



**Faculty of Science**

# Undergraduate Calendar

**2013/14**

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## **IMPORTANT NOTICE AND DISCLAIMER**

This calendar is intended to assist readers to understand the academic and administrative structure and policies and procedures of the University, and to describe the academic programs offered. The material has been submitted by academic units and administrative departments. All general information and course references have been checked for accuracy, but there may be inconsistencies or errors. By the act of registration each student becomes bound by the policies and regulations of York University, including the Faculty in which the student is registered. Students are responsible for familiarizing themselves with the general information, rules and regulations contained in the calendar, and with the specific information, rules and regulations of the Faculty or Faculties in which they are registered or enrolled or seek registration or enrolment, as well as the specific requirements of each degree, diploma or certificate sought. It is the student's responsibility to ensure that the courses chosen are appropriate to the program requirements.

York reserves the right to make changes in the information contained in the calendar without prior notice. Not every course listed in the calendar will necessarily be offered in any academic year. York reserves the right to limit the number of students who enrol in any program or course. While reasonable efforts will be made to offer courses as required within programs, admission to a program does not guarantee admission to any given course.

If there is an inconsistency between the general academic regulations and policies published in the calendar and such regulations and policies as established by resolution of a Faculty or of the University Senate, the version of such material as it is established by a Faculty or the University Senate will prevail.

York University disclaims all responsibility and liability for loss or damage suffered or incurred by any student or other party as a result of delays in or termination of its services, courses, or classes by reason of force majeure, fire, flood, riots, war, strikes, lock-outs, damage to University property, financial exigency or other events beyond the reasonable control of the University.

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## Faculty of Science

<b>Dean:</b>	D.R. Hastie (interim)
<b>Associate Deans:</b>	P.H. Cribb, R. Tsushima
<b>Office of the Dean:</b>	355 Lumbers Building, 416-736-5051
<b>Director, Student and Academic Services:</b>	T. Cuddy
<b>Office of Science Academic Services:</b>	352 Lumbers Building, 416-736-5085

## GENERAL INFORMATION

The Faculty combines excellence in research with an intimate teaching environment in which opportunities for experiential lab-based learning abound. Our mission is to offer the highest quality undergraduate and graduate education in the basic and applied sciences informed and strengthened by research within the international scientific community.

Programs offered span a wide range of basic and applied areas within the broad fields of mathematics, physics, chemistry and biology. In addition students are encouraged to explore science in both its contemporary and historical societal context through a vibrant science and technology studies program and through the broad range of intellectual, academic and cultural opportunities available at a large and diverse University.

BSc, BA, and iBSc degrees are offered at the Honours and Bachelors level. The requirements for completing degree programs are described in detail in this calendar.

## UNDERGRADUATE DEGREE AND CERTIFICATE PROGRAMS

Students may choose to major in a specific subject when they enter the University or they may wait until they have completed up to 24 credits. At this point, students must choose a major, but subsequent changes are possible. In selecting courses, students who are undecided should try to take introductory courses in a number of potential major subjects. This will allow them to proceed in their subject of choice without the possibility of a delay. Some departments will not permit undecided majors to enrol in their courses.

### Bachelor of Arts Degree Programs

Honours Bachelor of Arts (Honours BA) programs require at least four years of full-time study and at least 120 credits. Honours programs may be: Specialised Honours; Honours Major, which may be combined with a second Honours Major or with an Honours Minor; and Honours Minor, which must be combined with an Honours Major.

Bachelor of Arts (BA) programs are usually completed in three years of full-time study, require at least 90 credits and usually involve limited concentration in only one declared subject area.

Programs offered are:

- Specialized Honours with a declared major in one of applied mathematics, mathematics, mathematics for education, or statistics.
- Honours Major with a declared major in one of applied mathematics, mathematics, mathematics for commerce, mathematics for education, or statistics.
- Honours Double Major (intra-Faculty) with a declared major in one of applied mathematics, mathematics, mathematics for education and statistics and a second major in one of applied mathematics, mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics.

- Honours Double Major (Science/Environmental Studies inter-Faculty) with a declared major in one of applied mathematics, mathematics, or statistics and a second major in environmental studies.
- Honours Double Major (Science/Fine Arts inter-Faculty) with a declared major in one of applied mathematics, mathematics, or statistics and a second major in one of dance, film, music, theatre, or visual arts.
- Honours Double Major (Science/Health inter-Faculty) with a declared major in one of applied mathematics, mathematics, mathematics for education, or statistics and a second major in one of health studies, kinesiology and health science, or psychology.
- Honours Double Major (Science/Lassonde School of Engineering inter-Faculty) with a declared major in one of applied mathematics, mathematics, mathematics for education, or statistics and a second major in one of computer science or earth and atmospheric science.
- Honours Double Major (Science/Liberal Arts and Professional Studies inter-Faculty) with a declared major in one of applied mathematics, mathematics, mathematics for education, or statistics and a second major in one of African studies (mathematics or statistics only), anthropology, Canadian studies, children's studies, classical studies, classics, cognitive science, communication studies, creative writing, criminology, culture and expression, disaster and emergency management, East Asian studies, economics, English, European studies (mathematics or statistics only), French studies, geography, German studies, health and society, Hellenic studies, history, humanities, human rights and equity studies, information technology, international development studies, Italian studies, Jewish studies, labour studies, Latin American and Caribbean Studies (mathematics or statistics only), law and society, linguistics, philosophy, political science, professional writing, race, ethnicity and indigeneity, religious studies, science and technology studies, sexuality studies, social and political thought (mathematics and statistics only), social science, sociology, South Asian studies (mathematics and statistics only), Spanish, urban studies, or women's studies.
- Honours Major/Minor (intra-Faculty) with a declared major in one of applied mathematics, mathematics, mathematics for education, or statistics and a minor in one of applied mathematics, biology, chemistry, mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics.
- Honours Major/Minor (Science/Environmental Studies inter-Faculty) with a declared major in one of applied mathematics, mathematics, mathematics for education, or statistics and a minor in environmental studies.
- Honours Major/Minor (Science/Fine Arts inter-Faculty) with a declared major in one of applied mathematics, mathematics, mathematics for education, or statistics and a minor in one of dance, film, music, theatre, or visual arts.
- Honours Major/Minor (Science/Health inter-Faculty) with a declared major in one of applied mathematics, mathematics, mathematics for education, or statistics and a minor in one of health informatics, health management, health policy, kinesiology and health science, or psychology.
- Honours Major/Minor (Science/Lassonde School of Engineering) with a declared major in one of applied mathematics, mathematics, mathematics for education, or statistics and a minor in one of computer science or earth and atmospheric science.
- Honours Major/Minor (Science/Liberal Arts and Professional Studies inter-Faculty) with a declared major in one of applied mathematics, mathematics, mathematics for education, or statistics and a minor in one of African studies, anthropology, business, Canadian studies, children's studies, classical studies, classics, creative writing, culture and expression, disaster and emergency management, East Asian studies, economics, English, European studies, French studies, geography, German studies, health and society, Hellenic studies, history, humanities, human rights and equity studies, information technology, international development studies, Italian culture, Italian studies, Jewish studies, labour studies, Latin American and Caribbean studies, linguistics, philosophy, political science, Portuguese studies, public administration, race, ethnicity and indigeneity, religious studies, science and technology studies, sexuality studies, social and political thought, sociology, South Asian studies, Spanish, urban studies, or women's studies.
- Bachelor with a declared major in one of applied mathematics, mathematics, mathematics for commerce, or statistics.

## Bachelor of Science Degree Programs

Honours Bachelor of Science (Honours BSc) programs are usually completed in four years of full-time study, require at least 120 credits and may involve varying degrees of concentration in one or two declared subject areas. Honours programs may be: Specialised Honours; Honours Major, which may be combined with a second Honours Major or with an Honours Minor; and Honours Minor, which must be combined with an Honours Major. Note that some combinations of Double Major or Major/Minor programs may require more than 120 credits. Honours programs may also include a stream which further specialises the program of study within the declared subject.

Bachelor of Science (BSc) programs are usually completed in three years of full-time study, require at least 90 credits and usually involve limited concentration in only one declared subject area.

Programs offered are:

- Specialized Honours with a declared major in one of applied mathematics, biochemistry, biology, biophysics, chemistry, computational mathematics, environmental science, geography, international dual degree - mathematics and statistics, mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics.
- Honours Major with a declared major in one of applied mathematics, biology, chemistry, environmental biology, mathematics, mathematics for education, physics and astronomy, or statistics.
- Honours Double Major (intra-Faculty) with declared science majors in two of applied mathematics, biology, chemistry, environmental biology (may not be combined with biology), mathematics, mathematics for education, physics and astronomy, science and technology studies, and statistics.
- Honours Double Major (Science/Health inter-Faculty) with a declared science major in one of applied mathematics, biology, chemistry, environmental biology (with kinesiology and health science or psychology only), mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics and a declared health major in one of health studies, kinesiology and health science, or psychology.
- Honours Double Major (Science/Lassonde inter-Faculty) with a declared science major in applied mathematics, biology, chemistry, environmental biology, geography (in combination with earth and atmospheric science only), mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics and a declared Lassonde major in computer science or earth and atmospheric science.
- Honours Double Major (Science/Liberal Arts and Professional Studies inter-Faculty) with a declared science major in applied mathematics, mathematics, mathematics for education, physics and astronomy, science and technology studies or statistics and a declared liberal arts and professional studies major in one of anthropology, Canadian studies, children's studies, classical studies, classics, communication studies, cognitive science, creative writing, criminology, culture and expression, disaster and emergency management, East Asian studies, economics, English, French studies, German studies, health and society, Hellenic studies, history, humanities, human rights and equity studies, international development studies, Italian studies, Jewish studies, labour studies, law and society, linguistics, philosophy, political science, professional writing, race, ethnicity, and indigeneity, religious studies, sexuality studies, social science, sociology, Spanish, urban studies, or women's studies. In addition, students in applied mathematics, mathematics, mathematics for education or statistics may combine their major with a second major in information technology.
- Honours Major/Minor (intra-Faculty) with a declared science major in one of applied mathematics, biology (including the biomedical science stream), chemistry, environmental biology (may not be combined with biology), geography, mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics and a declared science minor in one of applied mathematics, biology, chemistry, geography, mathematics, mathematics for commerce, mathematics for education, physics and astronomy, science and technology studies, or statistics. Note: major/minor combinations with the major and minor in the same subject area are not permitted.
- Honours Major/Minor (Science/Environmental Studies inter-Faculty) with a declared science major in one of applied mathematics, biology, chemistry, environmental biology, mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics and a declared minor in environmental studies.



- Honours Major/Minor (Science/Fine Arts inter-Faculty) with a declared science major in one of applied mathematics, biology, chemistry, environmental biology, mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics and a declared fine arts minor in one of dance, film, music, theatre, or visual arts. Note: choice of major and minor is subject to timetabling constraints.
- Honours Major/Minor (Science/Health inter-Faculty) with a declared science major in one of applied mathematics, biology, chemistry, environmental biology, geography, mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics and a declared health minor in one of health informatics, health management, health policy, kinesiology and health science, or psychology.
- Honours Major/Minor (Science/Lassonde inter-Faculty) with a declared science major in one of applied mathematics, biology, chemistry, environmental biology, geography, mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics and a declared Lassonde minor in computer science or earth and atmospheric science.
- Honours Major/Minor (Science/Liberal Arts and Professional Studies inter-Faculty) with a declared science major in one of applied mathematics, biology, chemistry, environmental biology, mathematics, mathematics for education, physics and astronomy, science and technology studies, or statistics and a declared liberal arts and professional studies minor in one of African studies, anthropology, business, Canadian studies, children's studies, classical studies, classics, creative writing, culture and expression, disaster and emergency management, East Asian studies, economics, English, European studies, French studies, German studies, health and society, Hellenic studies, history, humanities, human rights and equity studies, international development studies, Italian culture, Italian studies, Jewish studies, labour studies, Latin American and Caribbean studies, linguistics, philosophy, political science, Portuguese studies, public administration, race, ethnicity, and indigeneity, religious studies, sexuality studies, social and political thought, sociology, South Asian studies, Spanish, urban studies, or women's studies. Note: in addition, students in applied mathematics, mathematics, mathematics for education or statistics may combine their major with a minor in information technology.
- Honours Science with no declared major, for the student who wishes to enrol in a broader range of courses at the 3000 and 4000 levels than can normally be undertaken in other BSc programs.
- Bachelor with a declared major in one of applied mathematics, biology, chemistry, environmental biology, geography, international dual degree - mathematics and statistics, mathematics, physics and astronomy, science and technology studies, or statistics.
- Bachelor with no declared major for the student who wishes to enrol in a broader range of courses at the 3000 and 4000 levels than can normally be undertaken in BSc programs.

