tbody>
<tr>
<td>BIOC*3560</td>
<td>Structure and Function in Biochemistry</td>
<td>0.50</td>
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<tr>
<td>CHEM*2700</td>
<td>Organic Chemistry I</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*2050</td>
<td>Molecular Biology of the Cell</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*2430</td>
<td>Methods in Microbial Culture and Physiology</td>
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0.50 Liberal Education electives

**Semester 5**

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<tr>
<td>MCB*3040</td>
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**Semester 6**

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<tbody>
<tr>
<td>MCB*3350</td>
<td>Laboratory Methods in Molecular Biology</td>
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Electives or restricted electives to a maximum of 2.75 total credits in this semester.

**Semester 7**

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MCB*4500</td>
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1.50 electives or restricted electives

**Semester 8**

<table>
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<tr>
<th>Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>MCB*4510</td>
<td>Research Project in Molecular &amp; Cellular Biology</td>
<td>1.00</td>
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</table>

1.50 electives or restricted electives

*instead of the 2 semester sequence of MCB*4500 / MCB*4510 students may choose to take MCB*4600 and 1.50 subject area electives at the 4000 level.

#### Restricted Electives

**Note:** Some courses have prerequisites, so be sure to consult the undergraduate calendar.

1. A minimum of 2.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

2. Physiology Elective - 0.50 credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOM*3200</td>
<td>Biomedical Physiology</td>
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<td>BOT*3310</td>
<td>Plant Growth and Development</td>
<td>0.50</td>
</tr>
<tr>
<td>HK*2810</td>
<td>Human Physiology I - Concepts and Principles</td>
<td>0.50</td>
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<tr>
<td>ZOO*3600</td>
<td>Comparative Animal Physiology</td>
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3. Subject Area Electives - 2.50 credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MCB*4500</td>
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</tr>
<tr>
<td>MCB*4600</td>
<td>Genomics</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4030</td>
<td>Animal Breeding Methods and Applications</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4040</td>
<td>Genetics and Molecular Biology of Development</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4110</td>
<td>Epigenetics</td>
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</tr>
<tr>
<td>MCB*4160</td>
<td>Plant Breeding</td>
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</tr>
<tr>
<td>MCB*4240</td>
<td>Applied Molecular Genetics in Medicine and Biotechnology</td>
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</tr>
<tr>
<td>MCB*4270</td>
<td>DNA Replication, Recombination and Repair</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4300</td>
<td>Plant Molecular Genetics</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4301</td>
<td>Dynamics of Cell Function and Signaling</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4010</td>
<td>Advanced Cell Biology</td>
<td>0.50</td>
</tr>
<tr>
<td>MCB*4050</td>
<td>Protein and Nucleic Acid Structure</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*3330</td>
<td>World of Viruses</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*4330</td>
<td>Molecular Virology</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*2050</td>
<td>Statistics II</td>
<td>0.50</td>
</tr>
</tbody>
</table>

#### Credit Summary (20.00 Total Credits)

4.00 - First year science core

7.25 - Required science courses semesters 3 - 8

3.00 - Restricted electives (#2 and 3 in restricted electives list)

1.75 - Approved science electives

2.00 - Liberal Education electives (# 1 in restricted elective list)

2.00 - Free electives - any approved elective for B.Sc. Students

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

#### Minor (Honours Program)

A minor in Molecular Biology and Genetics requires 5.00 credits in Molecular Biology and Genetics chosen in consultation with the faculty advisor, and will include:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCB*2040</td>
<td>Foundations in Molecular Biology and Genetics</td>
<td>0.50</td>
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<tr>
<td>MCB*2050</td>
<td>Molecular Biology of the Cell</td>
<td>0.50</td>
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A minimum of 4.00 credits from:

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<tr>
<th>Code</th>
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<tr>
<td>BIOC*3560</td>
<td>Structure and Function in Biochemistry</td>
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<td>BIOL*3020</td>
<td>Population Genetics</td>
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<td>BIOL*3300</td>
<td>Applied Bioinformatics</td>
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<td>MCB*2400</td>
<td>Fundamentals of Plant and Animal Genetics</td>
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<td>MCB*3040</td>
<td>Molecular Biology of the Gene</td>
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<td>MCB*3050</td>
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<td>MCB*3060</td>
<td>Quantitative Genetics</td>
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<td>MCB*3080</td>
<td>Bacterial Genetics</td>
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<td>MCB*3100</td>
<td>Plant Genetics</td>
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<td>MCB*3350</td>
<td>Laboratory Methods in Molecular Biology</td>
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<tr>
<td>MCB*3660</td>
<td>Genomics</td>
<td>0.50</td>
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<td>Animal Breeding Methods and Applications</td>
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<td>Genetics and Molecular Biology of Development</td>
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<td>MBG*4110</td>
<td>Epigenetics</td>
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<td>MBG*4160</td>
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<td>MBG*4220</td>
<td>Applied Molecular Genetics in Medicine and Biotechnology</td>
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<td>MBG*4270</td>
<td>DNA Replication, Recombination and Repair</td>
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<td>MBG*4300</td>
<td>Plant Molecular Genetics</td>
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<td>Dynamics of Cell Function and Signaling</td>
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<td>MCB*4010</td>
<td>Advanced Cell Biology</td>
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<td>MCB*4050</td>
<td>Protein and Nucleic Acid Structure</td>
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<td>MICR*3330</td>
<td>World of Viruses</td>
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<td>MICR*4330</td>
<td>Molecular Virology</td>
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**Nanoscience (NANO)**

Administered jointly by the Department of Chemistry and the Department of the Physics, College of Engineering and Physical Sciences

**Major (Honours Program)**

The major will require the completion of 20.00 credits as indicated below.

**Semester 1**

| BIOL*1090 | Introduction to Molecular and Cellular Biology | 0.50 |
| CHEM*1040 | General Chemistry I                             | 0.50 |
| IPS*1500  | Integrated Mathematics and Physics I            | 1.00 |
| NANO*1000 | Introduction to Nanoscience                     | 0.50 |

Students who are lacking one 4U/grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: https://www.uoguelph.ca/bsc/revised_SS

**Semester 2**

| CHEM*1050 | General Chemistry II                            | 0.50 |
| IPS*1510  | Integrated Mathematics and Physics II           | 1.00 |
| MATH*1160 | Linear Algebra I                                 | 0.50 |

One of:

| BIOL*1070 | Discovering Biodiversity                        | 0.50 |
| BIOL*1080 | Biological Concepts of Health                   | 0.50 |

**Semester 3**

| CHEM*2060 | Structure and Bonding                            | 0.50 |
| MATH*2270 | Applied Differential Equations                  | 0.50 |
| NANO*2000 | Synthesis and Characterization of Nanomaterials I | 0.50 |
| PHYS*2330 | Electricity and Magnetism I                     | 0.50 |

One of:

| CHEM*2820 | Thermodynamics and Kinetics                      | 0.50 |
| PHYS*2240 | Thermal Physics                                  | 0.50 |

**Semester 4**

| CHEM*2070 | Structure and Spectroscopy                      | 0.50 |
| NANO*2100 | Synthesis and Characterization of Nanomaterials II | 0.50 |
| PHYS*2310 | Mechanics                                       | 0.50 |

1.00 electives*

**Semester 5**

| NANO*3200 | Nanolithographic Techniques                     | 0.50 |
| NANO*3500 | Thin Film Science                               | 0.50 |

One of:

| CHEM*3860 | Quantum Chemistry                               | 0.50 |
| PHYS*3230 | Quantum Mechanics I                             | 0.50 |

1.00 electives

**Semester 6**

| NANO*3300 | Spectroscopy of Nanomaterials                   | 0.50 |
| NANO*3600 | Computational Methods in Materials Science      | 0.50 |

1.50 electives

**Semester 7**

| NANO*4100 | Biological Nanomaterials                        | 0.50 |
| NANO*4700 | Concepts in Quantum Computing                   | 0.50 |

1.50 electives

**Semester 8**

| NANO*4200 | Topics in Nanomaterials                         | 0.50 |

2.00 electives

* To take PHYS*3230 in semester 5, PHYS*2340 must be selected as an elective in semester 4.

**Note:** In semesters 7 and 8, the student must select to do either NANO*4900 or NANO*4910.

**Areas of Focus**

In completing the science requirements for the degree, some suggested complementary areas of focus are:
To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (22.00 Total Credits)*
4.50 - First year science core
8.00 - Required science courses semesters 3 - 8
0.50 or 1.00 - Restricted electives (either NANO 4900 (1.00) or NANO 4910 (0.50))
2.50 to 3.00 - Approved Science electives (depending on restricted elective chosen above)
1.00 - Liberal Education electives
3.00 - Free electives - any approved elective for B.Sc. students. (could be less if restricted electives do not count as science)
2.00 - Co-op Work Terms

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Note: A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 22.50

The recommended program sequence is outlined below.

Major (Honours Program)
Semester 1 - Fall
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
CHEM*1040 [0.50] General Chemistry I
IPS*1500 [1.00] Integrated Mathematics and Physics I
NANO*1000 [0.50] Introduction to Nanoscience

Students who are lacking one 4U grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: https://www.uoguelph.ca/bsc/revised_SS

Semester 2 - Winter
CHEM*1050 [0.50] General Chemistry II
IPS*1510 [1.00] Integrated Mathematics and Physics II
MATH*1160 [0.50] Linear Algebra I
One of:
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health

Semester 3 - Fall
CHEM*2060 [0.50] Structure and Bonding
COOP*1100 [1.00] Introduction to Co-operative Education
MATH*2270 [0.50] Applied Differential Equations
NANO*2000 [0.50] Synthesis and Characterization of Nanomaterials I
PHYS*2330 [0.50] Electricity and Magnetism I
One of:
CHEM*2820 [0.50] Thermodynamics and Kinetics
PHYS*2240 [0.50] Thermal Physics

Semester 4 - Winter
CHEM*2070 [0.50] Structure and Spectroscopy
NANO*2100 [0.50] Synthesis and Characterization of Nanomaterials II
PHYS*2310 [0.50] Mechanics
1.00 electives*

Summer Semester
COOP*1000 [0.50] Co-op Work Term I

Semester 5 - Fall
NANO*3200 [0.50] Nanolithographic Techniques
NANO*3500 [0.50] Thin Film Science
One of:
CHEM*3860 [0.50] Quantum Chemistry
PHYS*3320 [0.50] Quantum Mechanics I
1.00 electives

Winter Semester
COOP*2000 [0.50] Co-op Work Term II
(8-month work term in conjunction with COOP*3000)

Summer Semester
COOP*3000 [0.50] Co-op Work Term III

(8-month work term in conjunction with COOP*2000)

Semester 6 - Fall
NANO*4100 [0.50] Biological Nanomaterials
NANO*4700 [0.50] Concepts in Quantum Computing
1.50 electives

Semester 7 - Winter
NANO*3300 [0.50] Spectroscopy of Nanomaterials
NANO*3600 [0.50] Computational Methods in Materials Science
1.50 electives

Summer Semester
COOP*4000 [0.50] Co-op Work Term IV

Fall Semester
COOP*5000 [0.50] Co-op Work Term V

Semester 8 -- Winter
NANO*4200 [0.50] Topics in Nanomaterials
2.00 electives

* To take PHYS*3230 in semester 5, then PHYS*2340 must be selected as an elective in semester 4.

Note: In semesters 7 and 8, the student must select to do either NANO*4900 or NANO*4910.

Neuroscience (NEUR)

Departments of Biomedical Sciences (Ontario Veterinary College), Human Health and Nutritional Sciences (College of Biological Science), Molecular & Cellular Biology (College of Biological Science), and Psychology (College of Social and Applied Human Science).

Major (Honours Program)

This Honours program provides a foundation in the natural sciences and an opportunity to develop advanced knowledge of nervous system structure and function, and the skills required for independent inquiry within neuroscience. The specialization is unique in its emphasis on integrative/interdisciplinary problem solving. Through the use of electives, students may structure a program that emphasizes molecular and biomedical neuroscience, behavioural and cognitive neuroscience, or comparative neuroscience.

The major prepares students for professional programs in health science (medical, physiotherapy, pharmacy, veterinary medicine, nursing), post-graduate degrees in neuroscience research, and provides a strong foundation for students wishing to pursue careers in the pharmaceutical and biotechnology industries, public health, teaching, and scientific publishing & journalism.

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult with a Faculty Advisor. A minimum total of 20.00 credits is required to complete the major.

Semester 1
BIOL*1080 [0.50] Biological Concepts of Health
CHEM*1040 [0.50] General Chemistry I
MATH*1080 [0.50] Elements of Calculus I
PHYS*1080 [0.50] Physics for Life Sciences
0.50 Liberal Education elective

Semester 2
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
CHEM*1050 [0.50] General Chemistry II
MATH*1160 [0.50] Linear Algebra I
One of:
CHEM*2820 [0.50] Thermodynamics and Kinetics
PHYS*2240 [0.50] Thermal Physics

Semester 3
CHEM*2060 [0.50] Structure and Bonding
COOP*1100 [1.00] Introduction to Co-operative Education
MATH*2270 [0.50] Applied Differential Equations
NANO*2000 [0.50] Synthesis and Characterization of Nanomaterials I
PHYS*2330 [0.50] Electricity and Magnetism I
One of:
CHEM*2820 [0.50] Thermodynamics and Kinetics
PHYS*2240 [0.50] Thermal Physics

Summer Semester
COOP*1000 [0.50] Co-op Work Term I

Semester 4
NANO*3200 [0.50] Nanolithographic Techniques
NANO*3500 [0.50] Thin Film Science
One of:
CHEM*3860 [0.50] Quantum Chemistry
PHYS*3320 [0.50] Quantum Mechanics I
1.00 electives

Winter Semester
COOP*2000 [0.50] Co-op Work Term II
(8-month work term in conjunction with COOP*3000)

Summer Semester
COOP*3000 [0.50] Co-op Work Term III

(8-month work term in conjunction with COOP*2000)

Semester 6 - Fall
NANO*4100 [0.50] Biological Nanomaterials
NANO*4700 [0.50] Concepts in Quantum Computing
1.50 electives

Semester 7 - Winter
NANO*3300 [0.50] Spectroscopy of Nanomaterials
NANO*3600 [0.50] Computational Methods in Materials Science
1.50 electives

Summer Semester
COOP*4000 [0.50] Co-op Work Term IV

Fall Semester
COOP*5000 [0.50] Co-op Work Term V

Semester 8 -- Winter
NANO*4200 [0.50] Topics in Nanomaterials
2.00 electives

* To take PHYS*3230 in semester 5, then PHYS*2340 must be selected as an elective in semester 4.

Note: In semesters 7 and 8, the student must select to do either NANO*4900 or NANO*4910.
### Semester 6
- **BIOM*3090** [0.50] Principles of Pharmacology
- **NEUR*3500** [0.50] Techniques in Neuroscience

1.50 electives or restricted electives

### Semester 7
- **NEUR*4000** [0.50] Current Issues in Neuroscience
- **NEUR*4100** [0.50] Neuropharmacology

1.50 electives or restricted electives

### Semester 8
- 2.50 electives or restricted electives

#### Restricted Electives

Students are advised to pay particular attention to pre-requisite requirements when choosing individual courses, and seek advice as needed. *Indicates courses that require additional prerequisites.

1. A minimum of 0.50 credits of Critical thinking/Philosophy / Ethics from:
   - **BIOM*3210** [0.50] Critical Thinking in the Health Sciences
   - **PHIL*3200** [0.50] Critical Thinking
   - **PHIL*2110** [0.50] Formal Logic
   - **PHIL*2120** [0.50] Ethics
   - **PHIL*2180** [0.50] Philosophy of Science
   - **PHIL*2240** [0.50] Knowledge and Belief

   **Note:** if a PHIL course is completed from this list, students are required to take an additional 0.50 credit approved science course as an elective to ensure the minimum science requirement is met.

2. A minimum of 0.50 credits of Developmental Biology
   - **BIOM*3040** [0.75] Medical Embryology *
   - **MBG*3040** [0.50] Molecular Biology of the Gene
   - **ZOO*3050** [0.50] Developmental Biology

3. A minimum of 0.50 credits of Physiology
   - **BIOM*3200** [1.00] Biomedical Physiology
   - **HK*2810** [0.50] Human Physiology I - Concepts and Principles
   - **ZOO*3600** [0.50] Comparative Animal Physiology I *

   **NOTE:** If HK*2810 is completed in Semester 4, HK*3810 must be completed in Semester 5 in order to meet the BIOM*3090 pre-requisite requirement

4. A minimum of 0.50 credits of additional statistics or experimental design
   - **PSYC*2360** [0.50] Psychological Methods and Statistics
   - **STAT*2050** [0.50] Statistics II

5. A minimum of 1.00 credits of Independent Study

For students who are interested in graduate studies, a research course is recommended. * Indicates courses that have additional prerequisites.

** Faculty advisor will determine if this course is an eligible science elective, depending on the instructor and topic

- **BIOM*4500** [0.50] Literature-based Research in Biomedical Sciences
- **BIOM*4510** [1.00] Research in Biomedical Sciences
- **BIOM*4521/2** [2.00] Research in Biomedical Sciences
- **HK*4230** [0.50] Advanced Study in Human Health and Nutritional Sciences
- **HK*4360** [1.00] Research in Human Health and Nutritional Sciences
- **HK*4371/2** [1.00] Research in Human Health and Nutritional Sciences II
- **IBIO*4500** [1.00] Research in Integrative Biology I
- **IBIO*4510** [1.00] Research in Integrative Biology II
- **IBIO*4521/2** [2.00] Thesis in Integrative Biology
- **MCB*4500** [1.00] Research Project in Molecular & Cellular Biology I *
- **MCB*4510** [1.00] Research Project in Molecular & Cellular Biology *
- **MCB*4600** [0.50] Topics in Molecular and Cellular Biology *
- **NEUR*4401/2** [1.00] Research in Neurosciences
- **NEUR*4450** [1.00] Research in Neurosciences
- **PSYC*3240** [0.50] Independent Research Project **
- **PSYC*4240** [0.50] Advanced Independent Research Project **
- **PSYC*4870** [0.50] Honours Thesis I **
- **PSYC*4880** [1.00] Honours Thesis II **

### Lists of recommended electives

The following lists contain recommended electives for students wishing to emphasize particular areas in neuroscience.

*Indicates courses that require additional prerequisites.

#### Psychology
- **PSYC*2330** [0.50] Principles of Learning
- **PSYC*2390** [0.50] Sensation and Perception
- **PSYC*2650** [0.50] Cognitive Psychology
- **PSYC*3030** [0.50] Neurochemical Basis of Behaviour *
- **PSYC*3100** [0.50] Evolutionary Psychology *
- **PSYC*3330** [0.50] Memory and Attention *
- **PSYC*3410** [0.50] Behavioural Neuroscience II
- **PSYC*4470** [0.50] Advanced Topics in Behavioural and Cognitive Neuroscience
- **PSYC*4750** [0.50] Seminar in Motivation and Emotion

#### Computation, Modeling and Statistics
- **CIS*1300** [0.50] Programming
- **CIS*2500** [0.50] Intermediate Programming *
- **MATH*1090** [0.50] Elements of Calculus II
- **MATH*1160** [0.50] Linear Algebra I
- **MATH*2270** [0.50] Applied Differential Equations *
- **MATH*3510** [0.50] Biomathematics *
- **PSYC*3250** [0.50] Psychological Measurement *
- **PSYC*3290** [0.50] Conducting Statistical Analyses in Psychology *
- **STAT*3240** [0.50] Applied Regression Analysis *

#### Biological Science
- **BIOL*3560** [0.50] Structure and Function in Biochemistry
- **BIOL*4580** [0.50] Membrane Biochemistry *
- **BIOM*4070** [0.50] Biomedical Histology *
- **MBG*3050** [0.50] Human Genetics
- **MCB*3010** [0.50] Dynamics of Cell Function and Signaling
- **MCB*4010** [0.50] Advanced Cell Biology *
- **ZOO*3000** [0.50] Comparative Histology *

#### Health & Disease
- **BIOM*3040** [0.75] Medical Embryology *
- **BIOM*4030** [0.50] Endocrine Physiology *
- **BIOM*4050** [0.50] Biomedical Aspects of Aging *
- **HK*3100** [0.50] Neuromuscular Physiology *
- **HK*3810** [0.75] Human Physiology II - Integrated Systems *
- **HK*4070** [0.50] Clinical Biomechanics *
- **TOX*4000** [0.50] Medical Toxicology

### Credit Summary (20.00 Total Credits)

4.00 – First year science core
7.00 – Required science courses semester 3-8
3.00 – Restricted elective (#1,2,3,4,5 in restricted electives list)
2.00 – Approved Science elective*
0.50 - Required Liberal Education elective (PSYC*1000)
1.00 – Liberal Education electives
2.50 – Free electives

Of the 20 total credits required, students must complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

*2.50 Approved Science Electives if a PHIL*XXXX course is selected for restricted electives #1

### Minor (Honours Program)

A minor in Neuroscience requires a minimum of 5.00 credits including:
- **BIOL*1090** [0.50] Introduction to Molecular and Cellular Biology
- **PSYC*1000** [0.50] Introduction to Psychology
- **PSYC*2330** [0.50] Principles of Learning

One of:
- **NEUR*2000** [0.50] Introduction to Neuroscience
- **PSYC*2410** [0.50] Behavioural Neuroscience I

One of:
- **PSYC*1010** [0.50] Making Sense of Data in Psychological Research
- **STAT*2040** [0.50] Statistics I

A minimum of 0.50 credits from:
- **BIOM*2000** [0.50] Concepts in Human Physiology
- **BIOM*3200** [1.00] Biomedical Physiology
- **HK*2810** [0.50] Human Physiology I - Concepts and Principles
- **ZOO*3600** [0.50] Comparative Animal Physiology I

A minimum of 2.00 credits from:
- **BIOM*3000** [0.50] Functional Mammalian Neuroanatomy
- **BIOM*3090** [0.50] Principles of Pharmacology
- **BIOM*4030** [0.50] Endocrine Physiology

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**Note:** Faculty advisor will determine if this course is an eligible science elective, depending on the instructor and topic.
Of the 2.00 additional credits, students may select one course from:

- BIOM*3040 [0.75] Medical Embryology
- MBG*4040 [0.50] Genetics and Molecular Biology of Development
- ZOO*3050 [0.50] Developmental Biology

Please note that some of the restricted electives require prerequisites that are not included in the minor.