### **International Bachelor of Science Degree Programs**

International Bachelor of Science (iBSc) programs, which require at least four years of full-time study, at least 120 credits, and one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement:

- Specialized Honours, with one declared major in biology; Honours Major with one declared major in biology (can include the biomedical stream); Honours Major/Minor with biology as the major (can include the biomedical stream).

### **Bachelor of Science in Technology Degree Programs**

- Bachelor of Science in Technology (BSc (Tech)). Bachelor in applied biotechnology, offered jointly with Seneca College.

## **Joint Study Programs**

### **Intra-Faculty Honours Double Major and Major/Minor Programs**

Most subject areas within the Faculty of Science offer Honours Double Major and Honours Major Minor programs jointly with another subject area in the Faculty, allowing students to concentrate on two fields of interest. Such programs are open to students who have completed 24 credits in an Honours program and who satisfy the Faculty of Science academic standards to proceed in Honours. All Honours programs require a minimum of 120 credits which can normally be completed in four years of full-time study. For a list of possible subject combinations, refer to the sections above. Some combinations may require more than 120 credits.

### **Inter-Faculty Double Major and Major/Minor Programs**

The Faculty of Science jointly offers Honours Double Major programs and Honours Major Minor programs with other Faculties at the University, allowing students to combine diverse areas of interest. Such programs are open to students who have completed 24 credits in an Honours program and who satisfy the Faculty of Science academic standards to proceed in Honours. All Honours programs require a minimum of 120 credits which can normally be completed in four years of full-time study. Combined program require careful planning and may take longer than four years, and/or more than 120 credits to complete.

A program involving a first major in the other Faculty and a major or minor in the Faculty of Science lead to an Honours BA, BES, BFA or BSc degree in the other Faculty.

For a list of possible subject combinations, refer to the sections above. For details of the major or minor requirements for each program in the Faculty of Science, refer to the Faculty of Science Programs of Study section. For details of the major or minor requirements in the other Faculty, refer to the Programs of Study section of the appropriate Faculty.

## **Science and Education**

A student wishing to obtain the professional certification required to teach in Ontario schools may take both teacher training and an undergraduate academic program concurrently. This does not shorten the time required to gain the qualification but provides a better chance for the student to relate theory and practice and to have more opportunity to gain practical experience than is possible in a one-year program.

A student in the Faculty of Science who is presently enrolled in first year (at least 24 credits) or has a minimum of 36 credits remaining in the BSc, Honours BSc, BA or Honours BA with an overall standing of at least 5.00 (C+) may apply to coregister in the Faculty of Education. A coregistered student normally takes one and a half or two full courses in the Faculty of Education in an academic year concurrent with courses for the BSc, Honours BSc, BA or Honours BA. The specific study program of each student is subject to the approval of both Faculties.

Upon successful completion of the course requirements for the degree in the Faculty of Science, and of the required education courses, a coregistered student is awarded a BSc, Honours BSc, BA or Honours BA and a BEd.

## **Certificate Programs**

There are numerous certificate programs offered by other Faculties in various subject areas, allowing recognition of a specialised area of study. Certificate programs are open to all undergraduate students, subject to student eligibility and course availability. The following certificates, offered by departments in other Faculties may be of interest to students taking programs in the Faculty of Science.

### **Certificate in Geographic Information Systems (GIS) and Remote Sensing**

This certificate is offered jointly by the Department of Earth and Space Science and Engineering of the Lassonde School of Engineering, the Department of Geography of the Faculty of Liberal Arts and Professional Studies and the Faculty of Environmental Studies.

The certificate program includes three streams, one offered through each of the three units above. Honours BSc or BSc candidates majoring in environmental science or geography may be particularly interested in this certificate.

For additional information, consult the three units mentioned above.

### **Certificate in Meteorology**

This certificate is offered by the Department of Earth and Space Science and Engineering, Lassonde School of Engineering. The program is open to any student who satisfies the program admission requirements. Entrance to the program requires the candidate to have successfully completed at least 54 approved credits (nine approved full courses) in the areas of physical science and mathematics.

For additional information, consult the Department of Earth and Space Science and Engineering.

## ADVISING, ENROLMENT, REGISTRATION, GRADUATION AND OTHER ADMINISTRATIVE PROCEDURES

### Student Responsibility

Every effort is made in the Faculty of Science to ensure that each student receives academic advice and sufficient information to guide in course selection and program choice. Within this context, the student is solely responsible for the following:

- ensuring that the courses chosen in consultation with an adviser meet all program (refer to the Faculty of Science Programs of Study section) and degree (refer to the Faculty of Science Regulations Governing Undergraduate Degree Requirements section) requirements for graduation;
- ensuring that course prerequisites are satisfied and that chosen courses are not exclusions of other courses already taken;
- verifying the accuracy of registration records, including all course changes;
- fulfilling the requirements and being aware of academic progress in all registered courses;
- noting and abiding by the sessional deadline dates published on the Current Students Web page each year, especially course add and drop deadline dates.

### Advising

Before each academic session begins, every student can meet with an adviser to discuss program and degree requirements. However, it is the responsibility of all students to familiarize themselves with both the requirements of their individual programs of study (refer to the Faculty of Science Programs of Study section) and the regulations governing their degree requirements (refer to the Faculty of Science Regulations Governing Undergraduate Degree Requirements section).

In preparation for enrolment, and at the advising appointment, the following should be considered:

- **Choice of subject area(s).** Every student must choose one or two subject area(s) according to personal interests and career goals.
- **Choice of program.** All students who have completed 24 or more credits must choose a program (bachelor, Specialized Honours, Honours Major, Honours Double Major or Honours Major/Minor) in accordance with Faculty of Science regulations, including minimum grade point average requirements for Honours programs. See Faculty of Science Regulations Governing Undergraduate Degree Requirements, Faculty of Science Regulations Governing Examinations and Academic Standards (Designation of Honours or Bachelor Program section), and the program of study requirements in the Faculty of Science Programs of Study section.
- **Faculty of Science degree requirements and regulations.** Refer to the Faculty of Science Regulations Governing Undergraduate Degree Requirements section.

- **Course selection at the 1000 level.** The 1000-level (entry-level) of all programs is multidisciplinary. Course requirements are outlined under the program of study requirements for each subject area in the Faculty of Science Programs of Study section. Besides ensuring that students are well prepared for more advanced study in the subject areas of their choice these requirements ensure that students achieve an adequate and appropriate breadth in science, help students to develop basic computational, mathematical and laboratory skills, and also an appreciation of the humanities and social sciences. Most introductory courses carry prerequisites, normally at the 12U level. Unless stated otherwise in the program of study requirements Honours Double Major candidates and Honours Major/Minor candidates are expected to complete all 1000-level requirements for both majors and/or minor, excepting course credit exclusions. Since the normal yearly full-time credit load is 30 credits, it may not be possible for the student to complete all the 1000-level requirements for any degree program in year one. It is important to complete in year one those courses that are prerequisites for required 2000- level courses or that are introductory to the major or minor subject area. It is advisable to complete as many of the other required 1000-level courses as possible in year one to avoid timetable conflicts in later years. In some circumstances, equivalent courses approved in writing by the major program(s) may be substituted for the courses listed.
- **Course selection above the 1000 level.** Complete details of the course requirements for all subject areas and programs are found in the Faculty of Science Programs of Study section. Degree checklists for all programs/subject areas are available from the Office of Science Academic Services.
- **Prerequisites/corequisites.** Most courses in the Faculty of Science have prerequisite and/or corequisite requirements. These may be specific courses (indicating specific required background knowledge) or they may be general prerequisites (indicating a required level of maturity in university studies in the subject area or overall). As indicated in the Faculty of Science Regulations Governing Undergraduate Degree Requirements section, it is the student's responsibility to enrol in only those courses for which the student has successfully completed all designated prerequisites and to take concurrently all specified corequisites not already completed successfully. Students who lack the stated prerequisites but have reason to believe they can succeed in a course must obtain written permission from department concerned (consult the departmental undergraduate office regarding the procedure to be followed) before enrolling.
- **Course credit exclusions.** Students should avoid enrolling in any two courses which are designated as course credit exclusions of one another, since credit will be given for only one. For more information regarding course credit exclusions, refer to Course Credit Exclusions in the Faculty of Science Regulations Governing Undergraduate Degree Requirements section.
- **Scheduling.** All information regarding courses to be offered in each session, times, places etc. is found on the York Courses website (<https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm>).

### **Changes in Program/Subject Area(s)**

Candidates may change their degree programs and/or subject area(s) from the time of their advising sessions in the spring until the tenth class day of the fall term, provided their standing, prescription of studies and timetable arrangements permit the proposed changes, and provided they are supported in writing by the academic advisers concerned. All program and subject area changes must be effected through the Registrar's Office by submitting a Program Change Request available on the Program Change Web page at <http://www.registrar.yorku.ca/program/change/index.htm>. Transfer credit assessments must be reviewed after any change in program/subject area.

### **Enrolment**

Students enrol in courses through the Web enrolment system. Information on how to use the system is provided on the Enrolment and Registration Guide Web page at <http://www.registrar.yorku.ca/enrol/guide/index.htm>.

A maximum of 33 credits during a fall/winter session and 15 credits during a summer session may be taken at York University and/or at another institution.

### **Course Changes**

Course changes are permitted, but only for limited periods of time, and in accordance with the sessional dates in the enrolment guides. Written permission of the course instructor(s) may be required. Students should consult their advisers regarding the effect course changes may have on the fulfillment of program and degree requirements, but it is the responsibility of the student alone to recognize the consequences of course changes on academic progress. Students are responsible for verifying their enrolment during each academic session.

### **Transfer Credit**

Transfer credit towards a York University degree may be granted for courses taken at other accredited postsecondary institutions prior to registration at York University. Transfer credit assessments for the Faculty of Science are specific to the program and subject area(s) in which the student plans to enrol at York University. If the student does not enrol in the program(s) and subject area(s) specified on the admission application or, subsequent to first registration, changes subject area(s) and/or program(s), the transfer credit must be reassessed.

### **Letters of Permission**

A student wishing to take a course at an external accredited institution for credit towards a degree program in the Faculty of Science is required to obtain a letter of permission from York University prior to taking the course.

Request forms, and detailed information and instructions, for letters of permission are available online on the Letters of Permission Web page at <http://www.registrar.yorku.ca/enrol/lop/index.htm>.

## **Reactivation**

A student who has been absent from the University for one or more session(s) must apply to be reactivated to the Registrar's Office (available online at <http://www.registrar.yorku.ca/enrol/reactivate/index.htm>).

**Note:** this does not apply to students who have been debarred from York University or to students who have taken postsecondary courses at another institution during their absence from York University; all such students must apply, through the Admissions Office, to be re-admitted to York University.

## **Graduation**

Students should apply to graduate in the calendar year in which they expect to qualify for the degree, irrespective of whether or not they plan to attend the graduation ceremony. A student registered in an Honours program may apply to graduate with a bachelor degree, provided bachelor program requirements are met. The application to graduate can be found on the Apply to Graduate Web page at <http://www.yorku.ca/mygraduation/preparing/apply/index.htm>.

## **Degree Reclassification**

A student who has completed a York University bachelor degree in the Faculty of Science may continue, after graduation, in a Specialized Honours program in the same subject area or in an Honours Double Major or Honours Major/Minor program including the same subject area, provided the grade point average is that required for the Honours program.

A student who wishes to pursue a second degree in a different field of study must apply to the Admissions Office for admission as a second degree candidate.

## REGULATIONS GOVERNING EXAMINATIONS AND ACADEMIC STANDARDS

### Grading System

Refer to Grades and Grading Schemes within the Academic Information section of this publication. Note that percentages are not part of the official grading scheme and are only to be used as guidelines. The letter-grade system is the fundamental system of assessment of performance in undergraduate programs at York University. Note also that grades submitted by an instructor are subject to review by the teaching unit in which the course is offered and by the Faculty Council through its Committee on Examinations and Academic Standards. Grades appear on grade reports and transcripts as soon as they are submitted to the Registrar's Office and are not official until they have been reviewed and approved. Final course grades may be adjusted to conform to program or Faculty grades distribution profiles.

### Pass/Fail Grading Option

A pass/fail grading option is available to Faculty of Science students under the following conditions: 1) the student is in good standing (i.e. not under academic or debarment warning); 2) the student has successfully completed at least 24 credits before they apply to take a course under this option; 3) courses that may not be taken on a pass/fail basis include those in the major and minor subject area(s), those taken to satisfy general education, science breadth, or certificate requirements (refer to the Regulations Governing Undergraduate Degree Requirements section), required 1000-level science courses, and non-major courses required to satisfy program requirements; 4) a maximum of 12 (passed) credits may be counted towards an Honours program and a maximum of six (passed) credits from pass/fail graded courses may be counted towards a bachelor program; 5) the grade obtained in a pass/fail graded course is not included in grade point average calculation; 6) the option must be exercised within the first two weeks (10 class days) of the term, with the approval of the course director on a form available from the Pass/Fail Option Web page at <http://www.registrar.yorku.ca/enrol/passfail/index.htm> which must be returned to Student Client Services by this deadline; 7) the student may change the designation of a course from pass/fail back to the letter-grade system until the last day for withdrawal without academic penalty with formal notification, including the student's and course director's signatures, to be received by the Registrar's Office by this deadline.

### Repeated Courses

Students are allowed to repeat a passed or a failed course once for academic degree or certificate credit. Students should note that course availability and space considerations may preclude the possibility of repeating a course in the session they choose.

When a student is allowed to repeat a course for academic degree or certificate credit, the second grade will be the grade of record and the only grade calculated in the student's grade point average. Regardless of whether or not the student repeats a course a third time, the second grade remains the grade of record. Students are required to petition in order to gain permission to repeat a passed course more than once for academic credit towards a degree or certificate program. The record of each time a course was taken will appear on the student's transcript, with the all such attempts except the second being designated as NCR (No Credit Retained).



A student must be declared eligible to proceed in a degree or certificate program in order to be eligible to repeat a course. That is to say, when a student fails to achieve sufficient standing to proceed in a degree or certificate program, or when they are required to withdraw, they would not be eligible to repeat a course or courses.

### **Academic Standards for Bachelor and Honours Programs**

#### **Bachelor Programs**

**To graduate in a bachelor program.** A minimum overall grade point average of 4.00 (C) is required in order to be eligible to graduate in an undergraduate bachelor program.

Students in a bachelor program who have passed 90 credits in accordance with Faculty and program requirements, but whose cumulative overall grade point average is below 4.00 (C), may attempt to raise their average by taking up to 12 additional credits, to a maximum of 102 credits. These courses must be above the 1000 level and must be taken at York University. Regulations on equivalent and excluded courses apply.

#### **Honours Programs**

Honours students are classified by year according to the number of credits they have obtained (see below):

<b>Year</b>	<b>Credits</b>
1	Fewer than 24
2	Fewer than 54
3	Fewer than 84
4	At least 84

Subject to the selection criteria of the major departments, students will be registered in the Honours program who, upon completion of each academic session, have a cumulative average as follows:

<b>Year</b>	<b>Cumulative Overall Average</b>
1	4.00
2	4.25
3	4.80
4	5.00

Students who have taken 84 credits, and who wish to proceed in an Honours program must have a cumulative grade point average of 5.00 overall.

To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed, subject to the exception that some programs may require a higher standard - consult the program of study requirements in the Faculty of Science Programs of Study section.

### **Academic Standing Requirements for Visiting Students**

Individuals who wish to enrol in undergraduate credit courses, but who do not intend to complete a degree or a certificate may be admitted to York as a visiting student (refer to the Admissions section for more information). There are three categories of visiting students:

- a. those who hold an undergraduate degree (three-year bachelor's degree minimum) from an accredited university/university-level institution;
- b. those who do not hold an undergraduate degree but wish to enrol in York courses to fulfill the academic, upgrading or professional development requirements of a professional designation;
- c. those who are currently attending another recognized university and wish to take York courses on a letter of permission issued by their home institution.

### **Grade Point Average (GPA) Requirement**

Students in categories a) and b) whose overall cumulative grade point average (OCGPA) falls below 4.00 on at least 24 credits attempted will not be allowed to enrol in any subsequent session as visiting students. Students who are not permitted to re-enrol must apply for re-admission through the Admissions Office.

**Note:** repeated course legislation does not apply to visiting students but only to academic degrees and certificates. Therefore, all courses attempted or taken will count in the OCGPA.

### **Credit Limits**

Students in category b) who have maintained an OCGPA of 4.00 throughout their studies and who have completed 30 credits will not be allowed to enrol in subsequent sessions and must either reactivate to proceed as visiting students or may choose to apply for admission to a degree or certificate program.

### **Designation of Honours or Bachelor Program**

**Automatic Honours designation.** Students are automatically considered to be in an Honours program provided they achieve and maintain the minimum grade requirements for Honours described under the Academic Standards for Bachelor and Honours Programs section above.

**Automatic bachelor designation.** Students are automatically considered to be in a bachelor program if they fail to achieve or maintain the minimum grade requirements for Honours described under the Academic Standards for Bachelor and Honours Programs section above.

**Option to graduate with a bachelor program.** Students registered for an Honours degree may opt to graduate with a bachelor degree if they fulfill bachelor program requirements. Refer to Graduation in the Faculty of Science Advising, Enrolment, Registration, Graduation and Other Administrative Procedures section for details.

## **Examinations**

Students must maintain a standard of work in their courses of instruction satisfactory to the departments or divisions concerned, and must attend the required tests and examinations, unless prevented by illness or by some other special circumstance.

Identification is required when writing tests and final examinations. Generally this will be the YU-card with a photo or the YU-card without a photo plus a photo-bearing form of identification such as a driver's licence or passport. Chief invigilators control the conduct of tests and examinations, including such measures as: 1) the seating of students; 2) whether or not questions are permitted; 3) when students may leave the examination hall; 4) collection of examination answer sheets/booklets.

Unauthorized aids may not be taken into the examination halls. A student observed deriving assistance from any unauthorized source is subject to the procedures and penalties defined under the Senate regulations regarding academic honesty (refer to the University Policies and Regulations section).

Examination booklets, used and unused, must be submitted intact, with no insertions and no pages removed. All students must remain seated at the conclusion of the examination period until examination papers have been collected. Final examination answer sheets/booklets become the property of the teaching unit. Students have the right to review their graded tests and examinations once the grades have been published by the Registrar's Office.

## **Deferred Examinations / Aegrotat Standing**

A student may request aegrotat standing, permission to write deferred examinations (in respect of final examinations only) or permission to submit a final assignment after the Faculty's deadline for submission of term work, on the grounds of sickness or misfortune. There is no provision for rewriting a final examination to improve a grade.

It is the responsibility of the student to ensure that full documentation (medical or other) is provided in support of requests for deferred standing or aegrotat standing. A request submitted on the grounds of illness must include the attending physician's statement form completed by the petitioner's physician. Appropriate forms and guidelines are available from the Deferred Standing Web page at <http://www.registrar.yorku.ca/exams/deferred/index.htm>.

**Deferred standing agreement.** In the Faculty of Science, deferred standing may be arranged with the course director by means of a form called a deferred standing agreement (DSA). The DSA form and supporting documentation must normally be submitted within one week following a missed examination or the last day to submit course work.

**Deferred standing petition.** A petition for deferred standing may be submitted if the course director indicates on the DSA form a refusal to approve deferred standing. The petition application, together with other written evidence to be taken into consideration, must normally be submitted to the Registrar's Office within one week following a missed examination or the last day to submit coursework.

**Aegrotat standing petition.** In exceptional circumstances, a petition for aegrotat standing may be submitted in cases where a student cannot be expected to complete coursework. If granted, the phrase AEG "aegrotat standing" (from the Latin for "she/he is ill") is substituted for the grade on the transcript. Aegrotat standing is seldom granted in respect of final examinations; instead, the student may be granted permission to write deferred examination(s).

### **Term Work**

All final grades, including those assigned after deferred examinations, are calculated in a way which assigns a specific weighting to the term work done in addition to the final (or deferred) examination. The weighting is set by the course director and must be announced and available in writing within the first two weeks of classes. If possible, information about assignments, marking schemes and evaluation should be made known to students at or before the first class meeting. A previously announced marking scheme for a course may be changed by the course director with the consent of students enrolled in the course; the new marking scheme must also be distributed in written form.

Prior to the final date to withdraw from a course without receiving a grade, graded feedback worth at least 15 per cent of the final grade for fall, winter or summer term and 30 per cent for 'full year' courses offered in the fall/winter session must be received by students in all courses (excepting the following: those senior undergraduate courses, such as honours theses, where course work consists of a single piece of work, practicum courses, ungraded courses, courses in Faculties where the drop date occurs within the first three weeks of classes, courses which run on a compressed schedule). Students who, in the absence of recognized extenuating circumstances, fail to complete such course work cannot use the lack of feedback as grounds for withdrawal.

No examinations or tests collectively worth more than 20 per cent of the final grade in a course will be given during the final 14 calendar days of classes in a term. The exceptions to the rule are classes which regularly meet Friday evenings or on Saturday and/or Sunday at any time, and courses offered on a compressed schedule.

All tests in a given section of a course must be given during the class or tutorial times listed in the lecture schedule for that section of the course. The only exception is the scheduling of common tests administered to multiple-section courses; in such cases students with a conflict must be given reasonable accommodation.

Term work in any course may not be submitted later than the first day of the final examination period for the course. Earlier final dates for the submission of term work may be set at the discretion of the department/division concerned.

The student is responsible for ensuring that all written term work is received by the instructor concerned.

## **Reappraisal of Final Grades**

Students may, with sufficient academic grounds, request that a final grade in a course be reappraised. Students are normally expected to first contact the course director to discuss the grade received and to request that their tangible work be reviewed. Further information may be obtained from the department/division offering the course. Students applying to have a grade reappraised in a Faculty of Science course should note the following:

- requests for reappraisal must be filed with the unit offering the course within 21 calendar days of the release of the final grade in the course;
- students may request the review of specific pieces of work, or the overall course grade. Normally, however, only written work can be reassessed;
- when a student asks for reappraisal, an original grade may be raised, lowered or confirmed;
- students wishing to request the reappraisal of a final grade should fill out the appropriate form available from the department/division offering the course and submit it to the same office;
- the decision of the department/division may be appealed to the Faculty of Science Executive and Planning Committee only on grounds of procedural irregularity or new evidence.

## **Recognition of Excellence**

### **Dean's Honour Roll**

The annual Dean's Honour Roll recognizes academic excellence by assigning the notation "Member of Dean's Honour Roll" to the grade report and transcript of a student who achieves a sessional credit-weighted grade point average of 7.50 or higher on a minimum of 24 credits, or, in the final year of study, a minimum of 18 credits.

Students coregistered in the Faculty of Education, who are registered in a minimum of 24 credits overall (of which at least 18 credits are for the bachelor or Honours degree in the Faculty of Science) and who achieve a sessional credit-weighted grade point average of 7.50 or higher on their credits for the bachelor or Honours in the Faculty of Science, are also eligible to be on the Faculty of Science Dean's Honour Roll.

### **First-Class Degrees**

The Faculty of Science rewards exceptional students by designating their degrees "first class" or "first class with distinction".

First-class standing is normally awarded to students whose cumulative overall credit-weighted grade point average is 7.50 or higher.

With distinction is normally added to the first class degree of students whose cumulative overall credit-weighted grade point average is 8.00 (A) or higher.

## **Warnings and Sanctions (BA)**

### **Academic Warning**

Students whose cumulative overall grade point average falls below 4.00 (C) at the end of any session or who enter the Faculty with a grade point average equivalent to less than 4.00 (C) receive an academic warning.

### **Academic Warning Conditions**

Students on academic warning must achieve a cumulative grade point average of at least 4.00 within the next 24 credits taken, or earn a sessional grade point average of at least 5.00 in the session in which that 24th credit is taken and in each subsequent session until the cumulative grade point average reaches 4.00, or be required to withdraw. Students whose cumulative grade point average on at least 24 York credits is below 2.50 will be required to withdraw for 12 months.

### **Failure to Meet Academic Warning Conditions**

BA students on academic warning who fail to meet the academic warning conditions must withdraw for 12 months.

### **Required Withdrawal**

Students whose academic record shows marked weakness may be required to withdraw from their studies for twelve months, during which they are encouraged to identify and remedy any problems which may have contributed materially to their failure to perform up to their potential, and to reflect on their reasons for pursuing a university education. The following regulations apply to required withdrawal:

- **Grade point average below 2.50:** students whose cumulative grade point average on at least 24 credits is below 2.50 must withdraw for 12 months.
- **Students whose grade point average is below 4.00 and equal to or greater than 2.50:** students who have received an academic warning for a cumulative grade point average below 4.00 must satisfy the academic warning conditions as specified above or be required to withdraw for 12 months.