**Nutritional and Nutraceutical Sciences (NANS)**

Department of Human Health and Nutritional Sciences, College of Biological Science

The Nutritional and Nutraceutical Sciences major is concerned with understanding the contribution of food, beverage and nutritional supplement consumption to growth, development of optimal biological function, maintenance of health, and treatment of disease. If lacking the fundamentals of word processing, spreadsheet use and data management, the student should select CIS*1200 as early in the program as possible.

**Major (Honours Program)**

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. A total of 20.00 credits is required.

**Semester 1**

- BIOL*1080 [0.50] Biological Concepts of Health
- CHEM*1040 [0.50] General Chemistry I
- MATH*1080 [0.50] Elements of Calculus I
- PHYS*1080 [0.50] Physics for Life Sciences

**Semester 2**

- BIOL*1070 [0.50] Discovering Biodiversity
- BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
- CHEM*1050 [0.50] General Chemistry II
- PHYS*1070 [0.50] Physics for Life Sciences II

**Semester 3**

- BIOC*2580 [0.50] Introduction to Biochemistry
- MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
- STAT*2040 [0.50] Statistics I

**Semester 4**

- BIOC*3560 [0.50] Structure and Function in Biochemistry
- HK*2810 [0.50] Human Physiology I - Concepts and Principles
- MCB*2050 [0.50] Molecular Biology of the Cell
- NUTR*3210 [0.50] Fundamentals of Nutrition

**Semester 5**

- HK*3810 [0.75] Human Physiology II - Integrated Systems
- NUTR*3330 [0.50] Micronutrients, Phytochemicals and Health
- NUTR*3360 [0.50] Lifestyle Genomics
- NUTR*3390 [0.75] Applied Nutritional and Nutraceutical Sciences I

**Semester 6**

- BIOM*3090 [0.50] Principles of Pharmacology
- NUTR*4090 [0.50] Functional Foods and Nutraceuticals
- NUTR*4320 [0.50] Nutrition and Metabolic Control of Disease
- NUTR*4330 [0.75] Applied Nutritional and Nutraceutical Sciences II

Electives or restricted electives to a maximum of 2.75 total credits in this semester.

**Semester 7**

- NUTR*4210 [0.50] Nutrition, Exercise and Energy Metabolism
- NUTR*4510 [0.50] Toxicology, Nutrition and Food

**Semester 8**

2.50 electives or restricted electives

**Restricted Electives**

1. A minimum of 2.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

2. 1.00 credits from the following:

- HK*4230 [0.50] Advanced Study in Human Health and Nutritional Sciences
- HK*4340 [0.50] Genomics: Exercise and Disease
- HK*4360 [1.00] Research in Human Health and Nutritional Sciences
- HK*4371/2 [1.00] Research in Human Health and Nutritional Sciences II
- HK*4510 [1.00] Teaching, Learning & Knowledge Transfer
- HK*4511/2 [1.00] Teaching, Learning & Knowledge Transfer II
- HK*4660 [0.50] Regulation of Human Metabolism
- NUTR*4360 [0.50] Current Issues in Nutrigenomics
- PATH*3610 [0.50] Principles of Disease

**Credit Summary (20.00 Total Credits)**

4.00 - First year science core

9.25 - Required science courses semesters 3 - 8

1.00 - Restricted electives (#2 in restricted electives list)

1.75 - Approved science electives

2.00 - Liberal Education electives (#1 in restricted electives list)

2.00 - Free electives - any approved electives for B.Sc. students.

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

**Minor (Honours Program)**

A minor in Nutritional and Nutraceutical Sciences (NANS) requires 5.00 credits as follows:

- BIOC*2580 [0.50] Introduction to Biochemistry
- NUTR*3210 [0.50] Fundamentals of Nutrition
- NUTR*3330 [0.50] Micronutrients, Phytochemicals and Health
- NUTR*4090 [0.50] Functional Foods and Nutraceuticals
- STAT*2040 [0.50] Statistics I

At least 0.50 credits from:

- ANSC*3080 [0.50] Agricultural Animal Physiology (restricted to ABIO majors)
- BIOM*3200 [1.00] Biomedical Physiology
- HK*2810 [0.50] Human Physiology I - Concepts and Principles
- ZOO*3600 [0.50] Comparative Animal Physiology I

and 2.00 credits from:

- ANSC*3170 [0.50] Nutrition of Fish and Crustacea
- ANSC*3180 [0.50] Wildlife Nutrition
- ANSC*4260 [0.50] Beef Cattle Nutrition
- ANSC*4270 [0.50] Dairy Cattle Nutrition
- ANSC*4280 [0.50] Poultry Nutrition
- ANSC*4290 [0.50] Swine Nutrition
- ANSC*4560 [0.50] Pet Nutrition
- EQN*4020 [0.50] Advanced Equine Nutrition
- FOOD*2010 [0.50] Principles of Food Science
- HK*3810 [0.75] Human Physiology II - Integrated Systems
- HK*4230 [0.50] Advanced Study in Human Health and Nutritional Sciences

At least 0.50 credits from:

- HK*4340 [0.50] Genomics: Exercise and Disease
- HK*4360 [1.00] Research in Human Health and Nutritional Sciences
- HK*4371/2 [1.00] Research in Human Health and Nutritional Sciences II
- HK*4510 [1.00] Teaching, Learning & Knowledge Transfer
- HK*4511/2 [1.00] Teaching, Learning & Knowledge Transfer II
- NUTR*2150 [0.50] Introduction to Nutritional and Food Sciences
- NUTR*3360 [0.50] Lifestyle Genomics
- NUTR*3390 [0.75] Applied Nutritional and Nutraceutical Sciences I
- NUTR*4210 [0.50] Nutrition, Exercise and Energy Metabolism
- NUTR*4320 [0.50] Nutrition and Metabolic Control of Disease
- NUTR*4330 [0.75] Applied Nutritional and Nutraceutical Sciences II
- NUTR*4360 [0.50] Current Issues in Nutrigenomics
- NUTR*4510 [0.50] Toxicology, Nutrition and Food

**Physical Science (PSCI)**

College of Engineering and Physical Sciences

**X. Degree Programs, Bachelor of Science (B.Sc.)**

2019-2020 Undergraduate Calendar

Last Revision: July 4, 2019
Major (Honours Program)

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. This major will require the completion of 20.00 credits as indicated below:

1. Basic Science Core - 4.00 credits
   1.00 - Biology (BIOL*1070, BIOL*1080, BIOL*1090)
   1.00 - Chemistry (CHEM*1040, CHEM*1050)
   1.00 - Physics (PHYS*1080, (1 of PHYS*1010, PHYS*1070, PHYS*1130)]
   1.00 - Mathematical Science [(MATH*1080, MATH*1090) or (MATH*1200, MATH*1210)]
   * IPS*1500 can be taken instead of PHYS*1080 and MATH*1200, and IPS*1510 can be taken instead of PHYS*1010 and MATH*1210.

2. Subject Area Core - 8.00 credits
   0.50 STAT*2040
   0.50 (1 of CIS*1200, CIS*1300, CIS*1500)
   7.00 physical science credits, including at least 4.00 credits at the 3000 or 4000 level of which 2.00 credits must be at the 4000 level.

3. Science Electives - 4.00 credits
   4.00 science credits from the List of Approved Science Electives for B.Sc. Students.

4. Liberal Education - 2.00
   2.00 acceptable Liberal Education credits selected from the List of Approved B.Sc. Electives*

5. Free Electives - 2.00 credits
   Note: the program must include a total of 6.00 science credits at the 3000 or 4000 level. Of these, at least 2.00 credits must be physical science at the 4000 level.

Semester 1
CHEM*1040 [0.50] General Chemistry I
One of:
PHYS*1080 [0.50] Physics for Life Sciences
PHYS*1130 [0.50] Physics with Applications
One of:
MATH*1080 [0.50] Elements of Calculus I
MATH*1200 [0.50] Calculus I
* IPS*1500 can be taken instead of PHYS*1080 and MATH*1200.
One of:
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
0.50 Liberal Education electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: https://www.uoguelph.ca/bsc/revised_SS

Semester 2
CHEM*1050 [0.50] General Chemistry II
One of:
PHYS*1010 [0.50] Introductory Electricity and Magnetism
PHYS*1080 [0.50] Physics for Life Sciences
One of:
MATH*1210 [0.50] Calculus II
MATH*1090 [0.50] Elements of Calculus II
IPS*1510 can be taken instead of PHYS*1010 and MATH*1210.
One of:
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
0.50 Liberal Education electives

Semester 3
1.50 science electives from the approved list of acceptable B.Sc. science electives*
0.50 electives
One of:
CIS*1200 [0.50] Introduction to Computing
CIS*1300 [0.50] Programming
CIS*1500 [0.50] Introduction to Programming
OR
STAT*2040 [0.50] Statistics I

Semester 4
1.50 science electives from the approved list of B.Sc. science electives*
0.50 electives
One of:
CIS*1200 [0.50] Introduction to Computing
CIS*1300 [0.50] Programming
CIS*1500 [0.50] Introduction to Programming
(if a statistics course is chosen in Semester 3)

OR
STAT*2040 [0.50] Statistics I
(if a computing course is chosen in Semester 3)

Semester 5 to 8
Total of 2.50 credits per semester including at least 2.00 science electives.

Sufficient courses at the 3000 or 4000 level must be selected in Semesters 5 through 8 to total 6.00 credits in science at the 3000 or 4000 level with at least 2.00 physical science at the 4000 level.

*approved course lists are available in the B.Sc. Academic Counselling Office or at: https://www.uoguelph.ca/bsc/approved_electives

Credit Summary (20.00 Total Credits)

4.00 - First year science credits
8.00 - Subject area core semesters 3 – 8 (including STAT 2040 and CIS 1200 or CIS 1500)
4.00 - Approved Science electives
2.00 - Liberal Education electives (# 1 in restricted elective list)
2.00 - Free electives - any approved elective for B.Sc. students. (could be less if restricted electives do not count as science)

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Honours Physical Science (With a Minor)

The requirements and schedules are the same as for Honours Physical Science. Available Minor subjects are listed at the beginning of the B.SC. Program section under the heading Honours Program Minors.

Physics (PHYS)

Department of Physics, College of Engineering and Physical Sciences

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. Since some of the required courses are not offered every semester, students entering the Major in Honours Physics should plan their program in consultation with the Department of Physics Faculty Advisor.

Major (Honours Program)

This major requires the completion of 20.00 credits. At least 1.00 credits must be from Arts and/or Social Science courses.

Semester 1 *
CHEM*1040 [0.50] General Chemistry I
CIS*1300 [0.50] Programming
IPS*1500 [1.00] Integrated Mathematics and Physics I
One of:
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology

Students who are lacking one 4U /grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: https://www.uoguelph.ca/bsc/revised_SS

Semester 2 *
CHEM*1050 [0.50] General Chemistry II
IPS*1510 [1.00] Integrated Mathematics and Physics II
MATH*1160 [0.50] Linear Algebra I
One of:
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology

* students who have taken physics courses other than IPS*1500 or PHYS*1080 in Semester 1 and IPS*1510 or PHYS*1020 in Semester 2, may proceed to semester 3 with the permission of the Department of Physics

Semester 3
MATH*2200 [0.50] Advanced Calculus I
MATH*2270 [0.50] Applied Differential Equations
PHYS*2240 [0.50] Thermal Physics
PHYS*2330 [0.50] Electricity and Magnetism I
0.50 Liberal Education electives

Semester 4
PHYS*2180 [0.50] Experimental Techniques in Physics
PHYS*2310 [0.50] Mechanics
PHYS*2340 [0.50] Electricity and Magnetism II
1.00 electives

Semester 5
IPS*3000 [0.50] Science Communication
PHYS*3130 [0.50] Mathematical Physics

* IPS*1500 can be taken instead of PHYS*1080 and MATH*1200, and IPS*1510 can be taken instead of PHYS*1010 and MATH*1210.

Note:
1.00 electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: https://www.uoguelph.ca/bsc/revised_SS

Last Revision: July 4, 2019

2019-2020 Undergraduate Calendar
The Co-op program in Physics is a five year program, including five work terms. Students who are lacking one 4U /grade 12 course in Biology, Chemistry or Physics must complete one of the following courses:

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>Academic Semester 4</td>
<td>COOP*1000 Work Term I</td>
</tr>
<tr>
<td>3</td>
<td>Academic Semester 5</td>
<td>COOP*2000 Work Term II</td>
<td>COOP*3000 Work Term III</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
</tr>
<tr>
<td>5</td>
<td>COOP*5000 Work Term V</td>
<td>Academic Semester 8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

**Credit Summary (22.00 Total Credits)**

- 5.00 - First year science credits
- 8.50 - Required science courses semesters 3 – 8
- 1.00 - Restricted electives
- 1.50 - Approved Science electives
- 1.00 - Liberal Education electives
- 3.00 - Free electives - any approved elective for B.Sc. students
- 2.00 - Co-op Work Terms

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

**Note:** A minimum of four Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *A fifth Co-op work term is optional and if completed, the total number of credits will equal 22.50.

The recommended program sequence is outlined below.

**Major (Honours Program)**

<table>
<thead>
<tr>
<th>Semester 1 - Fall</th>
<th>Semester 2 - Winter</th>
<th>Semester 3 - Fall</th>
<th>Semester 4 - Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM*1040 [0.50]</td>
<td>General Chemistry I</td>
<td>COOP*1100</td>
<td>0.00</td>
</tr>
<tr>
<td>CIS*1300 [0.50]</td>
<td>Programming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPS*1500 [1.00]</td>
<td>Integrated Mathematics and Physics I</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>One of:</td>
<td></td>
<td>BIOL*1070 [0.50]</td>
<td>Discovering Biodiversity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BIOL*1080 [0.50]</td>
<td>Biological Concepts of Health</td>
</tr>
<tr>
<td>One of:</td>
<td></td>
<td>BIOL*1090 [0.50]</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students who are lacking one 4U /grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: <a href="https://www.uoguelph.ca/bsc/revised_sS">https://www.uoguelph.ca/bsc/revised_sS</a></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Semester 5 - Summer**

- 0.50 Liberal Education electives* |

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**Physics (Co-op) (PHYS:C)**

Department of Physics, College of Engineering and Physical Sciences

Program Requirements

The Co-op program in Physics is a five year program, including five work terms. Students must complete a Fall, Winter and Summer work term and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: [https://www.recruitguelph.ca/cecs/](https://www.recruitguelph.ca/cecs/)). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Physics Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>Off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summer Semester</th>
<th>COOP*1000 [0.50]</th>
<th>Co-op Work Term I ++</th>
</tr>
</thead>
</table>

2019-2020 Undergraduate Calendar
<table>
<thead>
<tr>
<th>Semester 5 - Fall</th>
<th>IPS*3000 [0.50]</th>
<th>Science Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PHYS*3130 [0.50]</td>
<td>Mathematical Physics</td>
</tr>
<tr>
<td></td>
<td>PHYS*3230 [0.50]</td>
<td>Quantum Mechanics I</td>
</tr>
<tr>
<td></td>
<td>PHYS*3400 [0.50]</td>
<td>Advanced Mechanics</td>
</tr>
<tr>
<td></td>
<td>0.50 electives</td>
<td></td>
</tr>
<tr>
<td>Winter Semester</td>
<td>COOP*2000 [0.50]</td>
<td>Co-op Work Term II ++</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8-month work term in conjunction with COOP*3000)</td>
</tr>
<tr>
<td>Summer Semester</td>
<td>COOP*3000 [0.50]</td>
<td>Co-op Work Term III ++</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8-month work term in conjunction with COOP*2000)</td>
</tr>
<tr>
<td>Semester 6 - Fall +</td>
<td>PHYS*4180 [0.50]</td>
<td>Advanced Electromagnetic Theory</td>
</tr>
<tr>
<td>One of:</td>
<td>CIS*2520 [0.50]</td>
<td>Data Structures</td>
</tr>
<tr>
<td></td>
<td>0.50 electives**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PHYS*4240 [0.50]</td>
<td>Statistical Physics II</td>
</tr>
<tr>
<td></td>
<td>0.50 electives**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.00 electives**</td>
<td></td>
</tr>
<tr>
<td>Semester 7 - Winter +</td>
<td>NANO*3600 [0.50]</td>
<td>Computational Methods in Materials Science</td>
</tr>
<tr>
<td></td>
<td>PHYS*3000 [0.50]</td>
<td>Optics: Fundamentals and Applications</td>
</tr>
<tr>
<td></td>
<td>PHYS*3510 [0.50]</td>
<td>Intermediate Laboratory</td>
</tr>
<tr>
<td></td>
<td>PHYS*4040 [0.50]</td>
<td>Quantum Mechanics II</td>
</tr>
<tr>
<td>One of:</td>
<td>MATH*3260 [0.50]</td>
<td>Complex Analysis</td>
</tr>
<tr>
<td></td>
<td>0.50 electives**</td>
<td></td>
</tr>
<tr>
<td>Summer Semester</td>
<td>COOP*4000 [0.50]</td>
<td>Co-op Work Term IV ++</td>
</tr>
<tr>
<td>Fall Semester</td>
<td>COOP*5000 [0.50]</td>
<td>Co-op Work Term V ++</td>
</tr>
<tr>
<td>Semester 8 - Winter +</td>
<td>PHYS*4500 [0.50]</td>
<td>Advanced Physics Laboratory</td>
</tr>
<tr>
<td>One of:</td>
<td>PHYS*4130 [0.50]</td>
<td>Subatomic Physics</td>
</tr>
<tr>
<td></td>
<td>0.50 electives**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PHYS*4150 [0.50]</td>
<td>Solid State Physics</td>
</tr>
<tr>
<td>One of:</td>
<td>0.50 electives**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.00 electives**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+ students going on to graduate school in physics should take PHYS<em>4130, PHYS</em>4150, and PHYS*4240</td>
<td></td>
</tr>
<tr>
<td>** At least 1.00 credits must be from the restricted electives listed below.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restricted Electives</td>
<td>PHYS*4130 [0.50]</td>
<td>Subatomic Physics</td>
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<tr>
<td></td>
<td>PHYS*4150 [0.50]</td>
<td>Solid State Physics</td>
</tr>
<tr>
<td></td>
<td>PHYS*4240 [0.50]</td>
<td>Statistical Physics II</td>
</tr>
</tbody>
</table>

### Plant Science (PLSC)

**Major (Honours Program)**

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. The major requires the completion of 20.00 credits.