### **Reactivation After Required Withdrawal**

Students who have been required to withdraw may apply for reactivation after the requisite period of absence by submitting a request at the Reactivation Web page at <http://www.registrar.yorku.ca/enrol/reactivate/index.htm>. Students who return to their studies after such a required withdrawal (as well as those who have been allowed to continue their studies by virtue of a petition to the Petitions Committee) receive a debarment warning.

## **Debarment Warning**

Students who have been required to withdraw in the Faculty of Science, or the equivalent in another Faculty at York University or elsewhere, receive a debarment warning upon continuing their studies in the Faculty.

## **Debarment Warning Conditions**

Students on debarment warning must achieve a cumulative grade point average of at least 4.00 within the next 24 credits taken or earn a sessional grade point average of at least 5.00 in the session in which the 24th credit is taken and in each subsequent session until the cumulative average reaches 4.00, and must then maintain this average. Students who do not fulfil these conditions will be debarred from the University.

## **Debarment**

Students who have been debarred may be re-admitted in some subsequent session only if they give convincing evidence that they can profit from university work. Applications for re-admission are not normally entertained in less than two years from the date of debarment. Applications must be submitted to the Admissions Office <http://futurestudents.yorku.ca>. Students who are re-admitted (as well as those who have been allowed to continue their studies by virtue of a petition) receive an academic probation.

## **Academic Probation**

Students who have been debarred and who subsequently resume their studies in the Faculty whether by petitioning to continue without interruption or by applying for readmission, receive an academic probation. Students on academic probation must meet the debarment warning conditions outlined above; otherwise, they will be debarred.

## **Warnings and Sanctions (BSc, BSc (Tech ), iBSc)**

**Note:** the following applies to students admitted to the Faculty for Fall 2013 and subsequent sessions. Students admitted before Fall 2013 should consult the York Undergraduate Programs Calendar of the year in which they were admitted for information regarding warnings and sanctions which apply to them.

## **Academic Warning**

Students whose cumulative overall grade point average falls below 4.00 (C) at the end of any session, or who enter the Faculty with a grade point average equivalent to less than 4.00 (C) on the York scale receive an Academic Warning.

## **Academic Warning Conditions**

Students on Academic Warning must achieve a cumulative overall grade point average of at least 4.00 within the next 24 credits taken, or earn a sessional grade point average of at least 5.00 in the session in which that 24th credit is completed and in each subsequent session until the cumulative grade point average reaches 4.00, or be required to withdraw.

## **Required to Withdraw**

Students whose academic record shows marked weakness may be required to withdraw from their studies for one year, during which they are encouraged to identify and remedy any problems which may have contributed materially to their failure to perform to their potential, and to reflect on their reasons for pursuing a university education. The following regulations apply to Required Withdrawals:

1. Grade Point Average Below 2.5: Students whose cumulative grade point average on at least 24 York credits is below 2.5 must withdraw for 12 months.
2. Failure to satisfy Academic Warning conditions: Students who fail to meet the Academic Warning Conditions above will be required to withdraw.

## **Petition to Continue Without Interruption**

Students who have been required to withdraw may submit a petition to their home Faculty Petitions Committee requesting permission to continue their studies without interruption. Students granted such a petition will be allowed to continue their studies on Debarment Warning.

## **Reactivation after Required Withdrawal**

Students who have been required to withdraw must apply for reactivation after the requisite period of absence by submitting a reactivation request to the Registrar's Office. Students who return to their studies after a Required Withdrawal (as well as those who have been allowed to continue their studies by virtue of a petition to the Committee on Petitions) receive a Debarment Warning.

## **Debarment Warning**

Students who have been required to withdraw receive a Debarment Warning upon continuing their studies in the University.



### **Debarment Warning Conditions**

Students on Debarment Warning must achieve a cumulative overall grade point average of at least 4.00 within the next 24 credits taken or earn a sessional grade point average of at least 5.00 in the session in which that 24th credit is completed and in each subsequent session until the cumulative grade point average reaches 4.00, and must then maintain this average in order to continue.

### **Debarment**

Students who fail to meet the Debarment Warning Conditions outlined above will be Debarred from the University. Debarment, the minimum period for which is normally two years, means that the student is no longer a student at York University.

### **Petition to Continue Without Interruption**

Students who have been Debarred may submit a petition to their home Faculty Petitions Committee requesting permission to continue their studies without interruption. Students granted such a petition will be allowed to continue their studies on Academic Probation.

### **Reapplying after Debarment**

Students who have been Debarred and who wish to resume their studies must apply for admission through the Admissions Office, and must provide persuasive evidence that they are ready and able to complete a degree program. Students who are readmitted (as well as those who have been allowed to continue their studies by virtue of a petition to the Petitions Committee) continue on Academic Probation.

### **Academic Probation**

Students who have been Debarred and who subsequently resume their studies at the University, whether by petitioning to continue without interruption or by reapplying for admission, continue on Academic Probation. Students on Academic Probation must meet the Debarment Warning Conditions outlined above; otherwise, they will be Debarred again.

### **Academic Honesty**

Refer to the York University Senate regulations regarding academic honesty in the University Policies and Regulations section. For further information contact the Office of Science Academic Services.

**Note:** students cannot drop any courses in which they have been penalized for a breach of academic honesty.

## **Petitions**

Students may petition on reasonable grounds, in writing, any Faculty of Science regulation. In some instances, circumstances affecting a student's performance in initial University course work will be accepted as grounds for petition. All enquiries about regulations and petition procedures should be addressed to the Registrar's Office. For information regarding petitions for deferred examinations, refer to Deferred Examinations in this section of the calendar. Petition forms must be submitted to Student Client Services.

Normally petitions for late withdrawal from a course will only be considered if they are submitted within 30 days of the last day of classes of the relevant course. Such petitions may be considered for a period of up to one year if they are based on special circumstances.

## **Appeals Procedures**

Appeals by students and/or faculty members against rulings of the Petitions Committee and/or the Committee on Examinations and Academic Standards of the Faculty of Science (with the exception of appeals on academic honesty rulings - see below) must be filed in writing with the secretary of the appeals panel of the Executive and Planning Committee, 349 Lumbers Building, within 15 calendar days of the date of notification of the decision.

Appeals against rulings of the petitions committee and/or the committee on examinations and academic standing will be heard by a panel of two faculty members of the executive and planning committee and one student member selected from student members of the Faculty council. In the rare event that a decision of a panel of the executive and planning committee, or of the Senate Appeals Committee, requires a completely new (de novo) hearing, the matter will be heard by a panel of three faculty members of the executive and planning committee and one student member selected from student members of the Faculty council. These panels will be constituted, as required, from available members, by the secretary of the appeals panel.

Members shall disqualify themselves if they are involved as a party or witness in the case, or believe that they could not be impartial. Where members disqualify themselves, alternate members will replace them.

Appeals are heard only on the following grounds:

a) new evidence; i.e. evidence that, through no fault of the appellant, could not reasonably have been presented at an earlier level (as a guide, events or performance subsequent to the decisions of the petitions committee and/or the committee on examinations and academic standing are not to be construed as new evidence);

b) evidence of procedural irregularity in the previous consideration of the case by the petitions committee and/or the committee on examinations and academic standing. This may be understood to include actions taken by the Faculty of Science, its officers, committees or members with respect to the case which would violate or nullify any of the following:

- normal and written procedures of the Faculty;

- recognized custom of the Faculty;
- the principles of natural justice and fairness.

Students and faculty members have the right to represent themselves at appeal hearings to hear and answer allegations and to present their arguments. Appeal hearings are not open to anyone not directly involved in the case being considered. The committee's decision is taken in camera.

All appeal decisions are reported in writing to the students and the faculty members concerned, the Office of Science Academic Services, the home Faculty and the Registrar's Office.

Further appeals may be made to the Senate Appeals Committee. Enquiries about these appeals, and the grounds upon which they may be filed, should be directed to the Senate Secretariat, 1050 York Research Tower.

Appeals on academic honesty rulings are also made directly to the Senate Appeals Committee. Appeals are heard only on the same grounds as cited above.

## **REGULATIONS GOVERNING UNDERGRADUATE DEGREE REQUIREMENTS**

### **The Credit System**

The Faculty of Science operates under a credit system in which a prescribed number of credits, intended to reflect total workload, is associated with each course offered by the University. One lecture hour per week per term is defined as one academic credit as is one laboratory session per week per term. Excepting some courses offered by the Faculty of Education, the number of credits in each course is indicated by the number which follows the four-digit course number.

### **Year of Study Equivalent**

When it is necessary to equate credits earned with year level, the following guidelines are used:

- fewer than 24 credits earned - study level one;
- more than or equal to 24 and fewer than 54 credits earned - study level two;
- more than or equal to 54 and fewer than 84 credits earned - study level three;
- more than or equal to 84 credits earned - study level four (with the exception that bachelor programs never go beyond study level three, regardless of the number of credits earned).

### **Residence Requirement**

In order to qualify for a York University degree in any bachelor or Honours program, a student must have successfully completed a minimum of 30 credits at York University and at least half (50 per cent) of the requirements in each major/minor.

### **Time Limit**

There is no time limit for completion of degree requirements in the Faculty of Science. Students taking a normal full-time load of approximately 30 credits per fall/winter session can expect to complete a bachelor degree in three fall/winter sessions or an Honours degree in four fall/winter sessions. A limited number of courses are also available during the summer session; a maximum of 15 credits can be taken in that session.

Although there is no minimum number of credits in which a student must enrol in any session, students who do not enrol in any courses in a fall/winter session must formally apply to have their files reactivated before resuming their studies in a subsequent session (refer to Reactivation in the Faculty of Science Advising, Enrolment, Registration, Graduation and Other Administrative Procedures section).

Since the curriculum is constantly evolving through the introduction of new course requirements and/or prerequisites, students are strongly advised to complete their degree requirements in a reasonable time period.

## **Course Credit Exclusions**

The University offers some courses in which at least part of the content is similar to that presented in other courses. To ensure that credit is not granted more than once for similar content, the Faculty of Science designates such courses as course credit exclusions. The exclusion(s) for a particular course are listed in the course description.

If a student in the Faculty of Science enrolls in and successfully completes two courses which are designated as exclusions of each other, credit is given for only one. Both courses appear on the student's official York University transcript.

A course (or combination of courses) designated as an exclusion for another course may be substituted for the latter (for the purposes of satisfying prerequisite and/or degree requirements) only with Faculty/department/division/program approval. Information regarding approved substitute courses may be found in the program of study requirements in the Faculty of Science Programs of Study section, in the prerequisite requirements listed for courses in this publication or in the departmental supplementary calendars.

## **Non-Science Requirement**

The non-science requirement provides a broad perspective on current scholarship and the diversity of human experience. These courses are also expected to enhance students' critical skills in reading, writing and thinking, and contribute to their preparation for post-university life.

## **Requirements for BSc, Honours BSc, BSc (Tech), iBSc Candidates**

All degree candidates in the above programs must complete a minimum of 12 credits from two different areas of study, including at least three credits from each area, subject to the restrictions noted below.

For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

## **Non-science course areas**

Subject to the restrictions listed below, courses in the following areas may be taken in the Faculties of Glendon or Liberal Arts and Professional Studies:

- anthropology
- classical studies\*
- economics
- English
- French studies\*
- geography\*\*
- history

- humanities (courses not cross-listed with STS)
- languages, literature and linguistics\*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with STS)
- sociology
- women's studies\*\*\*

The following courses offered by the Faculty of Environmental Studies may be taken to satisfy this requirement:

- [ES/ENVS 1000 6.00;](#)
- [ES/ENVS 2100 6.00;](#)
- [ES/ENVS 2150 3.00.](#)

The following courses offered by the Faculty of Fine Arts may be taken to satisfy this requirement:

- [FA/DANC 1340 3.00;](#)
- [FA/DANC 2340 3.00;](#)
- [FA/FACS 1900 6.00;](#)
- [FA/FILM 1401 6.00;](#)
- [FA/FILM 1410 6.00;](#)
- [FA/FILM 1701 3.00;](#)
- [FA/FILM 2401 6.00;](#)
- [FA/MUSI 1500 6.00;](#)
- [FA/MUSI 1510 6.00;](#)
- [FA/MUSI 1520 6.00;](#)
- [FA/MUSI 1530 6.00;](#)
- [FA/MUSI 1540 6.00;](#)
- [FA/MUSI 1550 6.00;](#)
- [FA/THEA 1500 6.00;](#)
- [FA/VISA 1110 6.00;](#)
- [FA/VISA 2110 6.00;](#)
- [FA/VISA 2540 6.00;](#)
- [FA/VISA 2550 6.00;](#)
- [FA/VISA 2620 6.00.](#)

### **Restrictions (for BSc, Honours BSc, BSc (Tech), iBSc Candidates)**

1. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement.
2. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the departments marked with an \* above.
3. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. For example, this applies to some economics courses.
4. \*\*Geography courses cannot be used to satisfy the requirement for students majoring in geography.
5. \*\*\*Excluding women's studies courses which are cross-listed with natural science courses.
6. Humanities and social science courses cross-listed with science and technology studies (STS) courses cannot count towards this requirement.

### **Notes:**

1. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science Regulations Governing Examinations and Academic Standards section).
2. Students may not take for credit any more than three humanities/social science foundations courses (27 credits).
3. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment.
4. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will fulfill the requirement should consult the Office of Science Academic Services.

### **General Regulations**

#### **Bachelor of Arts (BA)**

In order to graduate with a bachelor of arts:

- a) All students are required to observe the regulations of the University. Unless otherwise stated, any changes in regulations become effective as announced. This policy is not meant to disadvantage students as they proceed through their studies, including those who have completed a number of courses. It is intended to ensure that their preparation for courses is appropriate and current. Students should consult closely with departments and the Faculty through the advising process.

b) It is the student's responsibility to enrol in only those courses for which the student has successfully completed all designated prerequisites and to take concurrently all specified corequisites not already completed successfully. See also prerequisites/corequisites under Advising in the Faculty of Science Advising, Enrolment, Registration, Graduation and Other Administrative Procedures section.

c) Satisfy the general education requirement:

- a total of 24 credits from the following areas: humanities, modes of reasoning, natural science, social science. Of these 24 credits, students must complete the following:
- minimum requirements: at least six credits from humanities, natural science and social science (with no more than nine credits in each counting towards this requirement ).

**Note:** students may complete a maximum of three nine-credit foundations courses for degree credit. Students who need to complete more than three foundations courses in order to fulfill program (major or minor) course requirements may do so with permission of the relevant program coordinator or undergraduate director.

d) Present a total of at least 90 passed credits of which:

- a minimum of 30 must be earned in one major subject area,
- a minimum of 12 credits in the major must be at the 3000 or higher level,
- a minimum of 18 are elective credits,
- a minimum of 18 credits overall must be at the 3000 or higher level.

e) Satisfy the Senate academic standards for bachelor programs - refer to Academic Standards for Bachelor and Honours Programs in the Faculty of Science Regulations Governing Examinations and Academic Standards section.

f) Satisfy the program of study requirements specified in the Faculty of Science Programs of Study section for the bachelor program declared.

### **Bachelor of Science (BSc)**

In order to graduate with a bachelor of science, a student must complete the following:

a) All students are required to observe the regulations of the University. Unless otherwise stated, any changes in regulations become effective as announced. This policy is not meant to disadvantage students as they proceed through their studies, including those who have completed a number of courses. It is intended to ensure that their preparation for courses is appropriate and current. Students should consult closely with departments and the Faculty through the advising process.



b) It is the student's responsibility to enrol in only those courses for which the student has successfully completed all designated prerequisites and to take concurrently all specified corequisites not already completed successfully. See also prerequisites/corequisites under Advising in the Faculty of Science Advising, Enrolment, Registration, Graduation and Other Administrative Procedures section.

c) Satisfy the general education requirement, 27 credits in total, as follows:

- 12 credits in non-science disciplines (see Non-Science Requirement section of this calendar);
- six credits in mathematics at the 1000 level (excluding [SC/MATH 1510 6.00](#), [SC/MATH 1515 3.00](#), [SC/MATH 1520 3.00](#));
- three credits in computer science at the 1000 level;
- Foundational science requirement, six credits from courses with laboratories at the 1000 level in any of the following areas: biology, chemistry and physics (excluding [SC/BIOL 1500 3.00](#), [SC/CHEM 1500 4.00](#), [SC/PHYS 1510 4.00](#)).

**Note:** If the major is one of biology, chemistry or physics, then another six credits is required from courses with laboratories.

d) Satisfy science breadth: 24 credits, including at least 3 credits at the 2000 level or higher, in science disciplines outside the major. Current science disciplines are: biology, biochemistry, biophysics, chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies. Note: the following will not count towards this requirement: [SC/BIOL 1500 3.00](#), [SC/CHEM 1500 4.00](#), [SC/PHYS 1510 4.00](#). These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

e) Present a total of at least 90 passed credits of which:

- a minimum of 30 must be earned in one major science subject area, including a minimum of 12 major credits at the 3000 or higher level;
- a minimum of 18 must be earned in courses at the 3000 level or higher.

f) Satisfy the Senate academic standards for bachelor programs - refer to Academic Standards for Bachelor and Honours Programs in the Faculty of Science Regulations Governing Examinations and Academic Standards section.

g) Satisfy the program of study requirements specified in the Faculty of Science Programs of Study section for the bachelor program declared.

## **Bachelor of Arts Honours (Honours BA)**

In order to graduate with the bachelor of arts Honours, a student must complete the following:

a) All students are required to observe the regulations of the University. Unless otherwise stated, any changes in regulations become effective as announced. This policy is not meant to disadvantage students as they proceed through their studies, including those who have completed a number of courses. It is intended to ensure that their preparation for courses is appropriate and current. Students should consult closely with departments and the Faculty through the advising process.

b) It is the student's responsibility to enrol in only those courses for which the student has successfully completed all designated prerequisites and to take concurrently all specified corequisites not already completed successfully. See also prerequisites/corequisites under Advising in the Faculty of Science Advising, Enrolment, Registration, Graduation and Other Administrative Procedures section.

c) Satisfy the general education requirement:

- a total of 24 credits from the following areas: humanities, modes of reasoning, natural science, social science. Of these 24 credits, students must complete the following minimum requirements:
- at least six credits from humanities, natural science and social science (with no more than nine credits in each counting towards this requirement).

**Note:** students may complete a maximum of three nine-credit foundations courses for degree credit. Students who need to complete more than three foundations courses in order to fulfill program (major or minor) course requirements may do so with permission of the relevant program coordinator or undergraduate director.

d) Present a total of at least 120 passed credits of which:

- a minimum of 54 credits must be earned in the major subject area (Specialized Honours programs); a minimum of 42 credits in (each of) the major subject area(s) (Honours Major, Honours Double Major and Honours Major/Minor programs), of which a minimum of 12 credits are the 4000 level; a minimum of 30 credits must be earned in a minor subject area, at least six credits of which must normally be at the 4000 level,
- a minimum of 36 credits must be at the 3000 or 4000 level, at least 18 credits of which must be at the 4000 level,
- students in the Specialized Honours BA or Honours BA must complete 18 elective credits;

e) Satisfy the Faculty and Senate academic standards for Honours programs - refer to Academic Standards for Bachelor and Honours Programs in the Faculty of Science Regulations Governing Examinations and Academic Standards section;

f) Satisfy the program of study requirements specified in the Faculty of Science Programs of Study section for the declared Honours program and major and minor subject area(s).

### **Bachelor of Science Honours (Honours BSc)**

In order to graduate with the bachelor of science Honours, a student must complete the following:

a) All students are required to observe the regulations of the University. Unless otherwise stated, any changes in regulations become effective as announced. This policy is not meant to disadvantage students as they proceed through their studies, including those who have completed a number of courses. It is intended to ensure that their preparation for courses is appropriate and current. Students should consult closely with departments and the Faculty through the advising process.

b) It is the student's responsibility to enrol in only those courses for which the student has successfully completed all designated prerequisites and to take concurrently all specified corequisites not already completed successfully. See also prerequisites/corequisites under Advising in the Faculty of Science Advising, Enrolment, Registration, Graduation and Other Administrative Procedures section.

c) Satisfy the general education requirement, 27 credits in total, as follows:

- 12 credits in non-science disciplines (see Non-Science Requirement section of this calendar);
- six credits in mathematics at the 1000 level (excluding [SC/MATH 1510 6.00](#), [SC/MATH 1515 3.00](#), [SC/MATH 1520 3.00](#));
- three credits in computer science at the 1000 level;
- Foundational science requirement, six credits from courses with laboratories at the 1000 level in any of the following areas: biology, chemistry and physics (excluding [SC/BIOL 1500 3.00](#), [SC/CHEM 1500 4.00](#), [SC/PHYS 1510 4.00](#)). Note: If the major is one of biology, chemistry or physics, then another six credits is required from courses with laboratories.

d) Satisfy Science breadth: 24 credits, including at least 3 credits at the 2000 level or higher, in science disciplines outside the major. Current science disciplines are: biology, biochemistry, biophysics, chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

**Note:** the following will not count towards this requirement: [SC/BIOL 1500 3.00](#), [SC/CHEM 1500 4.00](#), [SC/PHYS 1510 4.00](#). These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

e) Present a total of at least 120 passed credits of which:

- a minimum of 54 must be earned in the major science subject area (Specialized Honours BSc programs); a minimum of 42 in (each of) the major subject area(s) (Honours Major BSc, Honours Double Major BSc and Honours Major/Minor BSc programs); programs); of the total major credits, a minimum of 18 credits must be at the 3000 or higher level, including at least 12 credits at the 4000 level; a minimum of 30 in the minor subject area (Honours Major/Minor BSc ) normally including at least six credits at the 4000 level;
- a minimum of 42 must be earned in courses at the 3000 or higher level. This includes the 18 credits in the major as listed above.

f) Satisfy the Faculty and Senate academic standards for Honours programs - refer to Academic Standards for Bachelor and Honours Programs in the Faculty of Science Regulations Governing Examinations and Academic Standards section.

g) Satisfy the program of study requirements specified in the Faculty of Science Programs of Study section for the declared Honours program and major and minor subject area(s).

### **International Bachelor of Science Honours (Honours iBSc)**

In order to graduate with the international bachelor of science Honours, a student must complete the following:

a) All students are required to observe the regulations of the University. Unless otherwise stated, any changes in regulations become effective as announced. This policy is not meant to disadvantage students as they proceed through their studies, including those who have completed a number of courses. It is intended to ensure that their preparation for courses is appropriate and current. Students should consult closely with departments and the Faculty through the advising process.

b) It is the student's responsibility to enrol in only those courses for which the student has successfully completed all designated prerequisites and to take concurrently all specified corequisites not already completed successfully. See also prerequisites/corequisites under Advising in the Faculty of Science Advising, Enrolment, Registration, Graduation and Other Administrative Procedures section.

c) Satisfy the general education requirement, 27 credits in total, as follows:

- 12 credits in non-science disciplines (see Non-Science Requirement section of this calendar);
- six credits in mathematics at the 1000 level (excluding [SC/MATH 1510 6.00](#), [SC/MATH 1515 3.00](#), [SC/MATH 1520 3.00](#));
- three credits in computer science at the 1000 level;
- foundational science requirement, six credits from courses with laboratories at the 1000 level in any of the following areas: biology, chemistry and physics (excluding [SC/BIOL 1500 3.00](#), [SC/CHEM 1500 4.00](#), [SC/PHYS 1510 4.00](#)). Note: If the major is one of biology, chemistry or physics, then another six credits is required from courses with laboratories.

d) Satisfy science breadth: 24 credits, including at least 3 credits at the 2000 level or higher, in science disciplines outside the major. Current science disciplines are: biology, biochemistry, biophysics, chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies. Note: the following will not count towards this requirement: [SC/BIOL 1500 3.00](#), [SC/CHEM 1500 4.00](#), [SC/PHYS 1510 4.00](#). These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

e) Present a total of at least 120 passed credits of which:

- a minimum of 54 must be earned in the major science subject area (Specialized Honours iBSc program); a minimum of 42 in the major subject area (Honours Major iBSc program), of which a minimum of 18 major credits must be at the 3000 or higher level, including at least 12 credits at the 4000 level;
- a minimum of 42 must be earned in courses at the 3000 or higher level;
- 30 required credits outside the science major, consisting of:
  - a minimum of 12 credits of language study in one of the languages offered at York University,
  - a minimum of 12 credits of non-science international content courses (refer to the program requirements in the Faculty of Science Programs of Study section). These courses may be used toward the non-Science credits required as part of the general education,
  - an additional six credits of language study or non-science international component courses for a total of 30 credits.

f) Satisfy the Faculty and Senate academic standards for Honours programs - refer to Academic Standards for Bachelor and Honours Programs in the Faculty of Science Regulations Governing Examinations and Academic Standards section.

g) Satisfy the program of study requirements specified in the Faculty of Science Programs of Study section.

h) Have one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

## Programs of Study – Faculty of Science

### APPLIED BIOTECHNOLOGY

The Department of Biology at York University and the School of Biological Sciences and Applied Chemistry at Seneca College offer a joint BSc (Tech) degree program in Applied Biotechnology. Students will enter the four year program by beginning their studies at Seneca College's School of Biological Sciences and Applied Chemistry. Following the successful completion of the first two and a half years of the curricula at the Biotechnology Technologist (Research) program at Seneca, students will transfer to the Department of Biology, Faculty of Science where they will complete the last year and a half of the program at York. Upon completion of this program, students will receive a York University BSc (Tech) degree in applied biotechnology. This program will prepare students to enter the workforce in the biotechnology industry, government laboratories and university research laboratories.