#### Semester 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1070</td>
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</tr>
<tr>
<td>CHEM*1040</td>
<td>[0.50]</td>
</tr>
<tr>
<td>ENGL*1030</td>
<td>[0.50]</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*1080</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: [https://www.uoguelph.ca/bsc/revised_SS](https://www.uoguelph.ca/bsc/revised_SS)

#### Semester 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>[0.50]</td>
</tr>
<tr>
<td>PHYS*1070</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CINS*1200</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

**Credit Summary (20.00 Total Credits)**

### Option A

1. 4.00 - First year science core
2. 6.00 - Required science courses semesters 3 - 8
3. 5.00 - Restricted electives for the declared area of emphasis (2) (some restricted electives do not count as science electives towards the degree. Therefore additional science electives may be required.)
4. 1.00 - Approved science electives, if all restricted electives chosen are approved science electives.
5. 1.00 - Liberal Education electives
6. 0.50 - ENGL*1030
Area of Emphasis

Applied Plant Science (APSC)

CROP*4240 [0.50] Weed Science
ENVS*2060 [0.50] Soil Science
ENVS*3210 [0.50] Plant Pathology
ENVS*4100 [0.50] Integrated Management of Invasive Insect Pests **

** 3.00 credits from:
AGR*3450 [0.50] Research Methods in Agricultural Science
BOT*3710 [0.50] Plant Diversity and Evolution
CROP*3300 [0.50] Grain Crops
CROP*3310 [0.50] Protein and Oilseed Crops
CROP*3340 [0.50] Managed Grasslands
CROP*4220 [0.50] Cropping Systems **
ENVS*2040 [0.50] Plant Health and the Environment
ENVS*3020 [0.50] Pesticides and the Environment
ENVS*3080 [0.50] Soil and Water Conservation **
ENVS*3140 [0.50] Management of Turfgrass Diseases **
ENVS*3310 [0.50] Soil Biodiversity and Ecosystem Function **
ENVS*4090 [0.50] Soil Management
HORT*2450 [0.50] Introduction to Turfgrass Science
HORT*3010 [0.50] Annual, Perennial and Indoor Plants - Identification and Use
HORT*3050 [0.50] Management of Turfgrass Insect Pests and Weeds **
HORT*3150 [0.50] Principles and Applications of Plant Propagation
HORT*3270 [0.50] Medicinal Plants
HORT*3280 [0.50] Greenhouse Production
HORT*3310 [0.50] Plants, Food and Health
HORT*3430 [0.50] Wine-Grape Culture
HORT*3510 [0.50] Vegetable Production
HORT*4200 [0.50] Plants, the Environment and Society
HORT*4300 [0.50] Postharvest Physiology
HORT*4420 [0.50] Fruit Crops
HORT*4450 [0.50] Advanced Turfgrass Science
LARC*2240 [0.50] Plants in the Landscape
MBG*2400 [0.50] Fundamentals of Plant and Animal Genetics
MBG*3100 [0.50] Plant Genetics
MBG*4160 [0.50] Plant Breeding
OAGR*2070 [1.00] Introduction to Organic Agriculture
OAGR*4050 [1.00] Design of Organic Production Systems **
PBIO*3410 [0.50] Crop Physiology
PBIO*3750 [0.50] Plant Tissue Culture
PBIO*4750 [0.50] Genetic Engineering of Plants
STAT*2050 [0.50] Statistics II
STAT*3210 [0.50] Experimental Design

Botany (BOT)

BOT*3050 [0.50] Plant Functional Ecology
MBG*3100 [0.50] Plant Genetics
PBIO*4000 [0.50] Molecular and Cellular Aspects of Plant-Microbe Interactions
PBIO*4150 [0.50] Molecular and Cellular Aspects of Plant Development

** 3.00 credits from:
AGR*3450 [0.50] Research Methods in Agricultural Science
BOT*3710 [0.50] Plant Diversity and Evolution
MBG*4300 [0.50] Plant Molecular Genetics
MCR*2420 [0.50] Introduction to Microbiology
MCR*3090 [0.50] Mycology
MCR*3320 [0.50] Plant Microbiology
PBIO*3110 [0.50] Crop Physiology
PBIO*3750 [0.50] Plant Tissue Culture
PBIO*4750 [0.50] Genetic Engineering of Plants
STAT*2050 [0.50] Statistics II

Plant Biotechnology (PBTC)

MBG*3100 [0.50] Plant Genetics
MBG*3350 [0.75] Laboratory Methods in Molecular Biology
PBIO*3750 [0.50] Plant Tissue Culture
PBIO*4750 [0.50] Genetic Engineering of Plants

‡ minimum of 2.75 credits from:
AGR*3450 [0.50] Research Methods in Agricultural Science
BOT*3710 [0.50] Plant Diversity and Evolution
BIOL*3300 [0.50] Applied Bioinformatics
MBG*2400 [0.50] Fundamentals of Plant and Animal Genetics
MBG*3660 [0.50] Conservation Biology
MBG*4160 [0.50] Plant Breeding
MBG*4300 [0.50] Plant Molecular Genetics
MCB*4010 [0.50] Advanced Cell Biology
MCR*2420 [0.50] Introduction to Microbiology
MCR*3220 [0.50] Plant Microbiology
MCR*3230 [0.50] Immunology
MCR*3330 [0.50] World of Viruses
PBIO*3110 [0.50] Crop Physiology
PBIO*4150 [0.50] Molecular and Cellular Aspects of Plant Development
STAT*2050 [0.50] Statistics II
STAT*3210 [0.50] Experimental Design **

Plant Environmental Science (PESC)

BOT*3050 [0.50] Plant Functional Ecology
ENVS*2040 [0.50] Plant Health and the Environment
ENVS*4350 [0.50] Forest Ecology
GEOG*2480 [0.50] Mapping and GIS

** 3.00 credits from:
AGR*3450 [0.50] Research Methods in Agricultural Science
BIOL*3010 [0.50] Laboratory and Field Work in Ecology
BIOL*3060 [0.50] Populations, Communities & Ecosystems
BIOL*3130 [0.50] Conservation Biology
BIOL*4500 [0.50] Natural Resource Policy Analysis
BOT*3710 [0.50] Plant Diversity and Evolution
ENVS*2060 [0.50] Soil Science
ENVS*2120 [0.50] Introduction to Environmental Stewardship **
ENVS*2330 [0.50] Current Issues in Ecosystem Science and Biodiversity
ENVS*3000 [0.50] Nature Interpretation
ENVS*3020 [0.50] Pesticides and the Environment
ENVS*3040 [0.50] Natural Chemicals in the Environment
ENVS*3090 [0.50] Insect Diversity and Biology
ENVS*3120 [0.50] Plant Pathology
ENVS*3250 [0.50] Forest Health and Disease
ENVS*4100 [0.50] Integrated Management of Invasive Insect Pests **
GEOG*2210 [0.50] Environment and Resources
GEOG*3210 [0.50] Management of the Biophysical Environment **
GEOG*4210 [0.50] Environmental Governance **
GEOG*4220 [0.50] Local Environmental Management
HORT*3310 [0.50] Plants, Food and Health
LARC*3200 [0.50] Principles of Landscape Ecology **
PHIL*2070 [0.50] Philosophy of the Environment
POLS*3370 [0.50] Environmental Politics and Governance
STAT*2050 [0.50] Statistics II
STAT*3210 [0.50] Experimental Design **

Unspecialized (UNSP)

Choose 5.00 credits from any courses listed in the other areas of emphasis.

Minor (Honours Program)

A minor in Plant Science requires a minimum of 5.00 credits in the Plant Science Program chosen in consultation with the Faculty Advisor. The courses include:

AGR*2470 [0.50] Introduction to Plant Agriculture
BOT*2100 [0.50] Life Strategies of Plants
BOT*3310 [0.50] Plant Growth and Development
BOT*4310 [0.50] Plant Anatomy
BOT*3710 [0.50] Plant Diversity and Evolution
Statistics (STAT)

Department of Mathematics and Statistics, College of Engineering and Physical Sciences

Statistics plays a fundamental role in virtually all scientific disciplines, including biology, physics, chemistry, medicine, epidemiology, kinesiology, and toxicology. Students minoring in Statistics will develop practical skills in data visualization and analysis, statistical computing, technical writing and communication in a variety of applications areas, preparing them well for careers in the modern workplace.

Students may declare this minor in any semester.

Minor (Honours Program)

A total of 5.00 credits is required to complete the minor, including:

(MATH*1080 or MATH*1200)*
(MATH*1090 or MATH*1210)**

MATH*1160 [0.50] Linear Algebra I
STAT*2040 [0.50] Statistics I
STAT*2050 [0.50] Statistics II
STAT*3100 [0.50] Introductory Mathematical Statistics I
STAT*3110 [0.50] Introductory Mathematical Statistics II
STAT*3240 [0.50] Applied Regression Analysis

0.50 additional credits in Statistics

0.50 additional credits in Statistics or Mathematics at the 2000 level or above

* IPS*1500 can count toward this 0.50 credit
** IPS*1510 can count toward this 0.50 credit

Note: Students majoring in Mathematical Science cannot minor in Statistics.

Theoretical Physics (THPY)

Department of Physics, College of Engineering and Physical Sciences

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. Since some of the required courses are not offered every semester, students entering the Major in Theoretical Physics should plan their program in consultation with the Faculty Advisor.

Major (Honours Program)

This major requires the completion of 20.00 credits. At least 1.00 of these credits must be obtained from the completion of Liberal Education electives.

Semester 1

CHEM*1040 [0.50] General Chemistry I
CIS*1300 [0.50] Programming
IPS*1500 [1.00] Integrated Mathematics and Physics I

One of:
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology

Students who are lacking one 4U/grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: https://www.uoguelph.ca/bsc/revised_SS

Semester 2

CHEM*1050 [0.50] General Chemistry II
IPS*1510 [1.00] Integrated Mathematics and Physics II
MATH*1160 [0.50] Linear Algebra I

One of:
BIOL*1070 [0.50] Discovering Biodiversity
BIOL*1080 [0.50] Biological Concepts of Health
BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology

Note: students who have taken physics courses other than IPS*1500 or PHYS*1080 in Semester 1 and IPS*1510 or PHYS*1010 in Semester 2, may proceed to semester 3 with the permission of the Department of Physics

Semester 3

MATH*2200 [0.50] Advanced Calculus I
MATH*2270 [0.50] Applied Differential Equations
PHYS*2240 [0.50] Thermal Physics
PHYS*2330 [0.50] Electricity and Magnetism I

0.50 Liberal Education electives

Semester 4

MATH*2210 [0.50] Advanced Calculus II
PHYS*2180 [0.50] Experimental Techniques in Physics
PHYS*2310 [0.50] Mechanics
PHYS*2340 [0.50] Electricity and Magnetism II

0.50 electives*

Semester 5

IPS*3000 [0.50] Science Communication
PHYS*3130 [0.50] Mathematical Physics
PHYS*3230 [0.50] Quantum Mechanics I
PHYS*3400 [0.50] Advanced Mechanics

0.50 electives*

Semester 6

NANO*3600 [0.50] Computational Methods in Materials Science
PHYS*3000 [0.50] Optics: Fundamentals and Applications
PHYS*3510 [0.50] Intermediate Laboratory
PHYS*4040 [0.50] Quantum Mechanics II

0.50 electives*

Semester 7

PHYS*4120 [0.50] Atomic and Molecular Physics
PHYS*4180 [0.50] Advanced Electromagnetic Theory
PHYS*4240 [0.50] Statistical Physics II

Two of:
PHYS*4001 [0.50] Research in Physics
PHYS*4500 [0.50] Advanced Physics Laboratory

0.50 electives*

Semester 8

MATH*3260 [0.50] Complex Analysis
PHYS*4130 [0.50] Subatomic Physics
PHYS*4150 [0.50] Solid State Physics

One of:
PHYS*4002 [0.50] Research in Physics

0.50 electives*

*Restricted Electives

Students must complete 2.00 credits from the following list:

CIS*2500 [0.50] Intermediate Programming
MATH*2000 [0.50] Proofs, Sets, and Numbers
MATH*2130 [0.50] Numerical Methods
MATH*3100 [0.50] Differential Equations II
MATH*3130 [0.50] Abstract Algebra
MATH*3160 [0.50] Linear Algebra II
MATH*3200 [0.50] Real Analysis
MATH*3240 [0.50] Operations Research

Credit Summary (20.00 Total Credits)

5.00 - First year science credits
11.00 - Required science courses semesters 3 – 8
2.00 - Restricted electives
1.00 - Liberal Education electives
1.00 - Free electives - any approved elective for B.Sc. students.

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Wildlife Biology and Conservation (WBC)

Department of Integrative Biology, College of Biological Science

The core of this major will provide students with an integrated foundation in three disciplines necessary to understand the origins, interactions, and protection of biological diversity: evolution, ecology, and conservation biology. After the second semester, the student has the opportunity to take a wide variety of electives, including courses that meet his/her specific interests within one or two of these disciplines. The program offers a sound scientific background in preparation for careers in resource management, conservation, ecological consulting, teaching, and government service. This major also qualifies students for post-graduate work in ecology, evolutionary biology, environmental sciences, or wildlife management.

Major (Honours Program)

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. A minimum total of 20.00 credits is required to complete the major.

Semester 1

BIOL*1070 [0.50] Discovering Biodiversity
CHEM*1040 [0.50] General Chemistry I
MATH*1080 [0.50] Elements of Calculus I
PHYS*1080 [0.50] Physics for Life Sciences

0.50 Liberal Education electives

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at https://www.uoguelph.ca/bsc/revised_SS

Last Revision: July 4, 2019
2019-2020 Undergraduate Calendar
Semester 2  
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1080</td>
<td>[0.50]</td>
<td>Biological Concepts of Health</td>
</tr>
<tr>
<td>BIOL*1090</td>
<td>[0.50]</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>[0.50]</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>PHYS*1070</td>
<td>[0.50]</td>
<td>Physics for Life Sciences II</td>
</tr>
</tbody>
</table>

0.50 Liberal Education electives

Semester 3  
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*2580</td>
<td>[0.50]</td>
<td>Introduction to Biochemistry</td>
</tr>
<tr>
<td>MBG*2040</td>
<td>[0.50]</td>
<td>Foundations in Molecular Biology and Genetics</td>
</tr>
</tbody>
</table>

1.50 electives or restricted electives

Semester 4  
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*2060</td>
<td>[0.50]</td>
<td>Ecology</td>
</tr>
<tr>
<td>BIOL*2400</td>
<td>[0.50]</td>
<td>Evolution</td>
</tr>
<tr>
<td>STAT*2230</td>
<td>[0.50]</td>
<td>Biostatistics for Integrative Biology</td>
</tr>
</tbody>
</table>

1.00 electives or restricted electives

Semester 5  
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*3010</td>
<td>[0.50]</td>
<td>Laboratory and Field Work in Ecology</td>
</tr>
</tbody>
</table>

2.00 electives or restricted electives

Semester 6  
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*3040</td>
<td>[0.50]</td>
<td>Methods in Evolutionary Biology</td>
</tr>
<tr>
<td>BIOL*3060</td>
<td>[0.50]</td>
<td>Populations, Communities &amp; Ecosystems</td>
</tr>
<tr>
<td>BIOL*3130</td>
<td>[0.50]</td>
<td>Conservation Biology</td>
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</table>

1.00 electives or restricted electives

Semester 7  
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tr>
<td>BIOL*4110</td>
<td>[1.00]</td>
<td>Ecological Methods</td>
</tr>
<tr>
<td>BIOL*4150</td>
<td>[0.50]</td>
<td>Wildlife Conservation and Management</td>
</tr>
</tbody>
</table>

1.00 electives or restricted electives

Note: For students considering graduate research programs, BIOL*4110 may be substituted by an independent research course (1.00 credits minimum). Course options include: (IBIO*4500 and IBIO*4510), IBIO*4521/IBIO*4522.

Semester 8  
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*4500</td>
<td>[0.50]</td>
<td>Natural Resource Policy Analysis</td>
</tr>
</tbody>
</table>

2.00 electives or restricted electives

Restricted Electives

Note that some courses have prerequisites, so be sure to consult the undergraduate calendar.

1. A minimum of 1.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: [https://www.uoguelph.ca/bsc/](https://www.uoguelph.ca/bsc/)

2. A minimum of 0.50 credits from:
   - BOT*2100 [0.50] Life Strategies of Plants
   - ZOO*2090 [0.50] Vertebrate Structure and Function
   - ZOO*2700 [0.50] Invertebrate Morphology & Evolution

3. A minimum of 0.50 credits from:
   - BOT*3050 [0.50] Plant Functional Ecology
   - ZOO*3600 [0.50] Comparative Animal Physiology I

4. A minimum of 0.50 credits from:
   - BIOL*3020 [0.50] Population Genetics
   - BIOL*4120 [0.50] Evolutionary Ecology

5. A minimum of 3.00 credits from any of the following lists of courses. The courses are broken into disciplines for which they are most suitable to help students tailor their electives towards a specific field if desired.

   * Some of the restricted electives will require additional courses outside of the required courses listed in Semesters 3-8

   ** Please note not all restricted electives are considered science electives for B.Sc students. If the non-science restricted electives are chosen, students are reminded that they will still be responsible for meeting the minimum of 16.00 credits in science and that the credit summary may vary from what is specified below.

Evolution

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*3020</td>
<td>[0.50]</td>
<td>Population Genetics</td>
</tr>
<tr>
<td>BIOL*3300</td>
<td>[0.50]</td>
<td>Applied Bioinformatics</td>
</tr>
<tr>
<td>BOT*3710</td>
<td>[0.50]</td>
<td>Plant Diversity and Evolution</td>
</tr>
<tr>
<td>ENVS*3090</td>
<td>[0.50]</td>
<td>Insect Diversity and Biology</td>
</tr>
<tr>
<td>ENVS*3180</td>
<td>[0.50]</td>
<td>Sedimentary Environments *</td>
</tr>
<tr>
<td>MBG*3040</td>
<td>[0.50]</td>
<td>Molecular Biology of the Gene</td>
</tr>
<tr>
<td>MBG*4110</td>
<td>[0.50]</td>
<td>Epigenetics *</td>
</tr>
<tr>
<td>MBG*4270</td>
<td>[0.50]</td>
<td>DNA Replication, Recombination and Repair *</td>
</tr>
<tr>
<td>ZOO*2700</td>
<td>[0.50]</td>
<td>Invertebrate Morphology &amp; Evolution</td>
</tr>
<tr>
<td>ZOO*3050</td>
<td>[0.50]</td>
<td>Developmental Biology</td>
</tr>
</tbody>
</table>

Ecology

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC*3180</td>
<td>[0.50]</td>
<td>Wildlife Nutrition *</td>
</tr>
<tr>
<td>BIOL*3450</td>
<td>[0.50]</td>
<td>Introduction to Aquatic Environments</td>
</tr>
<tr>
<td>ENVS*3000</td>
<td>[0.50]</td>
<td>Nature Interpretation</td>
</tr>
<tr>
<td>ENVS*3270</td>
<td>[0.50]</td>
<td>Forest Biodiversity *</td>
</tr>
</tbody>
</table>

Semester 1  
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1070</td>
<td>[0.50]</td>
<td>Discovering Biodiversity</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>[0.50]</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>[0.50]</td>
<td>Elements of Calculus I</td>
</tr>
<tr>
<td>PHYS*1080</td>
<td>[0.50]</td>
<td>Physics for Life Sciences</td>
</tr>
</tbody>
</table>

Credit Summary (20.00 Total Credits)

4.00 - First year science core

6.50 - Required science courses semesters 3 - 8

4.50 - Restricted electives (# 2, 3, 4 and 5 in restricted electives list)**

1.00 - Approved Science electives

1.00 - Liberal Education electives (#1 in restricted electives list)

3.00 - Free electives - any approved elective for B.Sc. students

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Zoology (ZOO)

Department of Integrative Biology, College of Biological Science

The Major in Zoology offers a broad education in the life sciences while providing a more specialized understanding of the structure, function and ecology of animals. This major qualifies students for post-graduate work in zoology and other life sciences and provides a sound science background for students wishing to pursue careers in teaching, government service or the private sector.

Major (Honours Program)

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. A minimum total of 20.00 credits is required to complete the major. At least 6.00 science credits must be at the 3000 or 4000 level, 2.00 of which must be at the 4000 level.
0.50 Liberal Education electives

Semester 3
BIOC*2580 [0.50] Introduction to Biochemistry
MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
STAT*2230 [0.50] Biostatistics for Integrative Biology
ZOO*2700 [0.50] Invertebrate Morphology & Evolution
0.50 electives or restricted electives *

Semester 4
BIOC*2580 [0.50] Introduction to Biochemistry
MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
STAT*2230 [0.50] Biostatistics for Integrative Biology
ZOO*2700 [0.50] Invertebrate Morphology & Evolution
1.00 electives or restricted electives *

Semester 5
ZOO*3000 [0.50] Comparative Histology
ZOO*3600 [0.50] Comparative Animal Physiology I
ZOO*3610 [0.25] Lab Studies in Animal Physiology I
ZOO*3700 [0.50] Integrative Biology of Invertebrates
Electives or restricted electives to a maximum of 2.75 total credits in this semester.

Semester 6
BIOL*3060 [0.50] Populations, Communities & Ecosystems
ZOO*3050 [0.50] Developmental Biology
ZOO*3620 [0.50] Comparative Animal Physiology II
ZOO*3630 [0.25] Lab Studies in Animal Physiology II
Electives or restricted electives to a maximum of 2.75 total credits in this semester.

Semester 7
ZOO*4070 [0.50] Animal Behaviour
ZOO*4910 [0.50] Integrative Vertebrate Biology
1.50 electives or restricted electives

Semester 8
2.50 electives or restricted electives
* CIS*1200 is recommended for those needing to improve their computer skills.

Restricted Electives must include:
1. A minimum of 1.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: https://www.uoguelph.ca/bsc/
2. A minimum of 0.50 credits from:
   ZOO*4330 [0.50] Biology of Fishes
   ZOO*4920 [0.25] Lab Studies in Ornithology
   ZOO*4940 [0.25] Lab Studies in Herpetology
   ZOO*4950 [0.25] Lab Studies in Mammalogy
3. A minimum of 0.50 credits from:
   BIOL*4410 [0.75] Field Ecology
   BIOL*4610 [0.75] Arctic Ecology
   BIOL*4700 [0.50] Field Biology
   BIOL*4710 [0.25] Field Biology
   BIOL*4800 [0.50] Field Biology
   BIOL*4810 [0.25] Field Biology
   IBIO*4500 [1.00] Research in Integrative Biology I
   IBIO*4510 [1.00] Research in Integrative Biology II
   IBIO*4521/2 [2.00] Thesis in Integrative Biology
   ZOO*4170 [0.50] Experimental Comparative Animal Physiology
   ZOO*4300 [0.75] Marine Biology and Oceanography

Other field or research courses with approval of faculty advisor.

Credit Summary (20.00 Total Credits)
4.00 - First year science core
8.00 - Required science courses semesters 3 - 8
1.00 - Restricted electives (# 2, and 3 in restricted electives list)
3.00 - Approved Science electives
2.00 - Liberal Education electives (#1 in restricted electives)
3.00 - Free electives - any approved elective for B.Sc. students

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Minor (Honours Program)
Students in majors other than Zoology, Biodiversity, Wildlife Biology & Conservation and Marine & Freshwater Biology who have a strong interest in Zoology may choose to take a minor in Zoology.

A minor in Zoology requires a minimum of 5.00 credits, 4.00 of which must be from the following list:
BIOL*2060 [0.50] Ecology
BIOL*2400 [0.50] Evolution
BIOL*3060 [0.50] Populations, Communities & Ecosystems

* CIS*1200 is recommended for those needing to improve their computer skills.
Bachelor of Science in Agriculture [B.Sc.(Agr.)]
The B.Sc.(Agr.) degree program is a 4 year honours science program designed to provide a fundamental education in the science of agriculture. The curriculum includes courses in the agricultural sciences, the physical, biological and social sciences, and in the arts.

Program Information
Agricultural scientists must be effective communicators and problem solvers, self-directed in their learning, and have a global perspective of the agri-food systems. Students will be involved in co-operative group learning activities and will experience courses that are multidisciplinary and integrate the teaching activities of many faculty and departments. Students will have the option of completing a broad agricultural program (honours agricultural science) or another major in which they take courses towards a more focused subject area. The curriculum provides opportunities for students to select courses that will help them prepare for professional careers as entrepreneurs, scientists, marketing specialists, financial managers, technical advisors, or communication specialists. Students will have a comprehensive understanding of the food system when they graduate. They will be able to integrate their knowledge of production agriculture, environmental management, resource allocation and business management as it applies to the food system nationally and globally.

Students will be encouraged to integrate their academic program with a well-planned series of employment activities in the summer months and to develop their leadership and interpersonal skills on-campus and community activities.

Graduates meet the educational requirements for membership in the Ontario Institute of Agrologists. The Ontario Institute of Agrologists is the professional organization in agriculture in the Province of Ontario. Professional institutes in the various provinces in Canada and the scientific societies in agriculture collectively comprise the Agricultural Institute of Canada. The program received full accreditation from the Agricultural Institute of Canada in April 2007.

B.Sc.(Agr.) Majors:
- Animal Science
- Crop, Horticulture and Turfgrass Science
- Honours Agricultural Science

Declaration of a Major
All students are admitted into an undeclared major upon entry. Students will be required to select a major by semester 3 through consultation with the Program Counsellor and Faculty Advisors. The course requirements are listed for each major in the following section.

Students may, with appropriate approvals, elect to complete Minors associated with another degree programs as listed in the undergraduate calendar.

Honours Minor
A minor is a group of courses which provides for exposure to and mastery of the fundamental principles of a subject. A minor consists of a minimum of 5.00 credits (normally 10 courses). It may also require certain other courses from other areas to be taken along with the specified courses of the minor. A minor is taken in conjunction with a major.

A maximum of 2.50 credits required in a major program may be applied to meet the requirements of a minor.

Students should seek advice from the B.Sc.(Agr.) Program Counsellor about the addition of a minor. Students in the B.Sc.(Agr.) are not eligible for a minor in Agriculture.

Study Abroad
The B.Sc.(Agr.) degree program is similar in many respects to programs offered at faculties of agricultural science in other provinces in Canada. Students are strongly encouraged to consider studying for 1 or 2 semesters in other faculties of agricultural science in Canada and in selected countries around the world.

Students interested in studying at another institution should consult the B.Sc.(Agr.) Program Counsellor to discuss their plans, and refer to the scholarship section for financial support. For more specific information on these opportunities refer to Section V--International Study in this calendar, or contact the OAC Dean's Office.

Doctor of Veterinary Medicine
Students in the B.Sc.(Agr.) program may apply for admission to the D.V.M. program after semester 4 or later. Applications must be submitted to the Admissions Services, Office of Registrarial Services. Students should consult the D.V.M. Section of the calendar. Students who do not gain admission to the D.V.M. program are eligible to continue in the B.Sc.(Agr.) program through to graduation.

Students planning to enter the D.V.M. program are advised to include 12U biology, 12U chemistry, and 12U physics in addition to calculus in secondary school.

Continuation of Study
Students are advised to consult the regulations for continuation of study within the program which are outlined in detail in Section VIII--Undergraduate Degree Regulations & Procedures.

Conditions of Graduation
To qualify for the degree Bachelor of Science (Agriculture), the student must successfully complete a minimum of 20.00 credits as set out in the Schedule of Studies listed below. In addition, students must meet the continuation of study requirements at the time of graduation and have a minimum of 60% cumulative average.

Honours Agriculture (AGRS)
Departments of Plant Agriculture and Animal Biosciences
The Honours Agriculture major combines a core curriculum of agricultural science courses with a wide range of electives focusing on agri-food business, animal and plant production, land stewardship and sustainability. This major allows students to create a curriculum uniquely tailored to their career goals and provides diverse opportunities to explore international agriculture and leading edge agricultural research in animal production, plant biotechnology and pest management. The flexibility provided in semesters 5 and 6 permits students to participate in international exchanges and semesters abroad. Students can also incorporate a variety of field trips, experiential learning in the workplace and independent study into their program of studies. The combination of a solid understanding of life science and current agricultural practice with specialized skills and experience provided by this program is greatly valued by prospective employers in this essential sector of Canada’s economy.

Semester 1
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGR*1110</td>
<td>Introduction to the Agri-Food Systems</td>
<td>1.00</td>
</tr>
<tr>
<td>BIOL*1050</td>
<td>Biology of Plants &amp; Animals in Managed Ecosystems</td>
<td>0.50</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>General Chemistry I</td>
<td>0.50</td>
</tr>
<tr>
<td>MATH*1080</td>
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Semester 2
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<tr>
<td>AGR*2050</td>
<td>Agrocology</td>
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<td>BIOL*1090</td>
<td>Introduction to Molecular and Cellular Biology</td>
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<tr>
<td>CHEM*1050</td>
<td>General Chemistry II</td>
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<tr>
<td>FARE*1400</td>
<td>Economics of the Agri-Food System</td>
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Semester 3
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<tr>
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<td>Animal Production Systems, Health and Industry</td>
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<td>AGR*2470</td>
<td>Introduction to Plant Agriculture</td>
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<tr>
<td>FARE*2700</td>
<td>Survey of Natural Resource Economics</td>
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<tr>
<td>MBG*2400</td>
<td>Fundamentals of Plant and Animal Genetics</td>
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Semester 4
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<td>ANSC*2340</td>
<td>Structure of Farm Animals</td>
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<td>ENV*2040</td>
<td>Plant Health and the Environment</td>
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<td>STAT*2040</td>
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1.00 electives or restricted electives

Semester 5 to 8
Students must choose either Option A (Production and Management) or B (Research).

Option A - Production and Management

Semester 5
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>FOOD*3090</td>
<td>Food Science and Human Nutrition</td>
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2.00 electives or restricted electives

Semester 6
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Semester 7
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Semester 8
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<th>Credits</th>
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<tbody>
<tr>
<td>AGR*4600</td>
<td>Agriculture and Food Issues Problem Solving</td>
<td>1.00</td>
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</table>

1.50 electives or restricted electives

Restricted Electives - Option A
Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

- A minimum of 1.00 credits from the list of restricted electives below:
  - AGR*2500 [0.50] Field Course in International Agriculture
  - AGR*3010 [0.50] Special Studies in Agricultural Science I
  - AGR*3450 [0.50] Research Methods in Agricultural Science
  - AGR*3500 [0.50] Experimental Education I
  - ANSC*4010 [0.50] Animal Welfare Judging and Evaluation
  - ANSC*4230 [0.50] Challenges and Opportunities in Dairy Cattle Production
  - ANSC*4610 [0.50] Critical Analysis in Animal Science
  - CROP*4260 [0.50] Crop Science Field Trip
  - EDRD*2020 [0.50] Interpersonal Communication
  - EDRD*3050 [0.50] Agricultural Communication I
  - EDRD*3140 [0.50] Organizational Communication
  - FARE*3310 [0.50] Operations Management
FAR4*2220 [0.50] Advanced Agribusiness Management
FAR4*3100 [0.50] Resource Economics
FAR4*3460 [0.50] Marketing Research
FAR4*4550 [0.50] Independent Studies I

• A minimum of 2.00 credits from the following lists:

A minimum of 0.50 credits from the following list:
CROP*3300 [0.50] Grain Crops
CROP*3310 [0.50] Protein and Oilseed Crops
CROP*3340 [0.50] Managed Grasslands
ENVS*4090 [0.50] Soil Management
ENVS*4160 [0.50] Soil and Nutrient Management
HORT*2450 [0.50] Introduction to Turfgrass Science
HORT*3150 [0.50] Principles and Applications of Plant Propagation
HORT*4380 [0.50] Tropical and Sub-Tropical Crops
PBIO*3110 [0.50] Crop Physiology
PBIO*3750 [0.50] Plant Tissue Culture

A minimum of 0.50 credits from the following list:
CROP*4240 [0.50] Weed Science
ENVS*3020 [0.50] Pesticides and the Environment
ENVS*3210 [0.50] Plant Pathology
ENVS*3230 [0.50] Agroforestry Systems

A minimum of 0.50 credits from the following list:
ACCT*1220 [0.50] Introductory Financial Accounting
ECON*1050 [0.50] Introductory Microeconomics
ECON*1100 [0.50] Introductory Macroeconomics
ECON*2310 [0.50] Intermediate Microeconomics
FARE*2410 [0.50] Agrifood Markets and Policy
FARE*3170 [0.50] Cost-Benefit Analysis

A minimum of 0.50 credits from the following list:
BIOC*2580 [0.50] Introduction to Biochemistry
BOT*2100 [0.50] Life Strategies of Plants
MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
MBG*3060 [0.50] Quantitative Genetics
OAGR*2070 [1.00] Introduction to Organic Agriculture

Students may also take any of the following courses as restricted electives:
BIOC*2580 [0.50] Introduction to Biochemistry
BOT*2100 [0.50] Life Strategies of Plants
MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
MBG*3060 [0.50] Quantitative Genetics
OAGR*2070 [1.00] Introduction to Organic Agriculture

• A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to Program Counsellor for list of agricultural science courses.

• A humanities or social science courses (0.50 credits) at the 1000-level or above. See Program Counsellor for acceptable list of courses.

Option B - Research

Semester 5
AGR*3450 [0.50] Research Methods in Agricultural Science
FOOD*3090 [0.50] Food Science and Human Nutrition
1.50 electives or restricted electives

Semester 6
2.50 electives or restricted electives

Semester 7
AGR*4450 [1.00] Research Project I
1.50 electives or restricted electives

Semester 8
AGR*4460 [1.00] Research Project II
1.50 electives or restricted electives

Restricted Electives - Option B

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. minimum of 2.00 credits from the list of restricted electives below:

A minimum of 0.50 credits from the following list:
CROP*3300 [0.50] Grain Crops
CROP*3310 [0.50] Protein and Oilseed Crops
CROP*3340 [0.50] Managed Grasslands
ENVS*4090 [0.50] Soil Management
ENVS*4160 [0.50] Soil and Nutrient Management
HORT*2450 [0.50] Introduction to Turfgrass Science
HORT*3150 [0.50] Principles and Applications of Plant Propagation
HORT*4380 [0.50] Tropical and Sub-Tropical Crops
PBIO*3110 [0.50] Crop Physiology
PBIO*3750 [0.50] Plant Tissue Culture

A minimum of 0.50 credits from the following list:
CROP*4240 [0.50] Weed Science
ENVS*3020 [0.50] Pesticides and the Environment
ENVS*3210 [0.50] Plant Pathology
ENVS*3230 [0.50] Agroforestry Systems

A minimum of 0.50 credits from the following list:
ECON*1050 [0.50] Introductory Microeconomics
ECON*1100 [0.50] Introductory Macroeconomics
ECON*2310 [0.50] Intermediate Microeconomics
FARE*2410 [0.50] Agrifood Markets and Policy
FARE*3170 [0.50] Cost-Benefit Analysis

Students may also take any of the following courses as restricted electives:
BIOC*2580 [0.50] Introduction to Biochemistry
BOT*2100 [0.50] Life Strategies of Plants
MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
MBG*3060 [0.50] Quantitative Genetics
OAGR*2070 [1.00] Introduction to Organic Agriculture

2. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to Program Counsellor for list of agricultural science courses.

3. A humanities or social science courses (0.50 credits) at the 1000-level or above. See Program Counsellor for acceptable list of courses.

Agriculture (AGR)

OAC Dean’s Office

Minor (Honours Program)

The requirement of 5.00 credits for the minor is divided into three groups of courses: required courses and two lists of restricted electives. Students should ensure that they obtain the necessary prerequisites for required and restricted elective courses. Students should seek academic counselling from the B.Sc.(Agr) Program Counsellor early in their program. This minor is not open to students in the B.Sc.(Agr) Program.

Minor

A minimum of 5.00 credits is required including:
AGR*1110 [1.00] Introduction to the Agri-Food Systems

1.50 credits from the following Restricted Elective list:
AGR*2050 [0.50] Agricology
AGR*2320 [0.50] Soils in Agroecosystems
AGR*2350 [0.50] Animal Production Systems, Health and Industry
AGR*2470 [0.50] Introduction to Plant Agriculture
AGR*2500 [0.50] Field Course in International Agriculture
EDRD*3400 [0.50] Sustainable Communities
FARE*1400 [1.00] Economics of the Agri-Food System
FOOD*3090 [0.50] Food Science and Human Nutrition

2.50 credits from the following Restricted Elective list, without regard to group:
Note: At least 0.50 credits from the following list must be at the 4000 level and 1.00 credits at the 3000 level or higher.

Agronomy:
CROP*3300 [0.50] Grain Crops
CROP*3310 [0.50] Protein and Oilseed Crops
CROP*3340 [0.50] Managed Grasslands
CROP*4220 [0.50] Cropping Systems
HORT*4380 [0.50] Tropical and Sub-Tropical Crops
PBIO*3110 [0.50] Crop Physiology

Animal Science:
ANSC*1210 [1.00] Principles of Animal Care and Welfare
ANSC*2330 [0.50] Horse Management Science
ANSC*2340 [0.50] Structure of Farm Animals
ANSC*3080 [0.50] Agricultural Animal Physiology
MBG*2400 [0.50] Fundamentals of Plant and Animal Genetics
MBG*3060 [0.50] Quantitative Genetics

Environmental Biology:
ENVS*2040 [0.50] Plant Health and the Environment
ENVS*3020 [0.50] Pesticides and the Environment
ENVS*3040 [0.50] Natural Chemicals in the Environment
ENVS*3210 [0.50] Plant Pathology
ENVS*4100 [0.50] Integrated Management of Invasive Insect Pests

Horticultural Science:
HORT*3150 [0.50] Principles and Applications of Plant Propagation
HORT*3280 [0.50] Greenhouse Production
HORT*4300 [0.50] Postharvest Physiology
PBIO*3110 [0.50] Crop Physiology
PBIO*3750 [0.50] Plant Tissue Culture

Resource Management:
ENVS*2120 [0.50] Introduction to Environmental Stewardship
ENVS*2030 [0.50] Meteorology and Climatology
ENVS*3050 [0.50] Microclimatology
ENVS*3080 [0.50] Soil and Water Conservation
ENVS*4090 [0.50] Soil Management
ENVS*4160 [0.50] Soil and Nutrient Management

OAC Dean’s Office

Last Revision: July 4, 2019

2019-2020 Undergraduate Calendar

X. Degree Programs, Bachelor of Science in Agriculture [B.Sc.(Agr.)]
### Animal Science (ANSC)

**Department of Animal Biosciences, Ontario Agricultural College**

The animal science curriculum is designed to provide a broad opportunity to study animal physiology, nutrition, genetics, behaviour and welfare across a range of large and small domestic animal species. The program is designed around an option to follow a Production and Management focus or a Research focus in semesters 5-8 with additional flexibility to allow for a semester of study abroad.

#### Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
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<tbody>
<tr>
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<td>1.00</td>
<td>Introduction to the Agri-Food Systems</td>
</tr>
<tr>
<td>BIOL*1050</td>
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<td>Biology of Plants &amp; Animals in Managed Ecosystems</td>
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<tr>
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#### Semester 2

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<td>Introduction to Molecular and Cellular Biology</td>
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<td>CHEM*1050</td>
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<td>General Chemistry II</td>
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<td>FARE*1400</td>
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#### Semester 3

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<tr>
<td>AGR*2320</td>
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<td>Soils in Agroecosystems</td>
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<td>AGR*2350</td>
<td>0.50</td>
<td>Animal Production Systems, Health and Industry</td>
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<tr>
<td>AGR*2470</td>
<td>0.50</td>
<td>Introduction to Plant Agriculture</td>
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<tr>
<td>MBG*2400</td>
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<td>Fundamentals of Plant and Animal Genetics</td>
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One of:

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<tr>
<td>FARE*2700</td>
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<td>Survey of Natural Resource Economics</td>
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<tr>
<td>MBG*2040</td>
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<td>Foundations in Molecular Biology and Genetics</td>
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#### Semester 4

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<td>Principles of Animal Care and Welfare</td>
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<td>ANSC*2340</td>
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<td>Structure of Farm Animals</td>
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<tr>
<td>BIOC*2580</td>
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<td>Introduction to Biochemistry</td>
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<td>STAT*2040</td>
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#### Semester 5 to 8

Students must choose either Option A (Production and Management) or B (Research).

**Option A - Production and Management**

#### Semester 5

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<td>ANSC*3120</td>
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<td>NUTR*3210</td>
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1.00 electives or restricted electives

#### Semester 6

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<td>Animal Reproduction</td>
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<td>ANSC*3270</td>
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<td>Animal Disorders</td>
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<td>MBG*3060</td>
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<td>Quantitative Genetics</td>
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1.00 electives or restricted electives

#### Semester 7

2.50 electives or restricted electives

#### Semester 8

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<tr>
<td>AGR*4600</td>
<td>1.00</td>
<td>Agriculture and Food Issues Problem Solving</td>
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1.50 electives or restricted electives

**Restricted Electives - Option A**

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. A minimum of 1.00 credits from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGR*2500</td>
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<td>Field Course in International Agriculture</td>
</tr>
<tr>
<td>AGR*3010</td>
<td>0.50</td>
<td>Special Studies in Agricultural Science</td>
</tr>
<tr>
<td>AGR*3450</td>
<td>0.50</td>
<td>Research Methods in Agricultural Science</td>
</tr>
<tr>
<td>AGR*3500</td>
<td>0.50</td>
<td>Experiential Education I</td>
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<td>ANSC*4010</td>
<td>0.50</td>
<td>Animal Welfare Judging and Evaluation</td>
</tr>
<tr>
<td>ANSC*4230</td>
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<td>Challenges and Opportunities in Dairy Cattle</td>
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<tr>
<td>ANSC*4610</td>
<td>0.50</td>
<td>Critical Analysis in Animal Science</td>
</tr>
<tr>
<td>CROP*4260</td>
<td>0.50</td>
<td>Crop Science Field Trip</td>
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<td>EDRD*2020</td>
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<td>Interpersonal Communication</td>
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<td>EDRD*3050</td>
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<td>Agricultural Communication I</td>
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<td>EDRD*3140</td>
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<td>Organizational Communication</td>
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<tr>
<td>FARE*3310</td>
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<td>Operations Management</td>
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<tr>
<td>FARE*4220</td>
<td>0.50</td>
<td>Advanced Agribusiness Management</td>
</tr>
<tr>
<td>FARE*4310</td>
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<td>Resource Economics</td>
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#### Semester 9

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<tbody>
<tr>
<td>ANSC*4700</td>
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<td>Research in Animal Biology</td>
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<tr>
<td>ANSC*4710</td>
<td>0.50</td>
<td>Research in Animal Biology II</td>
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#### Semester 10

2.50 electives or restricted electives

**Restricted Electives - Option B**

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. A minimum of 1.00 credits from the following list (normally to be taken during semesters 7 and 8):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>ANSC*4350</td>
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<td>Experiments in Animal Biology</td>
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<tr>
<td>ANSC*4610</td>
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<td>Critical Analysis in Animal Science</td>
</tr>
<tr>
<td>ANSC*4700</td>
<td>0.50</td>
<td>Research in Animal Biology</td>
</tr>
<tr>
<td>ANSC*4710</td>
<td>0.50</td>
<td>Research in Animal Biology II</td>
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</table>

2. A minimum of 3.00 credits is required from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>ANSC*4050</td>
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<td>Biotechnology in Animal Science</td>
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<tr>
<td>MBG*4020</td>
<td>0.50</td>
<td>Genetics of Companion Animals</td>
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<tr>
<td>MBG*4030</td>
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<td>Animal Breeding Methods and Applications</td>
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</tbody>
</table>

A minimum of 0.50 credits from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
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</thead>
<tbody>
<tr>
<td>ANSC*3170</td>
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<td>Nutrition of Fish and Crustacea</td>
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<tr>
<td>ANSC*3180</td>
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<td>Wildlife Nutrition</td>
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<td>ANSC*3420</td>
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<td>Beef Cattle Nutrition</td>
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<tr>
<td>ANSC*4270</td>
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<td>Dairy Cattle Nutrition</td>
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<td>ANSC*4280</td>
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<td>Poultry Nutrition</td>
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<td>ANSC*4290</td>
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<td>Swine Nutrition</td>
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<td>ANSC*4470</td>
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<td>Animal Metabolism</td>
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<td>ANSC*4560</td>
<td>0.50</td>
<td>Pet Nutrition</td>
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<tr>
<td>EQN*4020</td>
<td>0.50</td>
<td>Advanced Equine Nutrition</td>
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</tbody>
</table>

A minimum of 1.00 credits from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC*3090</td>
<td>0.50</td>
<td>Vertebrate Ethology</td>
</tr>
<tr>
<td>ANSC*4090</td>
<td>0.50</td>
<td>Applied Animal Behaviour</td>
</tr>
<tr>
<td>ANSC*4100</td>
<td>0.50</td>
<td>Applied Environmental Physiology and Animal Housing</td>
</tr>
<tr>
<td>ANSC*4490</td>
<td>0.50</td>
<td>Applied Endocrinology</td>
</tr>
<tr>
<td>ANSC*4650</td>
<td>0.50</td>
<td>Comparative Immunology</td>
</tr>
<tr>
<td>EQN*3050</td>
<td>0.50</td>
<td>Equine Exercise Physiology</td>
</tr>
</tbody>
</table>

3. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level.