For Seneca College course requirements, consult the Biotechnology Technologist (Research) program in the Seneca College Calendar.

The York University course requirements are as follows:

#### **BSc (Tech): 90 credits including:**

45 transfer credits for successful completion of the first two and a half years of the program at the approved joint program partner Seneca College.

All students must complete the following core:

- one of [AP/ECON 1900 3.00](#), [AP/ECON 1910 3.00](#), [AP/ECON 1000 3.00](#) or [AP/ECON 1010 3.00](#);
- [AP/PHIL 2070 3.00](#) or [AP/PHIL 2075 3.00](#);
- [SC/MATH 1505 6.00](#);
- [LE/CSE 1520 3.00](#);
- [SC/BIOL 2010 4.00](#);
- [SC/BIOL 2030 4.00](#);
- [SC/BIOL 2040 4.00](#);
- [SC/BIOL 3010 3.00](#);
- [SC/BIOL 3110 3.00](#);
- [SC/BIOL 3130 3.00](#).

All students must complete a minimum of ten credits from the following list of courses:

- [SC/BIOL 3160 4.00](#);
- [SC/BIOL 4010 3.00](#);
- [SC/BIOL 4020 3.00](#); [SC/BIOL 4030 3.00](#); [SC/BIOL 4040 3.00](#); [SC/BIOL 4050 3.00](#); [SC/BIOL 4061 3.00](#);
- [SC/BIOL 4150 3.00](#);

- [SC/BIOL 4151 3.00](#);
- [SC/BIOL 4160 3.00](#);
- [SC/BIOL 4220 4.00](#);
- [SC/BIOL 4270 3.00](#);
- [SC/BIOL 4285 3.00](#);
- [SC/BIOL 4320 3.00](#);
- [SC/BIOL 4330 3.00](#);
- [SC/BIOL 4350 4.00](#);
- [SC/BIOL 4370 3.00](#);
- [SC/BIOL 4450 4.00](#);
- [SC/BIOL 4510 3.00](#);
- [SC/CHEM 3051 3.00](#);
- [SC/CHEM 3070 3.00](#);
- [SC/CHEM 3071 3.00](#);
- [SC/CHEM 4050 3.00](#).

Based on the requirements noted above, students must take a minimum of 45 credits of which 30 credits must be taken at York as a minimum residency requirement.

To graduate in this program, students must have a minimum overall York grade point average of 4.00 (C).

## **APPLIED MATHEMATICS**

See Mathematics and Statistics.

## **BIOCHEMISTRY**

The Department of Biology and the Department of Chemistry offer jointly a Specialized Honours program in Biochemistry.

### **Specialized Honours Program**

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#) and [SC/MATH 1014 3.00](#);
- computer science: one of [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: [SC/PHYS 1410 6.00](#) or SC/PHYS 1420 6.00 or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#));
- [SC/CHEM 1000 3.00](#);
- [SC/CHEM 1001 3.00](#);
- [SC/BCHM 2020 3.00](#);
- [SC/BCHM 2021 3.00](#);
- [SC/BIOL 2040 3.00](#);
- [SC/BIOL 2070 3.00](#);
- [SC/CHEM 2011 3.00](#);
- [SC/CHEM 2020 3.00](#);
- SC/CHEM 2021 3.00;
- [SC/CHEM 2030 3.00](#);
- [SC/BCHM 3010 3.00](#); [SC/BCHM 3110 3.00](#); [SC/BCHM 3130 3.00](#); [SC/BCHM 3140 4.00](#); [SC/BCHM 3051 3.00](#); [SC/CHEM 3020 3.00](#); [SC/BCHM 4290 4.00](#); [SC/BCHM 4000 8.00](#); [SC/BCHM 4050 3.00](#);
- nine credits from any other 3000- or 4000-level biochemistry, biology or chemistry courses.

C. Science breadth: satisfied by above requirements.

D. Upper level requirement: satisfied by above requirements.

E. Additional elective credits, as required, for an overall total of at least 120 credits.

F. Standing requirements

To declare Honours requires successful completion of at least 24 credits, a minimum cumulative credit-weighted grade point average of 5.50 (B) over all science courses completed, and a minimum cumulative credit-weighted grade point average of 4.25 over all courses completed.

To proceed in each year of the Honours program requires a minimum cumulative credit-weighted grade point average of 5.50 (B) over all science courses completed, and a minimum cumulative credit-weighted overall grade point average as specified in the Academic Standards section of the Faculty of Science Regulations Governing Undergraduate Degree Requirements section.

To graduate in Specialized Honours biochemistry requires successful completion of all Faculty requirements and all required program courses, a minimum cumulative credit-weighted grade point average of 5.50 (B) over all science (SC) courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.



## BIOLOGY

The program core (24 credits) is defined as:

- [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#));
- [SC/BIOL 2070 3.00](#) or any three of [SC/BIOL 2010 4.00](#), [SC/BIOL 2030 4.00](#), [SC/BIOL 2050 4.00](#). Both [SC/CHEM 2020 3.00](#) and SC/CHEM2021 3.00 may replace one of these three biology courses;
- additional courses from the following for a total of at least 18 2000-level credits: [SC/BIOL 2010 4.00](#), [SC/BIOL 2020 3.00](#), [SC/BIOL 2021 3.00](#), [SC/BIOL 2030 4.00](#), [SC/BIOL 2040 3.00](#), [SC/BIOL 2050 4.00](#), [SC/BIOL 2060 3.00](#), [SC/BIOL 2070 3.00](#), both [SC/CHEM 2020 3.00](#) and SC/CHEM 2021 3.00.

### Bachelor Program

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1505 6.00](#), or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)) or [SC/PHYS 1410 6.00](#), [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- the program core specified above (24 credits);
- additional credits from biology courses, as required for an overall total of at least 46 credits from biology courses, including at least 12 credits at the 3000 level or above.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement.

D. Upper level: a minimum of 18 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 90 credits.

F. Standing requirements: A minimum overall grade point average of 4.00 (C) is required in order to be eligible to graduate with a BSc degree (bachelor program).

## Honours Programs

### Specialized Honours Program

Students may follow a stream in biology, biomedical science or biotechnology.

#### A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1505 6.00](#), or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)) or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#). Note that the biomedical science and biotechnology streams require specific courses (see below).

#### B. Major requirements:

##### Biology Stream

- The program core, as specified above (24 credits);
- [SC/BIOL 3100 2.00](#); [SC/BIOL 4000 8.00](#) or [SC/BIOL 4000 3.00](#);
- additional credits from biology courses, as required for an overall total of at least 68 credits from biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits are at the 4000 level.

##### Biomedical Science Stream

- [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#);
- one of [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [HH/PSYC 1010 6.00](#);
- The program core, as specified above (24 credits), including [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)); [SC/BIOL 2020 3.00](#); [SC/BIOL 2021 3.00](#); [SC/BIOL 2040 3.00](#); [SC/BIOL 2070 3.00](#); [SC/CHEM 2020 3.00](#) and [SC/CHEM 2021 3.00](#); a minimum of one of [SC/BIOL 2030 4.00](#) or [SC/BIOL 2060 3.00](#);
- a minimum of nine credits chosen from the following courses: [SC/BIOL 3060 4.00](#); [SC/BIOL 3070 4.00](#); [SC/BIOL 3110 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3150 3.00](#); [SC/BIOL 3150 4.00](#); [SC/BIOL 3155 3.00](#); [SC/BIOL 4010 3.00](#);
- [SC/BIOL 4000 8.00](#) or [SC/BIOL 4000 3.00](#);

- additional biology credits from the following courses, as required, for an overall total of 68 biology credits: [SC/BIOL 2010 4.00](#); [SC/BIOL 2030 4.00](#); [SC/BIOL 2060 3.00](#); [SC/BIOL 3010 3.00](#); [SC/BIOL 3060 4.00](#); [SC/BIOL 3070 4.00](#); [SC/BIOL 3071 3.00](#); [SC/BIOL 3100 2.00](#); [SC/BIOL 3110 3.00](#); [SC/BIOL 3120 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3140 4.00](#); [SC/BIOL 3150 3.00](#); [SC/BIOL 3150 4.00](#); [SC/BIOL 3155 3.00](#); [SC/BIOL 4010 3.00](#); [SC/BIOL 4020 3.00](#); [SC/BIOL 4030 3.00](#); [SC/BIOL 4061 3.00](#); [SC/BIOL 4110 4.00](#); [SC/BIOL 4141 3.00](#); [SC/BIOL 4150 3.00](#); [SC/BIOL 4151 3.00](#); [SC/BIOL 4200 3.00](#); [SC/BIOL 4220 4.00](#); [SC/BIOL 4270 3.00](#); [SC/BIOL 4285 3.00](#); [SC/BIOL 4290 4.00](#); [SC/BIOL 4310 3.00](#); [SC/BIOL 4320 3.00](#); [SC/BIOL 4350 4.00](#); [SC/BIOL 4360 4.00](#); [SC/BIOL 4370 3.00](#); [SC/BIOL 4450 4.00](#); [SC/BIOL 4510 3.00](#);
- within the 68 biology credits, at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology courses with an associated laboratory component.

### Biotechnology Stream

- [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#); [SC/PHYS 1410 6.00](#);
- [AP/ECON 1000 3.00](#), [AP/ECON 1010 3.00](#) and one of the following: [AP/PHIL 2070 3.00](#) or [AP/PHIL 2075 3.00](#) (will count towards the non-science requirement in the General Education component);
- the program core, as specified above (24 credits), including [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/BIOL 2020 3.00](#), [SC/BIOL 2021 3.00](#), [SC/BIOL 2040 3.00](#), [SC/BIOL 2060 3.00](#), [SC/BIOL 2070 3.00](#) and both [SC/CHEM 2020 3.00](#) and [SC/CHEM 2021 3.00](#);
- [SC/CHEM 2080 4.00](#); [SC/CHEM 3070 3.00](#) or [SC/CHEM 3071 3.00](#) or [SC/CHEM 4050 3.00](#); [SC/CHEM 3080 4.00](#);
- [SC/BIOL 3110 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3140 4.00](#); [SC/BIOL 3150 3.00](#);
- [SC/BIOL 4000 8.00](#) or [SC/BIOL 4000 3.00](#); [SC/BIOL 4290 4.00](#);
- a minimum of 12 credits chosen from the following courses in lists A and B, with a minimum of six credits chosen from list A. List A: [SC/BIOL 3010 3.00](#), [SC/BIOL 3120 3.00](#), [SC/BIOL 3155 3.00](#), [SC/BIOL 4020 3.00](#), [SC/BIOL 4030 3.00](#), [SC/BIOL 4061 3.00](#), [SC/BIOL 4285 3.00](#); List B: [SC/BIOL 3160 4.00](#) ([SC/BIOL 2010 4.00](#) is a prerequisite), [SC/BIOL 4010 3.00](#), [SC/BIOL 4040 3.00](#), [SC/BIOL 4150 3.00](#), [SC/BIOL 4151 3.00](#), [SC/BIOL 4160 3.00](#), [SC/BIOL 4270 3.00](#), [SC/BIOL 4370 3.00](#), [SC/BIOL 4510 3.00](#);
- additional biology credits as required for an overall total of at least 54 biology credits, including at least 12 credits at the 4000 level.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science and biotechnology streams, this requirement is fully satisfied by the above requirements.

D. Upper level: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: To declare Specialized Honours requires successful completion of at least 24 credits, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed and a minimum cumulative credit-weighted grade point average of 6.00 (B) over all biology courses completed.

To proceed in each year of a Specialized Honours program requires a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed and a minimum cumulative credit-weighted grade point average of 6.00 (B) over all biology courses completed.

To graduate in a Specialized Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 6.00 (B) over all biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Major Program (BSc)**

In addition to the Biology Honours Major, students may follow a stream in biomedical science.

### **Biology Honours Major**

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1505 6.00](#), or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)) or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#). Note that the biomedical science stream requires specific courses (see below).

B. Major requirements:

#### **Biology stream**

- The program core, as specified above (24 credits);
- additional credits from biology courses, as required, for an overall total of at least 51 credits from biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits are at the 4000 level.

#### **Biomedical Science Stream**

- [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#);
- one of [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [HH/PSYC 1010 6.00](#);

- The program core, as specified above (24 credits), including [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/BIOL 2020 3.00](#), [SC/BIOL 2021 3.00](#), [SC/BIOL 2040 3.00](#), [SC/BIOL 2070 3.00](#), SC/CHEM 2020 3.00 and [SC/CHEM 2021 3.00](#); a minimum of one of [SC/BIOL 2030 4.00](#) or [SC/BIOL 2060 3.00](#);
- a minimum of nine credits chosen from the following courses: [SC/BIOL 3060 4.00](#); [SC/BIOL 3070 4.00](#); [SC/BIOL 3100 2.00](#); [SC/BIOL 3110 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3150 3.00](#); [SC/BIOL 3150 4.00](#); [SC/BIOL 3155 3.00](#); [SC/BIOL 4010 3.00](#);
- additional biology credits from the following courses, as required, for an overall total of 51 biology credits: SC/BIOL 2010 4.00; [SC/BIOL 2030 4.00](#); [SC/BIOL 2060 3.00](#); [SC/BIOL 3010 3.00](#); [SC/BIOL 3060 4.00](#); [SC/BIOL 3070 4.00](#); [SC/BIOL 3071 3.00](#); [SC/BIOL 3100 2.00](#); [SC/BIOL 3110 3.00](#); [SC/BIOL 3120 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3140 4.00](#); [SC/BIOL 3150 3.00](#); [SC/BIOL 3150 4.00](#); [SC/BIOL 3155 3.00](#); [SC/BIOL 4010 3.00](#); [SC/BIOL 4020 3.00](#); [SC/BIOL 4030 3.00](#); [SC/BIOL 4061 3.00](#); [SC/BIOL 4110 4.00](#); [SC/BIOL 4141 3.00](#); [SC/BIOL 4150 3.00](#); [SC/BIOL 4151 3.00](#); [SC/BIOL 4200 3.00](#); [SC/BIOL 4220 4.00](#); [SC/BIOL 4270 3.00](#); [SC/BIOL 4285 3.00](#); [SC/BIOL 4290 4.00](#); SC/BIOL 4310 3.00; [SC/BIOL 4320 3.00](#); [SC/BIOL 4350 4.00](#); [SC/BIOL 4360 4.00](#); [SC/BIOL 4370 3.00](#); [SC/BIOL 4450 4.00](#); [SC/BIOL 4510 3.00](#);
- within the 51 biology credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology courses with an associated laboratory component.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

D. Upper level: 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits .

F. Standing requirements: To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Double Major Program**

All Honours BSc degree candidates should consult departmental advisers as early as possible concerning course requirements for particular Honours Double Major programs. Possible subject combinations for Honours Double Major BSc degree programs are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section. Students should consult with a departmental advisor to plan their studies in order to meet the requirements for both majors and their prerequisites.

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1505 6.00](#), or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)) or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#));
- at least 12 credits from 2000-level biology courses in the program core;
- additional credits from biology courses, as required for an overall total of at least 42 credits from biology courses, including at least 18 credits at the 3000 level or above, of which at least 12 credits are at the 4000 level;
- the course requirements for the second major .

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. Satisfied if the other major is another science discipline.

D. Upper level: 42 credits at the 3000 level or above.

E. Additional elective credits, as required for an overall total of 120 credits.

F. Standing requirements: To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Major/Minor Program**

An Honours Major in biology may be combined with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

Students may follow a stream within the Honours Major/Minor program in Biomedical Science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1505 6.00](#), or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)) or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

**Biology stream**

- the program core as specified above (24 credits);
- additional credits from biology courses, as required, for an overall total of at least 51 credits from biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits are at the 4000 level.
- The course requirements for the minor.

**Biomedical Science Stream**

- [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#);
- one of [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [HH/PSYC 1010 6.00](#);
- the program core, as specified above (24 credits), including [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/BIOL 2020 3.00](#), [SC/BIOL 2021 3.00](#), [SC/BIOL 2040 3.00](#), [SC/BIOL 2070 3.00](#), [SC/CHEM 2020 3.00](#) and [SC/CHEM 2021 3.00](#); a minimum of one of [SC/BIOL 2030 4.00](#) or [SC/BIOL 2060 3.00](#);
- a minimum of nine credits chosen from the following courses: [SC/BIOL 3060 4.00](#); [SC/BIOL 3070 4.00](#); [SC/BIOL 3100 2.00](#); [SC/BIOL 3110 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3150 3.00](#); [SC/BIOL 3150 4.00](#); [SC/BIOL 3155 3.00](#); [SC/BIOL 4010 3.00](#);
- additional biology credits from the following courses, as required, for an overall total of 51 biology credits: [SC/BIOL 2010 4.00](#); [SC/BIOL 2030 4.00](#); [SC/BIOL 2060 3.00](#); [SC/BIOL 3010 3.00](#); [SC/BIOL 3060 4.00](#); [SC/BIOL 3070 4.00](#); [SC/BIOL 3071 3.00](#); [SC/BIOL 3100 2.00](#); [SC/BIOL 3110 3.00](#); [SC/BIOL 3120 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3140 4.00](#); [SC/BIOL 3150 3.00](#); [SC/BIOL 3150 4.00](#); [SC/BIOL 3155 3.00](#); [SC/BIOL 4010 3.00](#); [SC/BIOL 4020 3.00](#); [SC/BIOL 4030 3.00](#); [SC/BIOL 4061 3.00](#); [SC/BIOL 4110 4.00](#); [SC/BIOL 4141 3.00](#); [SC/BIOL 4150 3.00](#); [SC/BIOL 4151 3.00](#); [SC/BIOL 4200 3.00](#); [SC/BIOL 4220 4.00](#); [SC/BIOL 4270 3.00](#); [SC/BIOL 4285 3.00](#); [SC/BIOL 4290 4.00](#); [SC/BIOL 4310 3.00](#); [SC/BIOL 4320 3.00](#); [SC/BIOL 4350 4.00](#); [SC/BIOL 4360 4.00](#); [SC/BIOL 4370 3.00](#); [SC/BIOL 4450 4.00](#); [SC/BIOL 4510 3.00](#);

- within the 51 biology credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology courses with an associated laboratory component.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. Satisfied if the minor is another science discipline.

D. Upper level: 42 credits at the 3000 level or above.

E. Additional elective credits, as required for an overall total of 120 credits.

F. Standing requirements: To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### Honours Minor

- [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#));
- at least 12 credits from biology courses at the 2000 level;
- at least 9 credits from biology courses at the 3000 or higher level, normally including 6 credits at the 4000 level;
- additional credits from biology courses at the 2000 or higher level, as required for an overall total of at least 30 credits from biology courses.

**Note:** it is recommended that students interested in cell biology, genetics, molecular biology and biochemistry take the following courses: [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/BIOL 2020 3.00](#), [SC/BIOL 2021 3.00](#), [SC/BIOL 2040 3.00](#), SC/BIOL 2070 3.00, [SC/CHEM 2020 3.00](#) and SC/CHEM 2021 3.00, plus a minimum of nine additional credits from biology courses at the 3000 or higher level. For other areas of interest, students are advised to choose their 2000-level biology courses wisely, based on the prerequisites for the courses they wish to take at the 3000 or higher level. Check the course outlines in this publication for course prerequisites.

### International Bachelor of Science

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international bachelor of science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science Programs of Study section.



## Specialized Honours in Biology (Honours iBSc)

### A. General education:

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component);
- mathematics: [SC/MATH 1505 6.00](#), or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)) or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#).

### B. Major requirements:

- the program core as specified above (24 credits);
- [SC/BIOL 3100 2.00](#);
- [SC/BIOL 4000 8.00](#) or [SC/BIOL 4000 3.00](#);
- additional credits from biology courses, as required for an overall total of at least 62 credits from biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits are at the 4000 level.

In addition, the following must be completed for the international component:

- a minimum of 12 credits of language study in one of the languages offered at York University;
- a minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
- an additional six credits of language study or non-science international component courses, for a total of 30 credits;
- one to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirement: To declare Specialized Honours requires successful completion of at least 24 credits, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed and a minimum cumulative credit-weighted grade point average of 6.00 (B) over all biology courses completed.

To proceed in each year of a Specialized Honours program requires a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed and a minimum cumulative credit-weighted grade point average of 6.00 (B) over all biology courses completed.

To graduate in a Specialized Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 6.00 (B) over all biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Major Program (iBSc)**

Students may follow a stream within the Honours Major program in biomedical science.

A. General education:

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component).
- mathematics: [SC/MATH 1505 6.00](#), or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)) or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

#### **Biology stream**

- the program core as specified above (24 credits);
- additional credits from biology courses, as required, for an overall total of at least 45 credits from biology courses (42 credits if [SC/CHEM 2020 3.00](#) and SC/CHEM 2021 3.00 are chosen in the core);

#### **Biomedical Science Stream (iBSc)**

- [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#);
- one of [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [HH/PSYC 1010 6.00](#);

- the program core, as specified above (24 credits), including [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/BIOL 2020 3.00](#), [SC/BIOL 2021 3.00](#), [SC/BIOL 2040 3.00](#), [SC/BIOL 2070 3.00](#), SC/CHEM2020 3.00 and [SC/CHEM 2021 3.00](#); a minimum of one of [SC/BIOL 2030 4.00](#) or [SC/BIOL 2060 3.00](#);
- a minimum of nine credits chosen from the following courses: [SC/BIOL 3060 4.00](#); [SC/BIOL 3070 4.00](#); [SC/BIOL 3110 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3150 3.00](#) or [SC/BIOL 3150 4.00](#); [SC/BIOL 3155 3.00](#); [SC/BIOL 4010 3.00](#);
- additional biology credits from the following courses, as required, for an overall total of 42 biology credits: SC/BIOL 2010 4.00; [SC/BIOL 2030 4.00](#); [SC/BIOL 2060 3.00](#); [SC/BIOL 3010 3.00](#); [SC/BIOL 3060 4.00](#); [SC/BIOL 3070 4.00](#); [SC/BIOL 3071 3.00](#); [SC/BIOL 3100 2.00](#); [SC/BIOL 3110 3.00](#); [SC/BIOL 3120 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3140 4.00](#); [SC/BIOL 3150 3.00](#); [SC/BIOL 3150 4.00](#); [SC/BIOL 3155 3.00](#); [SC/BIOL 4010 3.00](#); [SC/BIOL 4020 3.00](#); [SC/BIOL 4030 3.00](#); [SC/BIOL 4061 3.00](#); [SC/BIOL 4110 4.00](#); [SC/BIOL 4141 3.00](#); [SC/BIOL 4150 3.00](#); [SC/BIOL 4151 3.00](#); [SC/BIOL 4200 3.00](#); [SC/BIOL 4220 4.00](#); [SC/BIOL 4270 3.00](#); [SC/BIOL 4285 3.00](#); [SC/BIOL 4290 4.00](#); SC/BIOL 4310 3.00; [SC/BIOL 4320 3.00](#); [SC/BIOL 4350 4.00](#); [SC/BIOL 4360 4.00](#); [SC/BIOL 4370 3.00](#); [SC/BIOL 4450 4.00](#); [SC/BIOL 4510 3.00](#);
- within the 42 biology credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology courses with an associated laboratory component.

In addition, the following must be completed for the international component:

- a minimum of 12 credits of language study in one of the languages offered at York University;
- a minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
- an additional six credits of language study or non-science international component courses, for a total of 30 credits;
- one to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Major/Minor Program (iBSc)**

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

#### **A. General Education:**

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component);
- mathematics: [SC/MATH 1505 6.00](#), or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)), or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#).

#### **B. Major requirements:**

##### **Biology stream**

- the program core as specified above (24 credits);
- additional credits from biology courses, as required, for an overall total of at least 45 credits from biology courses (42 if [SC/CHEM 2020 3.00](#) and [SC/CHEM 2021 3.00](#) are chosen in the core), including at least 18 credits at the 3000 or higher level, of which at least 12 credits are at the 4000 level;
- the course requirements for the minor.