Refer to Program Counsellor for list of agricultural science courses.

4. A humanities or social science courses (0.50 credits) at the 1000-level or above. See Program Counsellor for acceptable list of courses.
Crop, Horticulture and Turfgrass Sciences (CHAT)

Department of Plant Agriculture, Ontario Agricultural College

The Crop, Horticultural and Turfgrass Sciences major is for students who want to apply the latest advancements in the biological sciences to contemporary problems in the plant production industries. This major is appropriate for students with a focus on the production of field crops for food, fuel or biomaterials, management of today’s advanced commercial greenhouses, horticultural production, breeding improved crop varieties, or using turfgrass and other plant species to enhance urban environments. The flexibility provided in semester 6 permits students to participate in international exchanges and semesters abroad. Students can also incorporate a variety of field trips, experiential learning in the workplace and independent study into their program of studies.

Semester 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGR*1110</td>
<td>1.00</td>
<td>Introduction to the Agri-Food Systems</td>
</tr>
<tr>
<td>BIOL*1050</td>
<td>0.50</td>
<td>Biology of Plants &amp; Animals in Managed Ecosystems</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>0.50</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>0.50</td>
<td>Elements of Calculus I</td>
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Semester 2

<table>
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<tr>
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<tbody>
<tr>
<td>AGR*2050</td>
<td>0.50</td>
<td>Agroecology</td>
</tr>
<tr>
<td>BIOL*1090</td>
<td>0.50</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>0.50</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>FARE*1400</td>
<td>1.00</td>
<td>Economics of the Agri-Food System</td>
</tr>
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</table>

Semester 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>AGR*2320</td>
<td>0.50</td>
<td>Soils in Agroecosystems</td>
</tr>
<tr>
<td>AGR*2350</td>
<td>0.50</td>
<td>Animal Production Systems, Health and Industry</td>
</tr>
<tr>
<td>AGR*2470</td>
<td>0.50</td>
<td>Introduction to Plant Agriculture</td>
</tr>
<tr>
<td>FARE*2700</td>
<td>0.50</td>
<td>Survey of Natural Resource Economics</td>
</tr>
<tr>
<td>MBG*2400</td>
<td>0.50</td>
<td>Fundamentals of Plant and Animal Genetics</td>
</tr>
</tbody>
</table>

Semester 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC*2580</td>
<td>0.50</td>
<td>Introduction to Biochemistry</td>
</tr>
<tr>
<td>BOT*2100</td>
<td>0.50</td>
<td>Life Strategies of Plants</td>
</tr>
<tr>
<td>ENV*2040</td>
<td>0.50</td>
<td>Plant Health and the Environment</td>
</tr>
<tr>
<td>STAT*2040</td>
<td>0.50</td>
<td>Statistics I</td>
</tr>
</tbody>
</table>

Semester 5 to 8

Students must choose either Option A (Production and Management) or B (Research).

Option A - Production and Management

Semester 5

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD*3090</td>
<td>0.50</td>
<td>Food Science and Human Nutrition</td>
</tr>
</tbody>
</table>

Semester 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBIO*3110</td>
<td>0.50</td>
<td>Crop Physiology</td>
</tr>
</tbody>
</table>

Semester 7

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENV*4090</td>
<td>0.50</td>
<td>Soil Management</td>
</tr>
<tr>
<td>ENV*4160</td>
<td>0.50</td>
<td>Soil and Nutrient Management</td>
</tr>
</tbody>
</table>

Semester 8

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGR*4600</td>
<td>1.00</td>
<td>Agriculture and Food Issues Problem Solving</td>
</tr>
</tbody>
</table>

Restricted Electives - Option A

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. A minimum of 1.00 credits from the following list:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGR*3010</td>
<td>0.50</td>
<td>Special Studies in Agricultural Science</td>
</tr>
<tr>
<td>AGR*3450</td>
<td>0.50</td>
<td>Research Methods in Agricultural Science</td>
</tr>
<tr>
<td>AGR*3500</td>
<td>0.50</td>
<td>Experiential Education I</td>
</tr>
</tbody>
</table>

2. Students must select a minimum of 3.00 credits from the below, without regard to group. Courses are organized into three subject areas only to provide guidance to students who wish to concentrate in a particular area of plant agriculture.

Crop Science:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGR*3500</td>
<td>0.50</td>
<td>Field Course in International Agriculture</td>
</tr>
<tr>
<td>CROP*3300</td>
<td>0.50</td>
<td>Grain Crops</td>
</tr>
<tr>
<td>CROP*3310</td>
<td>0.50</td>
<td>Protein and Oilseed Crops</td>
</tr>
<tr>
<td>CROP*3340</td>
<td>0.50</td>
<td>Managed Grasslands</td>
</tr>
<tr>
<td>CROP*4220</td>
<td>0.50</td>
<td>Cropping Systems</td>
</tr>
<tr>
<td>CROP*4240</td>
<td>0.50</td>
<td>Weed Science</td>
</tr>
<tr>
<td>ENV*3080</td>
<td>0.50</td>
<td>Soil and Water Conservation</td>
</tr>
<tr>
<td>ENV*3210</td>
<td>0.50</td>
<td>Plant Pathology</td>
</tr>
<tr>
<td>ENV*4100</td>
<td>0.50</td>
<td>Integrated Management of Invasive Insect Pests</td>
</tr>
<tr>
<td>HORT*4380</td>
<td>0.50</td>
<td>Tropical and Sub-Tropical Crops</td>
</tr>
<tr>
<td>MBG*2040</td>
<td>0.50</td>
<td>Foundations in Molecular Biology and Genetics</td>
</tr>
<tr>
<td>MBG*3100</td>
<td>0.50</td>
<td>Plant Genetics</td>
</tr>
<tr>
<td>MBG*4160</td>
<td>0.50</td>
<td>Plant Breeding</td>
</tr>
<tr>
<td>OAGR*2070</td>
<td>1.00</td>
<td>Introduction to Organic Agriculture</td>
</tr>
<tr>
<td>OAGR*4050</td>
<td>1.00</td>
<td>Design of Organic Production Systems</td>
</tr>
<tr>
<td>PBIO*3750</td>
<td>0.50</td>
<td>Plant Tissue Culture</td>
</tr>
<tr>
<td>PBIO*4070</td>
<td>0.50</td>
<td>Biological and Cultural Control of Plant Diseases</td>
</tr>
<tr>
<td>PBIO*4750</td>
<td>0.50</td>
<td>Genetic Engineering of Plants</td>
</tr>
</tbody>
</table>

Horticultural Science:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CROP*4240</td>
<td>0.50</td>
<td>Weed Science</td>
</tr>
<tr>
<td>ENV*3210</td>
<td>0.50</td>
<td>Plant Pathology</td>
</tr>
<tr>
<td>ENV*4100</td>
<td>0.50</td>
<td>Integrated Management of Invasive Insect Pests</td>
</tr>
<tr>
<td>HORT*2450</td>
<td>0.50</td>
<td>Introduction to Turfgrass Science</td>
</tr>
<tr>
<td>HORT*3010</td>
<td>0.50</td>
<td>Annual, Perennial and Indoor Plants - Identification and Use</td>
</tr>
<tr>
<td>HORT*3150</td>
<td>0.50</td>
<td>Principles and Applications of Plant Propagation</td>
</tr>
<tr>
<td>HORT*3270</td>
<td>0.50</td>
<td>Medicinal Plants</td>
</tr>
<tr>
<td>HORT*3280</td>
<td>0.50</td>
<td>Greenhouse Production</td>
</tr>
<tr>
<td>HORT*3310</td>
<td>0.50</td>
<td>Plants, Food and Health</td>
</tr>
<tr>
<td>HORT*3510</td>
<td>0.50</td>
<td>Vegetable Production</td>
</tr>
<tr>
<td>HORT*4300</td>
<td>0.50</td>
<td>Forage Production</td>
</tr>
<tr>
<td>HORT*4420</td>
<td>0.50</td>
<td>Fruit Crops</td>
</tr>
<tr>
<td>MBG*2040</td>
<td>0.50</td>
<td>Foundations in Molecular Biology and Genetics</td>
</tr>
<tr>
<td>MBG*3100</td>
<td>0.50</td>
<td>Plant Genetics</td>
</tr>
<tr>
<td>MBG*4160</td>
<td>0.50</td>
<td>Plant Breeding</td>
</tr>
<tr>
<td>PBIO*3750</td>
<td>0.50</td>
<td>Plant Tissue Culture</td>
</tr>
<tr>
<td>PBIO*4070</td>
<td>0.50</td>
<td>Biological and Cultural Control of Plant Diseases</td>
</tr>
<tr>
<td>PBIO*4750</td>
<td>0.50</td>
<td>Genetic Engineering of Plants</td>
</tr>
</tbody>
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Turfgrass Science:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CROP*4240</td>
<td>0.50</td>
<td>Weed Science</td>
</tr>
<tr>
<td>ENV*3020</td>
<td>0.50</td>
<td>Pesticides and the Environment</td>
</tr>
<tr>
<td>ENV*3310</td>
<td>0.50</td>
<td>Management of Turfgrass Diseases</td>
</tr>
<tr>
<td>HORT*2450</td>
<td>0.50</td>
<td>Introduction to Turfgrass Science</td>
</tr>
<tr>
<td>HORT*3050</td>
<td>0.50</td>
<td>Management of Turfgrass Insect Pests and Weeds</td>
</tr>
<tr>
<td>HORT*4200</td>
<td>0.50</td>
<td>Plants, the Environment and Society</td>
</tr>
<tr>
<td>HORT*4450</td>
<td>0.50</td>
<td>Advanced Turfgrass Science</td>
</tr>
</tbody>
</table>

3. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to Program Counsellor for list for agricultural

4. A humanities or social science courses (0.50 credits) at the 1000-level or above from the College of Arts or College of Social and Applied Human Sciences. See Program Counsellor for acceptable list of courses.

Option B - Research

Semester 5

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGR*3450</td>
<td>0.50</td>
<td>Research Methods in Agricultural Science</td>
</tr>
<tr>
<td>FOOD*3090</td>
<td>0.50</td>
<td>Food Science and Human Nutrition</td>
</tr>
</tbody>
</table>

Semester 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBIO*3110</td>
<td>0.50</td>
<td>Crop Physiology</td>
</tr>
</tbody>
</table>

Semester 7

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENV*4090</td>
<td>0.50</td>
<td>Soil Management</td>
</tr>
<tr>
<td>ENV*4160</td>
<td>0.50</td>
<td>Soil and Nutrient Management</td>
</tr>
</tbody>
</table>

Last Revision: July 4, 2019

2019-2020 Undergraduate Calendar
1.00 electives or restricted electives

Semester 8

AGR*4460 [1.00] Research Project II

1.50 electives or restricted electives

**Restricted Electives - Option B**

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. During semesters 4-8 students must select a minimum of 3.00 credits from the lists of restricted electives below, without regard to group. Courses are organized into three subject areas only to provide guidance to students who wish to concentrate in a particular area of plant agriculture.

**Crop Science:**
- AGR*2500 [0.50] Field Course in International Agriculture
- CROP*3310 [0.50] Grain Crops
- CROP*3340 [0.50] Protein and Oilseed Crops
- CROP*4220 [0.50] Managed Grasslands
- CROP*4240 [0.50] Cropping Systems
- ENVS*3080 [0.50] Weed Science
- ENVS*3210 [0.50] Soil and Water Conservation
- ENVS*4100 [0.50] Integrated Management of Invasive Insect Pests
- HORT*4380 [0.50] Tropical and Sub-Tropical Crops
- MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
- MBG*3100 [0.50] Plant Genetics
- MBG*4160 [0.50] Plant Breeding
- OAGR*2070 [1.00] Introduction to Organic Agriculture
- OAGR*4050 [1.00] Design of Organic Production Systems
- PBIO*4050 [1.00] Design of Organic Production Systems
- PBIO*4070 [0.50] Biological and Cultural Control of Plant Diseases
- PBIO*4750 [0.50] Genetic Engineering of Plants

**Horticultural Science:**
- CROP*4240 [0.50] Weed Science
- ENVS*3210 [0.50] Plant Pathology
- ENVS*4100 [0.50] Integrated Management of Invasive Insect Pests
- HORT*2450 [0.50] Introduction to Turfgrass Science
- HORT*3010 [0.50] Annual, Perennial and Indoor Plants - Identification and Use
- HORT*3150 [0.50] Principles and Applications of Plant Propagation
- HORT*3270 [0.50] Medicinal Plants
- HORT*3280 [0.50] Greenhouse Production
- HORT*3310 [0.50] Plants, Food and Health
- HORT*3510 [0.50] Vegetable Production
- HORT*4300 [0.50] Postharvest Physiology
- HORT*4420 [0.50] Fruit Crops
- MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
- MBG*3100 [0.50] Plant Genetics
- MBG*4160 [0.50] Plant Breeding
- PBIO*3750 [0.50] Plant Tissue Culture
- PBIO*4070 [0.50] Biological and Cultural Control of Plant Diseases
- PBIO*4750 [0.50] Genetic Engineering of Plants

**Turfgrass Science:**
- CROP*4240 [0.50] Weed Science
- ENVS*3020 [0.50] Pesticides and the Environment
- ENVS*3140 [0.50] Management of Turfgrass Diseases
- HORT*2450 [0.50] Introduction to Turfgrass Science
- HORT*3050 [0.50] Management of Turfgrass Insect Pests and Weeds
- HORT*4200 [0.50] Plants, the Environment and Society
- HORT*4450 [0.50] Advanced Turfgrass Science

2. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to the Program Counsellor for the list of agricultural science courses.

3. A humanities or social science courses (0.50 credits) at the 1000-level or above from the College of Arts or College of Social and Applied Human Sciences. See Program Counsellor for acceptable list of courses.

**Business Electives:**

Students in either Option A or Option B who wish to add business courses to their program are advised to select courses from the following list:

- FARE*3310 [0.50] Operations Management
- FARE*4220 [0.50] Advanced Agribusiness Management
- FARE*4240 [0.50] Futures and Options Markets
- FARE*4370 [0.50] Food & Agri Marketing Management
- MGMT*3320 [0.50] Financial Management
Bachelor of Science in Environmental Sciences  
[B.Sc.(Env.)]

Program Information

Objectives of the Program

The Environmental Sciences program is designed to provide a strong interdisciplinary grounding in specific environmental sciences including the socioeconomic context in which environmental issues are resolved.

There is an emphasis on management and decision-making skills for the application of scientific knowledge to environmental problems, and the evaluation of appropriate environmental policies. A practical perspective based on defining and resolving problems is central to the program, and this is often done in the context of group work. 

Substantial emphasis is placed on communication skills, including the development of competence in both written and oral presentations. These skills will be progressively developed in core courses from the first to the fourth year. Students in the final year of their program will be expected to take part in more intensive communication skill development. Graduates will seek employment in a range of fields, from government agencies to private industry and research.

Academic Counselling

General information on the degree program is available from the Program Counsellor. Advising for each major is available through the assigned faculty advisor responsible for the major. Students are encouraged to seek the advice of the faculty advisors when choosing restricted electives and planning course selections.

Degree

The degree granted for the successful completion of this honours program will be the Bachelor of Science in Environmental Sciences--B.Sc.(Env.).

Continuation of Study

Students are advised to consult the regulations for Continuation of Study in Section VIII--Undergraduate Degree Regulations and Procedures of this Calendar.

Conditions for Graduation

In order to graduate from the B.Sc.(Env.) program, students must successfully complete a minimum of 20.00 credits including all the stated course requirements for the program. As well, students must achieve a cumulative average of 60% or higher over all course attempts.

Environmental Sciences (Co-op)

A 5-year Honours Program in Environmental Sciences is offered as a Co-operative Education Program. This option is offered within the B.Sc. (Env.) degree and is available to all majors. The course requirements are the same as those listed for the regular B.Sc. (Env.) program, by the Co-operative Education Program and as outlined in the Continuation of Study policy (Section VIII--Undergraduate Degree Regulations & Procedures).

3 co-op work terms (COOP*1000, COOP*2000, COOP*3000) are required. An optional 4th co-op work term (COOP*4000) is available. COOP*1100 must be completed during semester 2.

Environmental Sciences Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Term 1</td>
<td>Academic Term 2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Academic Term 3</td>
<td>COOP*1000</td>
<td>Academic Term 4</td>
</tr>
<tr>
<td>3</td>
<td>COOP*2000</td>
<td>Academic Term 5</td>
<td>COOP*3000</td>
</tr>
<tr>
<td>4</td>
<td>Academic Term 6</td>
<td>Academic Term 7</td>
<td>COOP*4000 (Optional)</td>
</tr>
<tr>
<td>5</td>
<td>Academic Term 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Since some of the course requirements in the degree program (core or major) are not offered each semester, careful planning and program consultation with the Faculty Co-op Advisor is essential. In particular, students are encouraged to seek advice when choosing for their Summer academic semester.

The Environmental Sciences Program

The degree in Environmental Sciences consists of a minimum of 20.00 credits, as follows:

1. 7.00 Environmental Sciences Core
2. 8.50 - 11.00 Environmental Sciences prescribed and restricted electives according to major.
3. 3. free electives

Within these courses, students must include at least 6.00 credits at the 3000 or 4000 level, and no program may include more than 7.00 credits at the 1000 level.

* There are not specific subject requirements for the elective courses, however, you may NOT select the following: BIOL*1500, BOT*1200, CHEM*1100, CIS*1000, ENVS*1060, GEOL*1100, MIRC*1020, MBG*1000, PHYS*1600.

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

First Year Curriculum

The first year courses have been selected to provide students with sufficient background and knowledge to enter any one of the Environmental Sciences majors.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BIOL*1070</td>
<td>0.50</td>
<td>Discovering Biodiversity</td>
</tr>
<tr>
<td></td>
<td>CHEM*1040</td>
<td>0.50</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td></td>
<td>ENVS*1030</td>
<td>1.00</td>
<td>Introduction to Environmental Sciences</td>
</tr>
<tr>
<td></td>
<td>MATH*1080</td>
<td>0.50</td>
<td>Elements of Calculus I</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>BIOL*1090</td>
<td>0.50</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td></td>
<td>CHEM*1050</td>
<td>0.50</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td></td>
<td>FARE*1040</td>
<td>1.00</td>
<td>Intro to Environmental Economics, Law &amp; Policy</td>
</tr>
<tr>
<td></td>
<td>GEOG*1300</td>
<td>0.50</td>
<td>Introduction to the Biophysical Environment</td>
</tr>
</tbody>
</table>

Note: Co-op students must select COOP*1100 Introduction to Co-operative Education

Environmental Sciences Core

In addition to the common first year curriculum, students are required to take the following core Environmental Sciences courses in the semesters recommended in the schedule of studies:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ENVS*4001</td>
<td>0.50</td>
<td>Project in Environmental Sciences</td>
</tr>
<tr>
<td></td>
<td>ENVS*4002</td>
<td>0.50</td>
<td>Project in Environmental Sciences</td>
</tr>
</tbody>
</table>

One of:  
- ECON*2100 | 0.50 | Economic Growth and Environmental Quality |
- FARE*2700 | 0.50 | Survey of Natural Resource Economics |
- GEOG*2210 | 0.50 | Environment and Resources |

A required statistics course is prescribed by the student’s choice of major.

Environmental Sciences Majors

Ecology

Environment and Resource Management

Environmental Economics and Policy

Environmental Sciences

Requirements for each of these majors are described in the detailed schedules of studies below.

Ecology (ECOL)

Department of Integrative Biology, College of Biological Science

This program provides a solid foundation in the principles of ecology, training in both pure and applied aspects of ecology and an introduction to economic, legal and policy issues related to the management of the environment. From the 2nd year on, students increasingly augment the core in ecology and policy with extensive restricted electives choices that allow the student to tailor the program to their interests. The major provides a sound science background for careers in conservation, resource management, ecological consulting, or nature interpretation used in teaching, government, non-government or the private sector; or for further post-graduate training in fundamental ecology, environmental biology and environmental management or policy.

Major

<table>
<thead>
<tr>
<th>Semester</th>
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<th>Credits</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>1</td>
<td>BIOL*1070</td>
<td>0.50</td>
<td>Discovering Biodiversity</td>
</tr>
<tr>
<td></td>
<td>CHEM*1040</td>
<td>0.50</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td></td>
<td>ENVS*1030</td>
<td>1.00</td>
<td>Introduction to Environmental Sciences</td>
</tr>
<tr>
<td></td>
<td>MATH*1080</td>
<td>0.50</td>
<td>Elements of Calculus I</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>BIOL*1090</td>
<td>0.50</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td></td>
<td>CHEM*1050</td>
<td>0.50</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td></td>
<td>FARE*1040</td>
<td>1.00</td>
<td>Intro to Environmental Economics, Law &amp; Policy</td>
</tr>
<tr>
<td></td>
<td>GEOG*1300</td>
<td>0.50</td>
<td>Introduction to the Biophysical Environment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>BIOL*2060</td>
<td>0.50</td>
<td>Ecology</td>
</tr>
</tbody>
</table>

One of:  
- PHYS*1080 | 0.50 | Physics for Life Sciences |
- PHYS*1300 | 0.50 | Fundamentals of Physics |

One of:  
- ECON*2100 | 0.50 | Economic Growth and Environmental Quality |
- FARE*2700 | 0.50 | Survey of Natural Resource Economics |

Note: Students lacking 4U physics or equivalent must take PHYS*1300. Students with 4U physics or equivalent must take PHYS*1080. PHYS*1130 may be substituted for PHYS*1080.

Note: GEOG*2210 may be substituted for ECON*2100 or FARE*2700 and would be taken in semester 4.
Students in the Ecology Major are required to take an additional 5.50 restricted credits in Ecology as noted below. Of these, at least 1.00 credits must be at the 4000 level.

1. A minimum of 0.50 credits from:
   - BIOL*4150 [0.50] Wildlife Conservation and Management
   - CIS*1500 [0.50] Introduction to Programming
   - GEOG*2420 [0.50] The Earth From Space
   - GEOG*2480 [0.50] Mapping and GIS
   - GEOG*3420 [0.50] Remote Sensing of the Environment *
   - GEOG*3480 [0.50] GIS and Spatial Analysis *
   - GEOG*4480 [1.00] Applied Geomatics *
   * Additional prerequisites are required.

2. Students in the Ecology Major are required to take an additional 5.00 restricted elective credits from the following lists. Some courses may require other courses from the list as prerequisites.

   **Ecology**
   - ANSC*3180 [0.50] Wildlife Nutrition
   - BIOL*3450 [0.50] Introduction to Aquatic Environments
   - BOT*3050 [0.50] Plant Functional Ecology
   - ENVS*3030 [0.50] Climate Change Biology
   - ENVS*3270 [0.50] Forest Biodiversity
   - ENVS*3290 [0.50] Waterborne Disease Ecology
   - ENVS*4350 [0.50] Forest Ecology
   - GEOG*3020 [0.50] Geomorphology
   - GEOG*2110 [0.50] Climate and the Biophysical Environment
   - GEOG*5000 [0.50] Fluvial Processes
   - GEOG*3610 [0.50] Environmental Hydrology
   - NUTR*3210 [0.50] Fundamentals of Nutrition
   - ZOO*4570 [0.50] Marine Ecological Processes
   - BIO*4120 [0.50] Evolutionary Ecology
   - BIO*4150 [0.50] Wildlife Conservation and Management
   - BIO*4350 [0.50] Limnology of Natural and Polluted Waters
   - ENVS*2040 [0.50] Plant Health and the Environment
   - ENVS*2330 [0.50] Current Issues in Ecosystem Science and Biodiversity
   - ENVS*3000 [0.50] Nature Interpretation
   - ENVS*3010 [0.50] Climate Change Biology
   - GEOG*2480 [0.50] Mapping and GIS
   - GEOG*3020 [0.50] Global Environmental Change
   - GEOG*3110 [0.50] Biotic and Natural Resources
   - GEOG*3210 [0.50] Management of the Biophysical Environment
   - GEOG*3480 [0.50] GIS and Spatial Analysis
   - GEOG*4110 [1.00] Environmental Systems Analysis
   - GEOG*4230 [0.50] Environmental Impact Assessment
   - GEOG*4480 [1.00] Applied Geometrics

Credit Summary (21.50 Total Credits)*
7.00 credits - Environmental Sciences core
5.00 credits - Ecology Required courses
5.50 credits - Ecology Restricted electives
2.50 credits - Free electives

Students are reminded that 6.00 credits of their B.Sc. (Env.) degree must be at the 3000-4000 level.

Students are encouraged to seek advice on their choices from their faculty advisor. With prior approval, students may be able to use courses not on these lists towards their Ecology restrictive electives.

**Ecology (ECOL:C)**

Department of Integrative Biology, College of Biological Science

This program provides a solid foundation in the principles of ecology, training in both pure and applied aspects of ecology and an introduction to economic, legal and policy issues related to the management of the environment. From the 2nd year on, students increasingly augment the core in ecology and policy with extensive restricted electives choices that allow the student to tailor the program to their interests. The major provides a sound science background for careers in conservation, resource management, ecological consulting, or nature interpretation used in teaching, government, non-government or the private sector; or for further post-graduate training in fundamental ecology, environmental biology and environmental management or policy.

**Program Requirements**

The Co-op program in Ecology is a four and a half year program including four work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Ecology Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>COOP*1100</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1000 Work Term I</td>
<td>Academic Semester 4</td>
</tr>
<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>COOP*3000 Work Term III</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

**Credit Summary (21.50 Total Credits)**

7.00 - Environmental Sciences core
5.00 - Ecology Required courses
5.50 - Ecology Restricted electives

2.50 - Free electives

1.50 - Co-op Work Terms

Note: A minimum of three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *COOP*4000 is optional and if completed the total number of credits will equal 22.00.

Students are reminded that 6.00 credits of their B.Sc. (Env.) degree must be at the 3000-4000 level.

Students are encouraged to seek advice on their choices from their faculty advisor. With prior approval, students may be able to use courses not on these lists towards their Ecology restrictive electives.

The recommended program sequence is outlined below.

**Major**

**Semester 1 - Fall**
- BIOL*1070 [0.50] Discovering Biodiversity
- CHEM*1040 [0.50] General Chemistry I
- ENVS*1030 [1.00] Introduction to Environmental Sciences
- MATH*1080 [0.50] Elements of Calculus I

**Semester 2 - Winter**
- BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
- CHEM*1050 [0.50] General Chemistry II
- COOP*1100 [1.00] Introduction to Co-operative Education
- FARE*1040 [1.00] Intro to Environmental Economics, Law & Policy
- GEG*1300 [0.50] Introduction to the Biophysical Environment

**Semester 3 - Fall**
- BIOL*2060 [0.50] Ecology
- One of:
  - PHYS*1080 [0.50] Physics for Life Sciences
  - PHYS*1300 [0.50] Fundamentals of Physics
- One of:
  - ECON*2100 [0.50] Economic Growth and Environmental Quality
  - FARE*2700 [0.50] Survey of Natural Resource Economics

Note: Students lacking 4U physics or equivalent must take PHYS*1300. Students with 4U physics or equivalent must take PHYS*1080. PHYS*1130 may be substituted for PHYS*1080.

Note: GEG*2210 may be substituted for ECON*2100 or FARE*2700 and would be taken in semester 4.

**Winter Semester**
- COOP*1000 [0.50] Co-op Work Term I

**Semester 4 - Summer**
- BIOC*2580 [0.50] Introduction to Biochemistry

2.00 electives or restricted electives

**Fall Semester**
- COOP*2000 [0.50] Co-op Work Term II

**Semester 5 - Winter**
- BIOL*2400 [0.50] Evolution
- MBG*2040 [0.50] Foundations in Molecular Biology and Genetics
- STAT*2230 [0.50] Biostatistics for Integrative Biology

1.00 electives or restricted electives

**Summer Semester**
- COOP*3000 [0.50] Co-op Work Term III

**Semester 6 - Fall**
- BIOC*3010 [0.50] Laboratory and Field Work in Ecology
- ENVS*4001 [0.50] Project in Environmental Sciences
- One of:
  - BOT*2100 [0.50] Life Strategies of Plants
  - ZOO*3600 [0.50] Comparative Animal Physiology I
- One of:
  - BOT*3410 [0.50] Plant Anatomy
  - ZOO*2090 [0.50] Vertebrate Structure and Function

0.50 electives or restricted electives

Note: ZOO*2700 may be substituted for BOT*3410 or ZOO*2090 and would be taken in semester 7.

**Semester 7 - Winter**
- BIOL*3060 [0.50] Populations, Communities & Ecosystems
- BIOL*3130 [0.50] Conservation Biology
- ENVS*4002 [0.50] Project in Environmental Sciences

1.00 electives or restricted electives

Note: See note in semester 6.

**Summer Semester (Optional)**
- COOP*4000 [0.50] Co-op Work Term IV

**Semester 8 - Fall**
2.50 electives or restricted electives

**Restricted Electives**

Students are required to take 5.50 restricted credits in Ecology as noted below. Of these, at least 1.00 credits must be at the 4000 level.

1. A minimum of 0.50 credits from:
   - BIOL*4150 [0.50] Wildlife Conservation and Management
   - CIS*1500 [0.50] Introduction to Programming
   - GEOG*2420 [0.50] The Earth From Space
   - GEOG*2480 [0.50] Mapping and GIS
   - GEOG*3420 [0.50] Remote Sensing of the Environment *
   - GEOG*3480 [0.50] GIS and Spatial Analysis *
   - GEOG*4480 [1.00] Applied Geomatics
   - * Additional prerequisites are required.

2. Students in the Ecology Major are required to take an additional 5.00 restricted election credits from the following lists. Some courses may require other courses from the list as prerequisites.
   - Ecology
     - ANSC*3180 [0.50] Wildlife Nutrition
     - BIOL*3450 [0.50] Introduction to Aquatic Environments
     - BOT*3050 [0.50] Plant Functional Ecology
     - ENVS*2030 [0.50] Meteorology and Climatology
     - ENVS*3010 [0.50] Climate Change Biology
     - ENVS*3270 [0.50] Forest Biodiversity
     - ENVS*3290 [0.50] Waterborne Disease Ecology
     - ENVS*4330 [0.50] Forest Ecology
     - GEOG*2000 [0.50] Geomorphology
     - GEOG*2110 [0.50] Climate and the Biophysical Environment
     - GEOG*3000 [0.50] Fluvial Processes
     - GEOG*3610 [0.50] Environmental Hydrology
     - NUTR*3210 [0.50] Fundamentals of Nutrition
     - ZOO*4570 [0.50] Marine Ecological Processes
   - Conservation
     - BIOL*4120 [0.50] Evolutionary Ecology
     - BIOL*4150 [0.50] Wildlife Conservation and Management
     - BIOL*4350 [0.50] Limnology of Natural and Polluted Waters
     - ENVS*2040 [0.50] Plant Health and the Environment
     - ENVS*2330 [0.50] Current Issues in Ecosystem Science and Biodiversity
     - ENVS*3000 [0.50] Nature Interpretation
     - ENVS*3010 [0.50] Climate Change Biology
     - GEOG*2480 [0.50] Mapping and GIS
     - GEOG*3020 [0.50] Global Environmental Change
     - GEOG*3110 [0.50] Biotic and Natural Resources
     - GEOG*3210 [0.50] Management of the Biophysical Environment
     - GEOG*3480 [0.50] GIS and Spatial Analysis
     - GEOG*4110 [1.00] Environmental Systems Analysis
     - GEOG*4230 [0.50] Environmental Impact Assessment
     - GEOG*4480 [1.00] Applied Geomatics
     - * Policy, Law and Management
     - BIOL*4500 [0.50] Natural Resource Policy Analysis
     - ECON*2100 [0.50] Economic Growth and Environmental Quality
     - FARE*2700 [0.50] Survey of Natural Resource Economics
     - GEOG*2210 [0.50] Environment and Resources
     - GEOG*4210 [0.50] Environmental Governance
     - GEOG*4220 [0.50] Local Environmental Management
     - PHIL*2070 [0.50] Philosophy of the Environment
     - POLS*3370 [0.50] Environmental Politics and Governance
   - Independent Research and Field Courses
     - BIOL*4410 [0.75] Field Ecology
     - BIOL*4700 [0.50] Field Biology
     - BIOL*4710 [0.25] Field Biology
     - BIOL*4800 [0.50] Field Biology
     - BIOL*4810 [0.25] Field Biology
     - ENVS*4410 [0.50] Introduction to Advanced Independent Research
     - ENVS*4420 [0.50] Advanced Independent Research
     - ENVS*4430 [1.00] Advanced Independent Research
     - IBIO*4500 [1.00] Research in Integrative Biology I
     - IBIO*4510 [1.00] Research in Integrative Biology II
     - IBIO*4521 [1.00] Thesis in Integrative Biology
     - IBIO*4522 [1.00] Thesis in Integrative Biology
     - ZOO*4300 [0.75] Marine Biology and Oceanography

Environmental Sciences (ENVS)

School of Environmental Sciences, Ontario Agricultural College

X. Degree Programs, Bachelor of Science in Environmental Sciences [B.Sc.(Env.)]

Last Revision: July 4, 2019 2019-2020 Undergraduate Calendar
This major combines a foundation in the breadth of environmental science while giving students practical experience in integrating the basic science in environmental problem solving. The integration of biophysical sciences with real-world applications provides students with a unique skill set for engaging with current and future environmental issues.

The many opportunities in the major for experiential learning and independent research give students an ability to collect, analyze, and interpret environmental data, and propose solutions that account for both the biophysical science and the socio-economic context. The second year core curriculum develops a cross-disciplinary understanding of the biophysical environment, while the third and fourth years allow students to engage more deeply with issues of interest to them. Students will graduate from this major ready to address diverse problems such as pollinator conservation, soil and water conservation, greenhouse gas mitigation, plant disease management and chemical movement in the environment. It provides a solid foundation for careers in environmental protection, resource management and research, in both the public and private sectors.

**Major**

**Semester 1**
- **BIO*1070** [0.50] Discovering Biodiversity
- **CHEM*1040** [0.50] General Chemistry I
- **ENVS*1030** [1.00] Introduction to Environmental Sciences
- **MATH*1080** [0.50] Elements of Calculus I

**Semester 2**
- **BIO*1090** [0.50] Introduction to Molecular and Cellular Biology
- **CHEM*1050** [0.50] General Chemistry II
- **FARE*1040** [1.00] Intro to Environmental Economics, Law & Policy
- **GEOG*1300** [0.50] Introduction to the Biophysical Environment

**Semester 3**
- **ENVS*2030** [0.50] Meteorology and Climatology
- **ENVS*2060** [0.50] Soil Science
- **ENVS*2240** [0.50] Fundamentals of Environmental Geology
1.00 electives or restricted electives

**Semester 4**
- **BIO*2060** [0.50] Ecology
- **ENVS*2080** [0.50] Introduction to Environmental Microbiology
- **ENVS*2310** [0.50] Introduction to Biogeochemistry
- **STAT*2040** [0.50] Statistics I
0.50 electives or restricted electives

**Semester 5**
One of:
- **ECON*2100** [0.50] Economic Growth and Environmental Quality
- **FARE*2700** [0.50] Survey of Natural Resource Economics
- **GEOG*2210** [0.50] Environment and Resources
2.00 electives or restricted electives

Students wishing to register in BIO*4350 must substitute BIO*3450 in Semester 5 for ENVS*3150 in Semester 6.

**Semester 6**
- **ENVS*3150** [0.50] Aquatic Systems
2.00 electives or restricted electives

**Semester 7**
- **ENVS*4001** [0.50] Project in Environmental Sciences
2.00 electives or restricted electives

**Semester 8**
- **ENVS*4002** [0.50] Project in Environmental Sciences
2.00 electives or restricted electives

**Restricted Electives**
Students must take a total of 6.50 restricted elective credits as prescribed by the following lists.

**List A**
Students must take 0.50 credits from each of List A & B

One of:
- **ENVS*2330** [0.50] Current Issues in Ecosystem Science and Biodiversity
- **ENVS*2040** [0.50] Plant Health and the Environment

**List B**
One of:
- **PHYS*1070** [0.50] Physics for Life Sciences II
- **PHYS*1080** [0.50] Physics for Life Sciences
- **PHYS*1300** [0.50] Fundamentals of Physics

Students lacking 4U Physics or equivalent must take PHYS*1300.

Students are required to choose a minimum of 5.50 credits from Lists C, D, E, and F. Students must take a minimum of 1.50 credits from List C, a minimum of 1.00 credits from List D, and students may not count more than 1.00 credits from List F towards their restricted electives. Students should note that many restricted electives, particularly in List D, require other courses as prerequisites. Students should consult the most recent Undergraduate Calendar for specific requirements.

**List C**
Students must take a minimum of 1.50 credits from the following list:
- **BIO*3130** [0.50] Conservation Biology
- **CHEM*3360** [0.50] Environmental Chemistry and Toxicology
- **ENVS*2120** [0.50] Introduction to Environmental Stewardship
- **ENVS*2240** [0.50] Apiculture and Honey Bee Biology
- **ENVS*2230** [0.50] Communications in Environmental Science
- **ENVS*3000** [0.50] Nature Interpretation
- **ENVS*3010** [0.50] Climate Change Biology
- **ENVS*3020** [0.50] Pesticides and the Environment
- **ENVS*3030** [0.50] Conservation Field Course
- **ENVS*3040** [0.50] Natural Chemicals in the Environment
- **ENVS*3050** [0.50] Microclimatology
- **ENVS*3060** [0.50] Groundwater
- **ENVS*3080** [0.50] Soil and Water Conservation
- **ENVS*3090** [0.50] Insect Diversity and Biology
- **ENVS*3180** [0.50] Sedimentary Environments
- **ENVS*3210** [0.50] Plant Pathology
- **ENVS*3220** [0.50] Terrestrial Chemistry
- **ENVS*3230** [0.50] Agroforestry Systems
- **ENVS*3250** [0.50] Forest Health and Disease
- **ENVS*3270** [0.50] Forest Biodiversity
- **ENVS*3290** [0.50] Waterborne Disease Ecology
- **ENVS*3300** [0.50] Introduction to Controlled Environment Systems
- **ENVS*3310** [0.50] Soil Biodiversity and Ecosystem Function
- **ENVS*3340** [0.50] Use and Management of Environmental Data
- **ENVS*3370** [0.50] Terrestrial Ecosystem Ecology
- **MICR*3220** [0.50] Plant Microbiology
- **TOX*2000** [0.50] Principles of Toxicology

**List D**
Students must take a minimum of 1.00 credits from the following list:
- **BIO*4350** [0.50] Limnology of Natural and Polluted Waters
- **ENVS*4000** [0.50] Toxicological Risk Assessment
- **ENVS*4070** [0.50] Pollinator Conservation
- **ENVS*4090** [0.50] Soil Management
- **ENVS*4100** [0.50] Integrated Management of Invasive Insect Pests
- **ENVS*4160** [0.50] Soil and Nutrient Management
- **ENVS*4180** [0.50] Insecticide Biological Activity and Resistance
- **ENVS*4190** [0.50] Biological Activity of Herbicides
- **ENVS*4210** [0.50] Meteorological and Environmental Instrumentation
- **ENVS*4230** [0.50] Biology of Aquatic Insects
- **ENVS*4260** [0.50] Field Entomology
- **ENVS*4320** [1.00] Laboratory and Field Methods in Soil Biodiversity
- **ENVS*4350** [0.50] Forest Ecology
- **ENVS*4360** [0.50] Glacial Environments
- **ENVS*4370** [0.50] Environmental Organic Chemistry
- **ENVS*4390** [1.00] Soil Variability and Land Evaluation
- **PBIO*4530** [0.50] Plants and Environmental Pollution

**List E**
Students may count up to 1.00 credits from the following list towards their 6.50 credit restricted electives.
- **GEOG*2240** [0.50] The Earth From Space
- **GEOG*2480** [0.50] Mapping and GIS
- **GEOG*3420** [0.50] Remote Sensing of the Environment
- **GEOG*3480** [0.50] GIS and Spatial Analysis

**Credit Summary (20.00 Total Credits)**

- 7.00 credits - Environmental Sciences core
- 4.50 credits - Required Courses for the Major
- 5.50 credits - Restricted Electives
- 3.00 credits - Free electives

Students are encouraged to seek advice from their faculty advisor and are reminded that 6.00 credits of their B.Sc.(Env.) degree must be at the 3000–4000 level. With prior approval, students may be able to use courses not on Lists C, D, E, or F toward their restricted electives.

**Environmental Sciences (ENVS; C)**

School of Environmental Sciences, Ontario Agricultural College
This major combines a foundation in the breadth of environmental science while giving
students practical experience in integrating the basic science in environmental problem
solving. The integration of biophysical sciences with real-world applications provides
students with a unique skill set for engaging with current and future environmental issues.
The many opportunities in the major for experiential learning and independent research
give students an ability to collect, analyze and interpret environmental data, and propose
solutions that account for both the biophysical science and the socio-economic context.
The second year core curriculum develops a cross-disciplinary understanding of the
biophysical environment, while the third and fourth years allow students to engage more
deeply with issues of interest to them. Students will graduate from this major ready to
address diverse problems such as pollinator conservation, soil and water conservation,
greenhouse gas mitigation, plant disease management and chemical movement in the
environment. It provides a solid background for careers in environmental protection,
resource management and research, in both the public and private sectors.

Program Requirements

The Co-op program in Environmental Sciences is a four and a half year program including
four work terms. Students must complete a Fall, Winter and Summer work term, and must
follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.

Environmental Sciences Academic and Co-op Work Term Schedule

<table>
<thead>
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<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
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<td>Academic Semester 2</td>
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<td>Academic Semester 4</td>
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<td>COOP*3000 Work Term III</td>
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<td>Academic Semester 7</td>
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To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (21.50 Total Credits)

7.00 - Environmental Sciences core
4.50 - Required Courses for the Major
5.50 - Restricted Electives
3.00 - Free electives
1.50 - Co-op Work Terms

Note: A minimum of three Co-op work terms including a Summer, Fall, and Winter are
necessary to complete the Co-op requirement. *COOP*4000 is optional and if completed
the total number of credits will equal 22.00.

Students are encouraged to seek advice from their faculty advisor and are reminded that 6.00 credits of their B.Sc.(Env.) degree must be at the 3000-4000 level. With prior approval, students may be able to use courses not on Lists C, D, E or F towards their restricted electives.

The recommended program sequence is outlined below.

Major

Semester 1 - Fall

BIOL*1070 [0.50] Discovering Biodiversity
CHEM*1040 [0.50] General Chemistry I
ENVS*1030 [1.00] Introduction to Environmental Sciences
MATH*1080 [0.50] Elements of Calculus I

Semester 2 - Winter

BIOL*1090 [0.50] Introduction to Molecular and Cellular Biology
CHEM*1050 [0.50] General Chemistry II
COOP*1100 [0.00] Introduction to Co-operative Education
FARE*1040 [1.00] Intro to Environmental Economics, Law & Policy
GEOG*1300 [0.50] Introduction to the Biophysical Environment

Semester 3 - Fall

ENVS*2300 [0.50] Meteorology and Climatology
ENVS*2060 [0.50] Soil Science
ENVS*2240 [0.50] Fundamentals of Environmental Geology
1.00 electives or restricted electives

Winter Semester

COOP*1100 [0.50] Co-op Work Term I

Semester 4 - Summer

STAT*2040 [0.50] Statistics I
2.00 electives or restricted electives

Fall Semester

COOP*2000 [0.50] Co-op Work Term II

Semester 5 - Winter

BIOL*2060 [0.50] Ecology
ENVS*2080 [0.50] Introduction to Environmental Microbiology
ENVS*2310 [0.50] Introduction to Biogeochemistry
1.00 electives or restricted electives

Summer Semester

COOP*3000 [0.50] Co-op Work Term III

Semester 6 - Fall

ENVS*4001 [0.50] Project in Environmental Sciences
One of:
ECON*2100 [0.50] Economic Growth and Environmental Quality
FARE*2700 [0.50] Survey of Natural Resource Economics
1.50 electives or restricted electives

Summer Semester - (Optional)

COOP*4000 [0.50] Co-op Work Term IV

Semester 8 - Fall

2.50 electives or restricted electives

Restricted Electives

Students must take a total of 6.50 restricted elective credits as prescribed by the following lists.

Students must take 0.50 credits from each of List A & B

List A

One of:
ENVS*2330 [0.50] Current Issues in Ecosystem Science and Biodiversity
ENVS*2040 [0.50] Plant Health and the Environment

List B

One of:
PHYS*1070 [0.50] Physics for Life Sciences II
PHYS*1080 [0.50] Physics for Life Sciences
PHYS*1300 [0.50] Fundamentals of Physics

Students lacking 4U Physics or equivalent must take PHYS*1300.

Students are required to choose a minimum of 5.50 credits from Lists C, D, E and F.

Students must take a minimum of 1.50 credits from List C, a minimum of 1.00 credits from List D, and students may not count more than 1.00 credits from List F towards their restricted electives. Students should note that many restricted electives, particularly in List D, require other courses as prerequisites. Students should consult the most recent Undergraduate Calendar for specific requirements.

List C

Students must take a minimum of 1.50 credits from the following list:

BIOL*3130 [0.50] Conservation Biology
CHEM*3360 [0.50] Environmental Chemistry and Toxicology
ENVS*2120 [0.50] Introduction to Environmental Stewardship
ENVS*2210 [0.50] Apiculture and Honey Bee Biology
ENVS*2230 [0.50] Communications in Environmental Science
ENVS*3000 [0.50] Nature Interpretation
ENVS*3010 [0.50] Climate Change Biology
ENVS*3020 [0.50] Pesticides and the Environment
ENVS*3030 [0.50] Conservation Field Course
ENVS*3040 [0.50] Natural Chemicals in the Environment
ENVS*3050 [0.50] Microclimatology
ENVS*3060 [0.50] Groundwater
ENVS*3080 [0.50] Soil and Water Conservation
ENVS*3090 [0.50] Insect Diversity and Biology
ENVS*3180 [0.50] Sedimentary Environments
ENVS*3210 [0.50] Plant Pathology
ENVS*3220 [0.50] Territorial Chemistry
ENVS*3230 [0.50] Agroforestry Systems
ENVS*3250 [0.50] Forest Health and Disease
ENVS*3270 [0.50] Forest Biodiversity
ENVS*3290 [0.50] Waterborne Disease Ecology
### Environmental Economics and Policy (EEP)

**Department of Food, Agricultural and Resource Economics, Ontario Agricultural College**

This major provides the foundation for applying science and economics to environmental issues to produce effective environmental policy. Students gain an understanding of the policy tools and market mechanisms for managing our natural resources effectively. Knowledge and skills learned in this major will enable students to identify, prioritize and solve environmental problems by integrating both scientific and economic theories and data. Equipped with the ability to look at current topics from the perspectives of economics, politics and environmental sciences, students have a number of interesting career opportunities in the public, private and NGO sectors. At the same time, the major fully prepares students to move onto professional and research graduate programs.

#### Major

**Semester 1**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Title</th>
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<tr>
<td>BIOL*1070</td>
<td>0.50</td>
<td>Discovering Biodiversity</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>0.50</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>ENVS*1030</td>
<td>1.00</td>
<td>Introduction to Environmental Sciences</td>
</tr>
<tr>
<td>MATH*1080</td>
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**Semester 2**

<table>
<thead>
<tr>
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<th>Title</th>
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</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>0.50</td>
<td>Introduction to Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>0.50</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>FARE*1040</td>
<td>1.00</td>
<td>Intro to Environmental Economics, Law &amp; Policy</td>
</tr>
<tr>
<td>GEOG*1300</td>
<td>0.50</td>
<td>Introduction to the Biophysical Environment</td>
</tr>
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**Semester 3**

<table>
<thead>
<tr>
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<th>Title</th>
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<td>ECON*1100</td>
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<td>Introductory Macroeconomics</td>
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<tr>
<td>FARE*2700</td>
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<td>Survey of Natural Resource Economics</td>
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1.50 electives or restricted electives

**Semester 4**

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<td>ECON*2410</td>
<td>0.50</td>
<td>Intermediate Macroeconomics</td>
</tr>
<tr>
<td>ECON*2770</td>
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<td>Introductory Mathematical Economics</td>
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One of:

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<tr>
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<th>Credits</th>
<th>Title</th>
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<tbody>
<tr>
<td>ECON*2740</td>
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<td>Economic Statistics</td>
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<tr>
<td>STAT*2040</td>
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<td>Statistics I</td>
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0.50 electives or restricted electives

**Semester 5**

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<td>Economic Growth and Environmental Quality</td>
</tr>
<tr>
<td>ECON*3740</td>
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1.50 electives or restricted electives

**Semester 6**

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2.00 electives or restricted electives

**Semester 7**

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<td>ECON*4930</td>
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1.00 electives or restricted electives

**Semester 8**

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<tr>
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<tr>
<td>FARE*4310</td>
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<td>Resource Economics</td>
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1.50 restricted electives or electives

**Restricted Electives**

Students in the Environmental Economics and Policy major are required to complete 6.00 credits in restricted electives. 2.50 restricted elective credits must be in FARE or ECON courses at the 3000 or 4000 level.

Courses in the following lists may be taken to satisfy the restricted electives requirement. Courses are grouped to assist students select programs of study aimed at different educational and career paths.

**List A**

Students must select a minimum of 2.50 credits from the following lists:

1. **Quantitative Methods, Research and Graduate Studies**

   - ECON*3100 [0.50] Game Theory
   - ECON*3710 [0.50] Advanced Microeconomics
   - ECON*4640 [0.50] Advanced Econometrics
   - ECON*4700 [0.50] Advanced Mathematical Economics
   - ECON*4710 [0.50] Advanced Topics in Microeconomics
   - ECON*4750 [0.50] Topics in Public Economics
   - ECON*4840 [0.50] Financial Econometrics
   - FARE*4500 [0.50] Decision Science
   - FARE*4550 [0.50] Independent Studies I
   - FARE*4560 [0.50] Independent Studies II

2. **Policy Analysis**

   - ECON*2650 [0.50] Introductory Development Economics
   - ECON*3500 [0.50] Urban Economics
   - ECON*3580 [0.50] Economics of Regulation
   - ECON*3610 [0.50] Public Economics
   - ECON*3620 [0.50] International Trade
   - ECON*4830 [0.50] Economic Development
   - ECON*4880 [0.50] Topics in International Economics
   - EDDR*2650 [0.50] Introduction to Planning and Environmental Law
   - FARE*2410 [0.50] Agrifood Markets and Policy
   - FARE*3250 [0.50] Food and International Development
   - FARE*4000 [0.50] Agricultural and Food Policy
   - FARE*4210 [0.50] World Agriculture, Food Security and Economic Development
   - FARE*4550 [0.50] Independent Studies I
   - FARE*4560 [0.50] Independent Studies II
   - POLS*3370 [0.50] Environmental Politics and Governance

**List B**

Students must select a minimum of 1.00 credits from the following lists:

1. **Remote Sensing, Geographical Information Systems and Spatial Analysis**

   - GEOG*2420 [0.50] The Earth From Space
   - GEOG*2480 [0.50] Mapping and GIS
   - GEOG*3420 [0.50] Remote Sensing of the Environment
   - GEOG*3480 [0.50] GIS and Spatial Analysis
   - GEOG*4480 [1.00] Applied Geomatics

2. **Statistics and Environmental Risk Assessment**

   - STAT*2050 [0.50] Statistics II
   - STAT*3510 [0.50] Environmental Risk Assessment

**Note:** Students interested in this sequence should take STAT*2040 rather than ECON*2740 to satisfy the statistics requirement in the ENVS core.

3. **Earth Sciences**

   - ENVS*2030 [0.50] Meteorology and Climatology
   - ENVS*2060 [0.50] Soil Science
   - ENVS*2310 [0.50] Introduction to Biogeochemistry
X. Degree Programs, Bachelor of Science in Environmental Sciences [B.Sc.(Env.)]

The recommended program sequence is outlined below.

**Major**

**Semester 1 - Fall**

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**Semester 2 - Winter**

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**Semester 3 - Fall**

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**Winter Semester**

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**Semester 4 - Summer**

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**Fall Semester**

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**Semester 5 - Winter**

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**Summer Semester**

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**Semester 6 - Fall**

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<td>ENVS*4001</td>
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**Semester 7 - Winter**

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**Summer Semester (Optional)**

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**Semester 8 - Fall**

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<td>FARE*4290</td>
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<td>TOTAL</td>
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**Restricted Electives**

Students in the Environmental Economics and Policy major are required to complete 6.00 credits in restricted electives. 2.50 restricted elective credits must be in FARE or ECON courses at the 3000 or 4000 level.

Courses in the following lists may be taken to satisfy the restricted electives requirement. Courses are grouped to assist students select programs of study aimed at different educational and career paths.

**List A**

Students must select a minimum of 2.50 credits from the following lists:

1. **Quantitative Methods, Research and Graduate Studies**
   - ECON*3100 [0.50] Game Theory
   - ECON*3710 [0.50] Advanced Microeconomics
   - ECON*4640 [0.50] Advanced Econometrics
   - ECON*4700 [0.50] Advanced Mathematical Economics
   - ECON*4710 [0.50] Advanced Topics in Microeconomics
   - ECON*4750 [0.50] Topics in Public Economics
   - ECON*4840 [0.50] Financial Econometrics
   - FARE*4500 [0.50] Decision Science

Last Revision: July 4, 2019

2019-2020 Undergraduate Calendar
### 2. Policy Analysis

<table>
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<tr>
<th>Course Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>ECON*2650</td>
<td>Introductory Development Economics</td>
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<td>ECON*3500</td>
<td>Urban Economics</td>
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<td>ECON*3580</td>
<td>Economics of Regulation</td>
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<td>ECON*3610</td>
<td>Public Economics</td>
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<tr>
<td>ECON*3620</td>
<td>International Trade</td>
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<tr>
<td>ECON*4830</td>
<td>Economic Development</td>
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<tr>
<td>ECON*4880</td>
<td>Topics in International Economics</td>
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<tr>
<td>EDRD*2650</td>
<td>Introduction to Planning and Environmental Law</td>
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<tr>
<td>FARE*2410</td>
<td>Agrifood Markets and Policy</td>
</tr>
<tr>
<td>FARE*3250</td>
<td>Food and International Development</td>
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<td>FARE*4000</td>
<td>Agricultural and Food Policy</td>
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<tr>
<td>FARE*4210</td>
<td>World Agriculture, Food Security and Economic Development</td>
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<td>Independent Studies I</td>
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<td>FARE*4560</td>
<td>Independent Studies II</td>
</tr>
<tr>
<td>POLS*3370</td>
<td>Environmental Politics and Governance</td>
</tr>
</tbody>
</table>

### List B

Students must select a minimum of 1.00 credits from the following lists:

1. **Remote Sensing, Geographical Information Systems and Spatial Analysis**
   - GEOG*2420: The Earth From Space
   - GEOG*2480: Mapping and GIS
   - GEOG*3420: Remote Sensing of the Environment
   - GEOG*3480: GIS and Spatial Analysis
   - GEOG*4480: Applied Geomatics

2. **Statistics and Environmental Risk Assessment**
   - STAT*2050: Statistics I
   - STAT*3510: Environmental Risk Assessment

Note: Students interested in this sequence should take STAT*2040 rather than ECON*2740 to satisfy the statistics requirement in the ENVS core.

3. **Earth Sciences**
   - ENVS*2030: Meteorology and Climatology
   - ENVS*2060: Soil Science
   - ENVS*2310: Introduction to Biogeochemistry
   - ENVS*3060: Groundwater

4. **Ecology and Conservation Biology**
   - BIOL*2060: Ecology
   - BIOL*3060: Populations, Communities & Ecosystems
   - BIOL*3130: Conservation Biology
   - BIOL*4150: Wildlife Conservation and Management
   - BIOL*4500: Natural Resource Policy Analysis
   - ENVS*2330: Current Issues in Ecosystem Science and Biodiversity

5. **Toxicology and Environmental Chemistry**
   - ENVS*3020: Pesticides and the Environment
   - ENVS*3040: Natural Chemicals in the Environment
   - ENVS*3220: Terrestrial Chemistry
   - TOX*2000: Principles of Toxicology
   - TOX*3360: Environmental Chemistry and Toxicology

### Environment and Resource Management (ERM)

#### Department of Geography, Environment and Geomatics, College of Social and Applied Human Sciences

The major focuses on environmental interactions and problem solving by developing an integrated biophysical environment - human environment perspective. In ERM, students will gain knowledge across the natural sciences, an understanding of how they interact, the skills (tools and techniques) needed to support decision making, as well as the methods of management and governance that are critical for environmental decision making. Beginning in first year students learn in the classroom and through hands-on work in labs and in the field. Students are expected to design and conduct experiments and problem solve using state-of-the-art computing and analytical tools. This major provides the knowledge, skills and methods an environmental scientist requires as environmental consultant, environmental manager, environmental and/or resource planner, geographic information systems analyst or to facilitate future graduate work.

#### Major

**Semester 1**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1070</td>
<td>Discovering Biodiversity</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>ENVS*1030</td>
<td>Introduction to Environmental Sciences</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>Elements of Calculus I</td>
</tr>
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**Semester 2**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>Introduction to Molecular and Cellular Biology</td>
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**Semester 3**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>ENVS*2100</td>
<td>Economic Growth and Environmental Quality</td>
</tr>
<tr>
<td>FARE*2700</td>
<td>Survey of Natural Resources</td>
</tr>
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</table>

1.00 electives

**Semester 4**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>GEOG*2110</td>
<td>Climate and the Biophysical Environment</td>
</tr>
<tr>
<td>GEOG*2210</td>
<td>Environment and Resources</td>
</tr>
<tr>
<td>GEOG*2480</td>
<td>Mapping and GIS</td>
</tr>
<tr>
<td>1.00 electives or restricted electives</td>
<td></td>
</tr>
</tbody>
</table>

#### List A

- ENVS*3610: may be substituted for GEOG*3000 and would be taken in Semester 6.

**Semester 5**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>ENVS*2120</td>
<td>Introduction to Environmental Stewardship</td>
</tr>
<tr>
<td>GEOG*3000</td>
<td>Fluvial Processes</td>
</tr>
<tr>
<td>GEOG*3120</td>
<td>Biological Natural Resources</td>
</tr>
<tr>
<td>GEOG*3210</td>
<td>Management of the Biophysical Environment</td>
</tr>
<tr>
<td>0.50 electives or restricted electives</td>
<td></td>
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</tbody>
</table>

**Semester 6**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG*3480</td>
<td>GIS and Spatial Analysis</td>
</tr>
<tr>
<td>2.00 electives or restricted electives</td>
<td></td>
</tr>
</tbody>
</table>

**Semester 7**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVS*4001</td>
<td>Project in Environmental Sciences</td>
</tr>
<tr>
<td>GEOG*4110</td>
<td>Environmental Systems Analysis</td>
</tr>
<tr>
<td>GEOG*4210</td>
<td>Environmental Governance</td>
</tr>
<tr>
<td>0.50 electives or restricted electives</td>
<td></td>
</tr>
</tbody>
</table>

**Semester 8**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVS*4002</td>
<td>Project in Environmental Sciences</td>
</tr>
<tr>
<td>2.00 electives or restricted electives</td>
<td></td>
</tr>
</tbody>
</table>

#### Restricted Electives

1. A minimum of 2 of the following courses:
   - ENVS*4390: Soil Variability and Land Evaluation (1.00)
   - GEOG*4220: Local Environmental Management (0.50)
   - GEOG*4230: Renewable Resource Management (0.50)
   - GEOG*4300: Environmental Impact Assessment (0.50)
   - ENVS*4401: Project in Environmental Sciences (1.00)

2. An additional 1.00 credits in Geography (GEOG) at the 3000 level or higher.

#### Credit Summary (20.00 Total Credits)

- 7.00 credits - Environmental Sciences core
- 6.00 credits - Environment and Resource Management Required courses
- 2.00 - 2.50 credits - Environment and Resource Management Restricted electives, depending on course selection
- 4.00 - 4.50 credits - Free electives, depending on course selection

Students are reminded that 6.00 credits of their B.Sc. (Env.) degree must be at the 3000-4000 level.

Students are encouraged to seek advice on their choices from their faculty advisor.

### Environment and Resource Management (ERM:C)

#### Department of Geography, Environment and Geomatics, College of Social and Applied Human Sciences

The major focuses on environmental interactions and problem solving by developing an integrated biophysical environment - human environment perspective. In ERM, students will gain knowledge across the natural sciences, an understanding of how they interact, the skills (tools and techniques) needed to support decision making, as well as the methods of management and governance that are critical for environmental decision making. Beginning in first year students learn in the classroom and through hands-on work in labs and in the field. Students are expected to design and conduct experiments and problem solve using state-of-the-art computing and analytical tools. This major provides the knowledge, skills and methods an environmental scientist requires as environmental consultant, environmental manager, environmental and/or resource planner, geographic information systems analyst or to facilitate future graduate work.

#### Program Requirements

The Co-op program in Environment and Resource Management is a four and a half year program including four work terms. Students must complete a Fall, Winter and Summer work term, and must follow the academic work schedule as outlined below (also found on the Co-operative Education program website: [https://www.recruitguelph.ca/cecs/](https://www.recruitguelph.ca/cecs/)). Please refer to the Co-operative Education program policy with respect to adjusting this schedule.
Environment and Resource Management Academic and Co-op Work Term Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Semester 1</td>
<td>Academic Semester 2</td>
<td>COOP*1100</td>
</tr>
<tr>
<td>2</td>
<td>Academic Semester 3</td>
<td>COOP*1000 Work Term I</td>
<td>Academic Semester 4</td>
</tr>
<tr>
<td>3</td>
<td>COOP*2000 Work Term II</td>
<td>Academic Semester 5</td>
<td>COOP*3000 Work Term III</td>
</tr>
<tr>
<td>4</td>
<td>Academic Semester 6</td>
<td>Academic Semester 7</td>
<td>COOP*4000 Work Term IV</td>
</tr>
<tr>
<td>5</td>
<td>Academic Semester 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary (21.50 Total Credits)*

- 7.00 - Environmental Sciences core
- 6.00 - Environment and Resource Management Required courses
- 2.00 - 2.50 - Environment and Resource Management Restricted electives, depending on course selection
- 4.00 - 4.50 - Free electives, depending on course selection
- 1.50 - Co-op Work Terms

Note: A minimum of three Co-op work terms including a Summer, Fall, and Winter are necessary to complete the Co-op requirement. *COOP*4000 is optional and if completed the total number of credits will equal 22.00.

Students are reminded that 6.00 credits of their B.Sc. (Env.) degree must be at the 3000-4000 level.

Students are encouraged to seek advice on their choices from their faculty advisor.

The recommended program sequence is outlined below.

**Major**

**Semester 1 - Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1070</td>
<td>Discovering Biodiversity</td>
<td>0.50</td>
</tr>
<tr>
<td>CHEM*1040</td>
<td>General Chemistry I</td>
<td>0.50</td>
</tr>
<tr>
<td>ENVS*1030</td>
<td>Introduction to Environmental Sciences</td>
<td>1.00</td>
</tr>
<tr>
<td>MATH*1080</td>
<td>Elements of Calculus I</td>
<td>0.50</td>
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</tbody>
</table>

**Semester 2 - Winter**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOL*1090</td>
<td>Introduction to Molecular and Cellular Biology</td>
<td>0.50</td>
</tr>
<tr>
<td>CHEM*1050</td>
<td>General Chemistry II</td>
<td>0.50</td>
</tr>
<tr>
<td>COOP*1100</td>
<td>Introduction to Co-operative Education</td>
<td>0.00</td>
</tr>
<tr>
<td>FARE*1040</td>
<td>Intro to Environmental Economics, Law &amp; Policy</td>
<td>1.00</td>
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<tr>
<td>GEOG*1300</td>
<td>Introduction to the Biophysical Environment</td>
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**Semester 3 - Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ENVS*2120</td>
<td>Introduction to Environmental Stewardship</td>
<td>0.50</td>
</tr>
<tr>
<td>GEOG*2000</td>
<td>Geomorphology</td>
<td>0.50</td>
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<tr>
<td>GEOG*2480</td>
<td>Mapping and GIS</td>
<td>0.50</td>
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</table>

1.00 electives or restricted electives

Note: FARE*2700 may be substituted for ECON*2100 and may be taken in Semester 3 or 6. GEOG*2460 may be substituted for STAT*2040 and may be taken in Semester 3 or 6.

**Winter Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COOP*1000</td>
<td>Co-op Work Term I</td>
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**Semester 4 - Summer**

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<tr>
<td>ECON*2100</td>
<td>Economic Growth and Environmental Quality</td>
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<tr>
<td>GEOG*2210</td>
<td>Environment and Resources</td>
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<tr>
<td>STAT*2040</td>
<td>Statistics I</td>
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1.00 electives or restricted electives

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>COOP*2000</td>
<td>Co-op Work Term II</td>
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**Semester 5 - Winter**

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<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>GEOG*2110</td>
<td>Climate and the Biophysical Environment</td>
<td>0.50</td>
</tr>
<tr>
<td>GEOG*3480</td>
<td>GIS and Spatial Analysis</td>
<td>0.50</td>
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1.50 electives or restricted electives

**Summer Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>COOP*3000</td>
<td>Co-op Work Term III</td>
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**Semester 6 - Fall**

<table>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ENVS*4001</td>
<td>Project in Environmental Sciences</td>
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**Semester 7 - Winter**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVS*4002</td>
<td>Project in Environmental Sciences</td>
<td>0.50</td>
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</table>

2.00 electives or restricted electives

**Summer Semester (Optional)**

<table>
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<tr>
<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>COOP*4000</td>
<td>Co-op Work Term IV</td>
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**Semester 8 - Fall**

<table>
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<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>GEOG*4110</td>
<td>Environmental Systems Analysis</td>
<td>1.00</td>
</tr>
<tr>
<td>GEOG*4210</td>
<td>Environmental Governance</td>
<td>0.50</td>
</tr>
</tbody>
</table>

1.00 electives or restricted electives

**Restricted Electives**

1. A minimum of 2 of the following courses:
   - ENVS*4390 [1.00] Soil Variability and Land Evaluation
   - GEOG*4220 [0.50] Local Environmental Management
   - GEOG*4230 [0.50] Environmental Impact Assessment

2. An additional 1.00 credits in Geography (GEOG) at the 3000 level or higher.

3. An additional 1.00 credits in Geography (GEOG) at the 3000 level or higher.

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X. Degree Programs, Bachelor of Science in Environmental Sciences [B.Sc.(Env.)]

GEOG*3000 [0.50] Fluvial Processes
GEOG*3110 [0.50] Biotic and Natural Resources
GEOG*3210 [0.50] Management of the Biophysical Environment
0.50 electives or restricted electives

Note: GEOG*3610 may be substituted for GEOG*3000 and would be taken in Semester 6.
Doctor of Veterinary Medicine (D.V.M.)

Program Information
The University of Guelph offers the degree program Doctor of Veterinary Medicine (D.V.M.) at the Ontario Veterinary College. The program is offered during the Fall and Winter semesters only and normally requires four years to complete. The college is accredited jointly by the Canadian and American Veterinary Medical Association, and the Royal College of Veterinary Surgeons of Britain. The D.V.M. degree from Guelph is respected by veterinarians throughout the world.

Objectives of the Program
1. The graduates should have the knowledge and skills appropriate to their career orientations and sufficient to allow the pursuit of a variety of careers in veterinary medicine, including graduate studies. They should be able to pass the examinations of all Canadian licensing bodies and must possess a fundamental core of academic veterinary science knowledge and of technical competence.
2. The graduates must be able to solve animal health problems and must have knowledge of the management of domestic animals and the functioning of the various animal industries.
3. The graduates must be able to communicate effectively, whether writing scientific papers or conversing with clients.
4. Through a commitment to continuing education, the graduates must accept the professional responsibility to stay abreast of new developments and to pursue solutions to new problems.
5. The graduates must have a genuine concern for the welfare of all animals. The graduates should be aware of their responsibilities to the profession in terms of ethical and professional conduct and have an understanding of the moral questions facing veterinarians.
6. The graduates must have had the opportunity during their university tenure to develop a range of non-veterinary interests sufficient to equip them to take a responsible role in society.

Regulations for Licence to Practise
Graduates are eligible to practise in Canada, but the degree in veterinary medicine does not in itself confer the right to practise. For information on matters relative to licence to practise in the various provinces of Canada, students should communicate with the Canadian Veterinary Medical Association, 339 Booth Street, Ottawa, Ontario, Canada K1R 7K1, who will refer them to the appropriate provincial veterinary association.

Admission to the Veterinary Medicine Program
Complete details on admission requirements and procedures are listed in Section IV--Admission Information. Additional information may be found at: http://www.ovc.uoguelph.ca/recruitment/en/index.asp

Academic Counselling
The Office of the Associate Dean, Students provides academic counselling and referral to other appropriate resources for all D.V.M. students. In particular, students who are requesting a Supplemental Privilege are required to meet with the Associate Dean so that the student can be informed of appropriate resources (such as Learning and Writing Services and the Counselling and Student Resource Centre) and use them to deal with his/her academic difficulties.

Conditions for Continuation of Study
For supplemental and deferred privileges, all students in the D.V.M. Program are subject to Deferred Privilege Procedures and Supplemental Privilege Procedures outlined in Chapter VIII--Undergraduate Degree Regulations and Procedures. For continuation of study, a student must satisfy the conditions presented below. In order to graduate, students must fulfill the course requirements for the program and have achieved at least a 60% Program Average (PA). The Academic Review Sub-Committee will assess all cases where a student's academic progress does not meet the Continuation of Study requirements and will interpret the academic regulations. The requirements will be applied with due consideration to the credit weights of the course, the role of the course in the Phase and the degree of integration of the course with concurrently required, and in light of the student's particular circumstances (see VIII--Undergraduate Degree Regulations and Procedures).

Full-time Study
The D.V.M. program is offered as a full-time program and normally requires four years (over the equivalent of eight academic semesters at the University of Guelph) to complete. In exceptional extenuating circumstances, the Academic Review Sub-Committee may allow a student to take courses on a part-time basis. In these instances, the Academic Review Sub-Committee has the discretion to select the courses that the student will register in on a part-time basis. Students permitted to take courses on a part-time basis are cautioned that there is an enrolment limitation for the program and that access to certain courses or resumption of the program on a full-time basis will be conditional on the availability of space.

Failed Courses
1. Continuation of study from one phase of the D.V.M. Program to the next is dependent on the successful completion of all courses, or approved equivalents, in the published schedule of studies for the D.V.M. Program.
2. A student who fails one course in a Phase may be required to repeat all courses in the Phase. The consequences of failure of any particular course in the D.V.M. Program are as follows:
   a. Failure in any of the following courses result in the Repeat of the Course:
      VETM*3210, VETM*3390, VETM*3430, VETM*3320, VETM*5440, VETM*3510, VETM*4220, VETM*4450, VETM*4530, VETM*4610, VETM*4660, VETM*4710, VETM*4870, VETM*4900, VETM*4920.
   b. Failure in any of the following courses result in the Repeat of the Phase:
      VETM*3070, VETM*3080, VETM*3120, VETM*3400, VETM*3410, VETM*3450, VETM*3460, VETM*3470, VETM*4460, VETM*4470, VETM*4480, VETM*4490, VETM*4540.
   This information is also available as part of the Phase Handbooks.
3. A student will be allowed to fail a particular course only once. Any student who fails the same course twice will be required to withdraw and will be ineligible for readmission to the D.V.M. Program.
4. Grades obtained by D.V.M. students who repeat one or more VETM course(s) will be reported on the transcript in addition to the original course grade. In the instance where all courses in a Phase are repeated, the grades from the repeated VETM courses will constitute the new Phase Average (PHA). The new D.V.M. Program Average will include the grades obtained in both the original and repeated VETM course attempts.

Supplemental Privileges
1. In the circumstances of a failed course, the Academic Review Sub-Committee may, if appropriate and under special circumstances only, allow a student the opportunity to gain credit standing in a failed course by granting a supplemental privilege (see Failed Courses and Supplemental Privilege in Section VIII). Students must request a supplemental privilege by submitting the request to the Academic Review Sub-Committee, and the fee for the privilege, within 7 days of the release of grades for the phase in which the failure occurred. The Academic Review Sub-Committee, upon receiving a request from a student, and after consulting with the instructor and reviewing the student's course performance, will determine whether a supplemental privilege should be granted.
2. Students will be permitted supplemental privileges in a maximum of two courses over the entire D.V.M. Program. A supplemental privilege will not be granted for a second failure in a course. Any student granted a supplemental privilege must meet with the Associate Dean for Student Affairs who will inform the student of appropriate resources to be used to deal with his/her academic difficulties.

Conditions for Graduation
In order to qualify for graduation from the D.V.M. program, the student must have completed successfully all of the courses approved for the program. Students will not be allowed to graduate with a PA of < 60% or PHA of < 60% in Phase 4.

Voluntary Withdrawal from the Program
Students who have voluntarily withdrawn from the D.V.M. program and who wish to return must give notice to the Associate Dean, Students O.V.C of their intention to return by May 31 if they wish to return in September of the upcoming academic year. Students contemplating a withdrawal from the program are cautioned that there is an enrolment limitation for the program and that re-entry will be conditional on the availability of space. The Program Committee reserves the right to select the quota from among the qualified applicants.

Estimate of Expenses
Attention is drawn to Section VI--Schedule of Fees for information on tuition, University student organizations and rabies immunization required for all students in the program. In addition, while the college supplies most laboratory equipment, students may wish to purchase instruments for personal use. Texts, protective clothing, and a minimum of supplies for personal use may cost approximately $500 per semester.

Health and Safety
Students must follow the health and safety policies required for the various courses in the veterinary program. Pregnant students and others with increased medical risks should consult Health Services concerning potential health risks which may occur during the normal course of their studies.

Immunization against rabies is a requirement for admission and continuation in the D.V.M. Program. Annual rabies titres and booster immunizations (if necessary) are mandatory for all Program participants. Prospective students and in-course students should contact Student Health Services (519-824-4120 extension 52131) for further information and guidance about the rabies surveillance program. Faculty and staff members should contact Occupational Health Services, extension 52133, for information about medical surveillance programs provided in accordance with University Safety Policy 851.13.03.
Schedule 5 (D.V.M. Continuation of Study)

Continuation of Study is assessed on the student's D.V.M. Program Average (not the University Cumulative Average) and according to the policy on failures as stated above. In Phase 2 and beyond, eligibility to continue is also assessed at the end of each Phase using the Phase Average (PHA). Courses that are given a grade of Pass or Fail do not affect either the PA or PHA because they are not attached to any numerical grade.

Students required to repeat a Phase must achieve the required PA of greater than or equal to 60% by the end of the repeated Phase. If a student does not achieve the required standing by the end of the repeated Phase, he or she will normally be required to withdraw from the program.

The required averages are as follows:

For Course Attempts in Phase 1

<table>
<thead>
<tr>
<th>Program Average (PA)</th>
<th>Status of Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA &lt; 50%</td>
<td>Required to Withdraw</td>
</tr>
<tr>
<td>PA ≥ 50% but &lt; 60%</td>
<td>Required to Repeat Phase</td>
</tr>
<tr>
<td>PA ≥ 60%</td>
<td>Eligible to Continue</td>
</tr>
</tbody>
</table>

For Course Attempts in Phase 2 and Phase 3

<table>
<thead>
<tr>
<th>Program Average (PA) and Phase Average (PHA)</th>
<th>Status of Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHA &lt; 50%</td>
<td>Required to Withdraw</td>
</tr>
<tr>
<td>PA or PHA ≥ 50% but &lt; 60%</td>
<td>Required to Repeat Phase*</td>
</tr>
<tr>
<td>PA and PHA ≥ 60%</td>
<td>Eligible to Continue</td>
</tr>
</tbody>
</table>

* Students required to repeat Phase 3 will not be permitted to proceed to the Externship course prior to Phase 4.

If Repeating Phase 1, 2, or 3

<table>
<thead>
<tr>
<th>Program Average (PA)</th>
<th>Status of Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA &lt; 60%</td>
<td>Required to Withdraw</td>
</tr>
<tr>
<td>PA ≥ 60%</td>
<td>Eligible to Continue</td>
</tr>
</tbody>
</table>

For Course Attempts in Phase 4

<table>
<thead>
<tr>
<th>Program Average (PA) and Phase Average (PHA)</th>
<th>Status of Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHA &lt; 50%</td>
<td>Required to Withdraw</td>
</tr>
<tr>
<td>PA or PHA ≥ 50% but &lt; 60%</td>
<td>Required to Remediate**</td>
</tr>
<tr>
<td>PA and PHA ≥ 60%</td>
<td>Eligible to Continue***</td>
</tr>
</tbody>
</table>

** Students finishing Phase 4 with a PA or PHA > 50% but < 60%, will not be permitted to graduate. The Academic Review Sub-Committee will establish the appropriate remediation requirements that must be fulfilled in order for the student to obtain the standing of Eligible to Graduate. These may include repeating a component of a course, one or more entire courses, or one or more clinical rotations.

*** Students finishing Phase 4 with a PA and PHA ≥ 60% and having satisfied all course requirements for the program are Eligible to Graduate.

Schedule of Studies

Phase 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>VETM*3070</td>
<td>2.00</td>
<td>Veterinary Anatomy</td>
</tr>
<tr>
<td>VETM*3080</td>
<td>2.00</td>
<td>Veterinary Physiology and Biochemistry</td>
</tr>
<tr>
<td>VETM*3120</td>
<td>0.75</td>
<td>Veterinary Histology and General Pathology</td>
</tr>
<tr>
<td>VETM*3210</td>
<td>0.50</td>
<td>Art of Veterinary Medicine I</td>
</tr>
<tr>
<td>VETM*3390</td>
<td>0.50</td>
<td>Developmental Biology</td>
</tr>
<tr>
<td>VETM*3400</td>
<td>0.75</td>
<td>Health Management I</td>
</tr>
<tr>
<td>VETM*3430</td>
<td>0.25</td>
<td>Clinical Medicine I</td>
</tr>
</tbody>
</table>

Phase 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>VETM*3220</td>
<td>0.50</td>
<td>Art of Veterinary Medicine II</td>
</tr>
<tr>
<td>VETM*3410</td>
<td>0.75</td>
<td>Health Management II</td>
</tr>
<tr>
<td>VETM*3440</td>
<td>0.50</td>
<td>Clinical Medicine II</td>
</tr>
<tr>
<td>VETM*3450</td>
<td>2.75</td>
<td>Principles of Disease in Veterinary Medicine</td>
</tr>
<tr>
<td>VETM*3460</td>
<td>0.75</td>
<td>Theriogenology</td>
</tr>
<tr>
<td>VETM*3470</td>
<td>0.75</td>
<td>Anaesthesiology and Pharmacology</td>
</tr>
<tr>
<td>VETM*3510</td>
<td>0.25</td>
<td>Principles of Surgery</td>
</tr>
</tbody>
</table>

Phase 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>VETM*4220</td>
<td>0.50</td>
<td>Art of Veterinary Medicine III</td>
</tr>
<tr>
<td>VETM*4420</td>
<td>0.25</td>
<td>Clinical Pharmacology</td>
</tr>
<tr>
<td>VETM*4450</td>
<td>0.50</td>
<td>Equine Medicine and Surgery</td>
</tr>
</tbody>
</table>

Phase 4

Students entering into the Phase 4 of the DVM Program will select an area of emphasis from either: Small Animal Stream, Rural Community Practice Stream, Equine Stream or the Food Animal Stream.

Small Animal Stream:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>VETM*4610</td>
<td>7.50</td>
<td>Small Animal Stream</td>
</tr>
<tr>
<td>VETM*4900</td>
<td>2.50</td>
<td>Veterinary Externship</td>
</tr>
</tbody>
</table>

Rural Community Practice Stream:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>VETM*4660</td>
<td>7.50</td>
<td>Rural Community Practice Stream</td>
</tr>
<tr>
<td>VETM*4900</td>
<td>2.50</td>
<td>Veterinary Externship</td>
</tr>
</tbody>
</table>

Equine Stream:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>VETM*4920</td>
<td>7.50</td>
<td>Equine Stream</td>
</tr>
<tr>
<td>VETM*4900</td>
<td>2.50</td>
<td>Veterinary Externship</td>
</tr>
</tbody>
</table>

Food Animal Stream:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>VETM*4710</td>
<td>7.50</td>
<td>Food Animal Stream</td>
</tr>
<tr>
<td>VETM*4900</td>
<td>2.50</td>
<td>Veterinary Externship</td>
</tr>
</tbody>
</table>
Co-operative Education Programs

Co-operative Education (Co-op), constitutes part of the student’s formal education and is available in over 35 majors for students. A form of experiential learning, Co-op is a model of education that integrates a student’s academic learning with periods of paid workplace learning in fields relevant to the student’s academic and personal/professional goals. The academic and work schedules will vary with degree program and major. The first co-op work term is scheduled after the third or fourth academic semester, providing workplace learning in fields relevant to the student’s area of academic study. COOP*1100 – Introduction to Co-operative Education, a mandatory, non-credit course, is a prerequisite for the first co-op work term and prepares the student for the employment process.

The student’s performance in the workplace is supervised and evaluated by the student’s employer using the Work Performance Evaluation tool. The student’s progress during the work term is also monitored by CECS, which may include a site visit during the co-op work term and a review of the student’s official Learning Goals. A Co-op Work Report is required for each co-op work term and is graded by an assigned Co-op Faculty Advisor. All evaluation grades will appear on the student’s official transcript.

The Co-operative Education program at the University of Guelph is accredited by the Co-operative Education and Work Integrated Learning Canada (CEWIL), therefore standardized guidelines regarding co-op programs will be followed at all times. Course requirements and schedules of studies for specific majors are listed under the appropriate degree program in this section.

In addition to Co-operative Education CECS supports, trains and leads students and alumni as they make career and further education planning decisions. Successful students connect with CECS early in their academic career and take full advantage of the career planning and job search services offered. CECS helps students discern “what to do with their degree”. As well, the CECS job posting service, Recruit Guelph, provides online job postings including full-time, part-time, contract, seasonal, summer and internships. Job & Career Fairs and employer networking events also provide exposure to the working world. Please refer to https://www.recruitguelph.ca/cecs for more information.

Admission Information

Normally students are admitted to a Co-operative Education program directly from high school in the Fall semester through Admission Services. For a complete listing of University of Guelph admission requirements refer to www.uoguelph.ca/admissions. Some programs may admit a limited number of in-course students after first or second semester. Refer to the schedule of dates in the Undergraduate Calendar for in-course application deadlines.

External transfer students may apply to Co-operative Education following admission to the University of Guelph. Students must not be beyond second year of their studies and be interested in one of over 35 co-operative education programs available at the University of Guelph. Interested students should visit https://www.recruitguelph.ca/cecs/for more information on admission eligibility.

The decision to admit an in-course or external transfer student is dependent upon space in the program, the grades of the student, the approved Academic & Work Sequence Agreement, and any other information relevant to the program.

Note: Due to the Schedule of Studies for Hotel & Tourism Management Co-op there is no Winter start date available. Students must begin their program in the Fall term.

Eligibility

High school students must have a minimum average of 80% to apply to the co-op program. Once accepted to the University of Guelph, the student must maintain a 70% cumulative average in the first 2 semesters of full-time study in order to continue in the co-op program. First year in-course students must maintain a 70% cumulative average in their academic semester(s) prior to admission to the co-op program. There must also be space in the co-op program in which they wish to be admitted.

External transfer students must meet normal admission requirements, as well as submit an official transcript from their previous educational institution, and may be required to achieve a minimum 70% cumulative average prior to participating in the co-op employment process. An academic and work schedule must also be approved by the academic department prior to the student being accepted into the co-op program.

Continuation of Study

Students are required to meet a continuation requirement at the end of semester two. Students will be allowed to continue in the co-op program if their cumulative average, over 4.0 credits, is 70% or higher after two full-time academic semesters. * Students are also required to meet the conditions for continuation of study for their degree program as outlined in the Undergraduate Calendar. In addition, all students must satisfactorily complete COOP*1100 - Introduction to Co-operative Education in the semester scheduled.
Withdrawing from Co-op after accepting an eight or twelve month co-op work term will result in the student being responsible for paying the balance of their remaining co-op academic fees at the time of withdrawal.

**Schedule of Studies**

Students are required to follow the schedule of studies as outlined in the Undergraduate Calendar. Where a program has two co-op stream options, students will be defaulted to an established “Stream A”.

If, under exceptional circumstances, the schedule cannot be followed, the student must obtain written approval of an alternative Co-op Academic & Work Sequence Agreement from the academic department and submit the form to CECS for final approval. These exceptions are listed on the sequence form.

There is no guarantee that a sequence revision will be approved.
University of Guelph-Humber

For University of Guelph-Humber programs please refer to http://www.guelphhumber.ca.
Associate Diploma Programs

For Associate Diploma Programs please refer to the Associate Diploma Program Calendar, available on the world wide web at http://www.uoguelph.ca/diploma_calendar/.