##### **Biomedical science stream**

- [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#);
- one of [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [HH/PSYC 1010 6.00](#);
- the program core, as specified above (24 credits), including [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/BIOL 2020 3.00](#), [SC/BIOL 2021 3.00](#), [SC/BIOL 2040 3.00](#), [SC/BIOL 2070 3.00](#), [SC/CHEM 2020 3.00](#) and [SC/CHEM 2021 3.00](#); a minimum of one of [SC/BIOL 2030 4.00](#) or [SC/BIOL 2060 3.00](#);

- a minimum of nine credits chosen from the following courses: [SC/BIOL 3060 4.00](#); [SC/BIOL 3070 4.00](#); [SC/BIOL 3110 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3150 3.00](#) or [SC/BIOL 3150 4.00](#); [SC/BIOL 3155 3.00](#); [SC/BIOL 4010 3.00](#);
- additional biology credits from the following courses, as required, for an overall total of 42 biology credits: [SC/BIOL 2010 4.00](#); [SC/BIOL 2030 4.00](#); [SC/BIOL 2060 3.00](#); [SC/BIOL 3010 3.00](#); [SC/BIOL 3060 4.00](#); [SC/BIOL 3070 4.00](#); [SC/BIOL 3071 3.00](#); [SC/BIOL 3100 2.00](#); [SC/BIOL 3110 3.00](#); [SC/BIOL 3120 3.00](#); [SC/BIOL 3130 3.00](#); [SC/BIOL 3140 4.00](#); [SC/BIOL 3150 3.00](#); [SC/BIOL 3150 4.00](#); [SC/BIOL 3155 3.00](#); [SC/BIOL 4010 3.00](#); [SC/BIOL 4020 3.00](#); [SC/BIOL 4030 3.00](#); [SC/BIOL 4061 3.00](#); [SC/BIOL 4110 4.00](#); [SC/BIOL 4141 3.00](#); [SC/BIOL 4150 3.00](#); [SC/BIOL 4151 3.00](#); [SC/BIOL 4200 3.00](#); [SC/BIOL 4220 4.00](#); [SC/BIOL 4270 3.00](#); [SC/BIOL 4285 3.00](#); [SC/BIOL 4290 4.00](#); [SC/BIOL 4310 3.00](#); [SC/BIOL 4320 3.00](#); [SC/BIOL 4350 4.00](#); [SC/BIOL 4360 4.00](#); [SC/BIOL 4370 3.00](#); [SC/BIOL 4450 4.00](#); [SC/BIOL 4510 3.00](#);
- within the 42 biology credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology courses with an associated laboratory component;
- the course requirements for the minor.

In addition, the following must be completed for the international component:

- a minimum of 12 credits of language study in one of the languages offered at York University;
- a minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
- an additional six credits of language study or non-science international component courses, for a total of 30 credits;
- one to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. On the biology stream, 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements. Satisfied if the minor is another science discipline.

D. Upper level: 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits .

F. Standing requirements: To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

**Important note:** some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies, environmental studies, European studies, geography, German studies, French studies, history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish.

## BIOPHYSICS

This is an interdisciplinary Specialized Honours program, offered by the Department of Physics and Astronomy, requiring coursework and practical experience in physics, biology, chemistry, mathematics and computer science. The focus of the program is on applying laws and methods of physics to understand biological processes.

The program core (73 credits) is defined as:

- [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)); [SC/BIOL 2020 3.00](#); [SC/BIOL 2021 3.00](#); [SC/BIOL 2040 3.00](#); [SC/BIOL 2070 3.00](#);
- [SC/BPHS 2090 3.00](#); [SC/BPHS 3090 3.00](#); [SC/BPHS 4090 4.00](#);
- [SC/CHEM 1000 3.00](#); [SC/CHEM 1001 3.00](#);
- [SC/MATH 1025 3.00](#); [SC/MATH 2015 3.00](#); [SC/MATH 2271 3.00](#);
- [SC/PHYS 1010 6.00](#) or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) with a grade of C or higher; [SC/PHYS 2010 3.00](#); [SC/PHYS 2020 3.00](#); [SC/PHYS 2060 3.00](#); [SC/PHYS 2213 3.00](#); [SC/PHYS 3030 3.00](#); [SC/PHYS 3040 6.00](#); [SC/PHYS 4061 3.00](#).

### Specialized Honours Program

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#) and [SC/MATH 1014 3.00](#);
- computer science: [LE/CSE 1541 3.00](#);
- foundational science: satisfied within the major requirements.

B. Major requirements:

- the program core (73 credits)

Additional courses:

- at least nine credits from [SC/PHYS 2040 3.00](#), [SC/PHYS 3020 3.00](#), [SC/PHYS 3050 3.00](#), [SC/PHYS 3090 3.00](#), [SC/PHYS 3150 3.00](#), [SC/PHYS 3220 3.00](#), [SC/PHYS 3320 3.00](#), [SC/PHYS 4010 3.00](#), [SC/PHYS 4011 3.00](#), [SC/PHYS 4020 3.00](#), [SC/PHYS 4040 3.00](#), [SC/PHYS 4050 3.00](#), [SC/PHYS 4120 3.00](#);
- at least 15 credits from: [SC/BIOL 3010 3.00](#), [SC/BIOL 3051 3.00](#), [SC/BIOL 3060 4.00](#), [SC/BIOL 3110 3.00](#), [SC/BIOL 3120 3.00](#), [SC/BIOL 3130 3.00](#), [SC/BIOL 3150 3.00/SC/BIOL 3150 4.00](#), [SC/BIOL 3155 3.00](#), [SC/BIOL 4030 3.00](#), [SC/BIOL 4061 3.00](#), [SC/BIOL 4141 3.00](#), [SC/BIOL 4150 3.00](#), [SC/BIOL 4151 3.00](#), [SC/BIOL 4160 3.00](#), both [SC/CHEM 2020 3.00](#) and [SC/CHEM 2021 3.00](#), [SC/CHEM 4092 3.00](#), [SC/CHEM 4093 3.00](#), [HH/KINE 2031 3.00](#), [HH/KINE 4470 3.00](#).

C. Science breadth: satisfied by above requirements.

D. Upper level requirements: at least 42 credits at the 3000 or higher level, including at least 12 major credits at the 4000 level.

E. Additional elective credits, as required for an overall total of at least 120 credits.

F. Standing requirements: To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

## CHEMISTRY

The program core is defined as (28 credits): [SC/CHEM 1000 3.00](#); [SC/CHEM 1001 3.00](#); [SC/CHEM 2011 3.00](#); [SC/CHEM 2020 3.00](#); [SC/CHEM 2021 3.00](#); [SC/CHEM 2030 3.00](#); [SC/CHEM 2080 4.00](#); [SC/CHEM 3000 3.00](#); [SC/CHEM3001 3.00](#).

Note: [SC/BIOL 1500 3.00](#) and [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) are strongly recommended for students lacking OAC or 12U biology.

In the applied chemistry area, the Department of Chemistry offers a Specialized Honours program stream in pharmaceutical and biological chemistry (see below). In addition, students may develop a concentration in analytical chemistry, or materials chemistry, for which they should consult the Department of Chemistry on course selection.

### Bachelor Program

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#);

- computer science: one of [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#) or [LE/CSE 1020 3.00](#);
- foundational science: [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#) (not necessarily in year one).

B. Major requirements:

- the program core, as specified above (28 credits);
- [SC/CHEM 2050 4.00](#) (or SC/BIOL 2070 3.00 and one of SC/BCHM 2020 3.00 or SC/BIOL 2020 3.00, in which case SC/BIOL1000 3.00 and SC/BIOL 1001 3.00 are pre-requisites);
- at least 15 credits from chemistry courses at the 3000 or higher level (**Note:** [SC/CHEM 3080 4.00](#) is strongly advised.).

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the general education requirement.

**Note:** [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) are strongly recommended for students lacking OAC or 12U biology ([SC/BIOL 1500 3.00](#) is a prerequisite).

D. Upper level requirement: a minimum of 18 credits at the 3000 level or above (satisfied by the above requirements).

E. Additional elective credits, as required, for an overall total of 90 credits.

F. Standing requirements: A minimum overall grade point average of 4.00 (C) is required in order to be eligible to graduate with a BSc degree (bachelor program).

## Honours Programs

### Specialized Honours Program

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#);
- computer science: one of [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#) or [LE/CSE 1020 3.00](#);
- foundational science: [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#) (not necessarily in year one).

B. Major requirements:

- the program core, as specified above (28 credits);



- [SC/CHEM 2050 4.00](#) (or [SC/BIOL 2070 3.00](#) and one of [SC/BCHM 2020 3.00](#) or [SC/BIOL 2020 3.00](#), in which case SC/BIOL1000 3.00 and SC/BIOL 1001 3.00 are pre-requisites);
- [SC/CHEM 3010 3.00](#); [SC/CHEM 3020 3.00](#); [SC/CHEM 3030 3.00](#); [SC/CHEM 3080 4.00](#);
- [SC/CHEM 4000 8.00](#);
- a minimum of 18 additional credits from chemistry courses at the 3000 or 4000 level, of which at least nine must be at the 4000 level.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement.

D. Upper level requirement: a minimum of 42 credits at the 3000 level or above (satisfied by the above requirements).

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in a Specialized Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.50 (B) over all courses completed.

### **Specialized Honours Program Stream in Pharmaceutical and Biological Chemistry**

A degree program stream of interest as an entry into the field of pharmaceutical (medicinal) chemistry or for those wishing to explore biologically relevant topics and issues from a chemical perspective. It is suitable for employment in the pharmaceutical and related industries, and in government laboratories, as well as for graduate work in areas of biological chemistry, including medicinal chemistry and structural biology.

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#); or [SC/MATH 1505 6.00](#) with a minimum grade of B;
- computer science: one of [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#) or [LE/CSE 1020 3.00](#);
- foundational science: [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#) (not necessarily in year one).

B. Major requirements:

- the program core, as specified above (28 credits);
- [SC/BIOL 1000 3.00](#); [SC/BIOL 1001 3.00](#);
- [SC/BIOL 2040 3.00](#); [SC/BIOL 2070 3.00](#); one of [SC/CHEM 2050 4.00](#) or [SC/BCHM 2020 3.00](#) or [SC/BIOL 2020 3.00](#); [SC/BCHM 2021 3.00](#) or [SC/BIOL 2021 3.00](#);

- [SC/CHEM 3011 3.00](#); [SC/CHEM 3020 3.00](#); [SC/CHEM 3030 3.00](#); [SC/CHEM 3050 3.00](#); [SC/CHEM 3051 3.00](#); [SC/CHEM 3071 3.00](#); [SC/CHEM 3080 4.00](#);
- [SC/CHEM 4000 8.00](#); [SC/CHEM 4050 3.00](#); [SC/CHEM 4051 3.00](#) or [SC/CHEM 4021 3.00](#);
- at least three additional credits chosen from [SC/CHEM 3021 3.00](#), [SC/CHEM 4051 3.00](#), [SC/BIOL 3110 3.00](#), [SC/BIOL 4151 3.00](#).

C. Science breadth: Satisfied by the above requirements.

D. Upper level requirement: a minimum of 42 credits at the 3000 level or above (satisfied by the above requirements).

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: To graduate in a Specialized Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.50 (B) over all courses completed.

### **Honours Major Program**

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#);
- computer science: one of [LE/CSE 1520 3.00](#), [LE/CSE 1530 3.00](#), [LE/CSE 1540 3.00](#) or [LE/CSE 1020 3.00](#);
- foundational science: [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#) (not necessarily in year one).

B. Major requirements:

- The program core as specified above (28 credits);
- [SC/CHEM 2050 4.00](#) (or [SC/BIOL 2070 3.00](#) and one of [SC/BCHM 2020 3.00](#) or [SC/BIOL 2020 3.00](#), in which case SC/BIOL1000 3.00 and SC/BIOL 1001 3.00 are pre-requisites);
- [SC/CHEM 3030 3.00](#) or [SC/CHEM 3050 3.00](#) or [SC/CHEM 3080 4.00](#) ([SC/CHEM 3080 4.00](#) is recommended to facilitate employment in industry);
- at least twelve credits in chemistry at the 4000 level, of which at least six must be in three-credit courses (being mindful of 3000-level prerequisites for 4000-level courses; some 4000-level courses can be taken in Year 3).

C. Science breadth: at least 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the general education requirement.

D. Upper level requirement: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Double Major Program**

Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section. Honours Double Major programs are necessarily highly demanding and should not be considered by any student without an average academic performance of B grade or better.

The following are minimum requirements:

- the Honours Major chemistry program requirements listed above;
- the requirements for the second major;

Students should consult the departmental undergraduate handbook or a departmental advisor to plan their studies in order to meet the requirements for both majors and their prerequisites.

### **Honours Major/Minor Program**

An Honours Major in chemistry may be combined with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

The following are minimum requirements:

- the Honours Major chemistry program requirements listed above;
- the requirements for the Honours minor;

Students should consult the departmental undergraduate handbook or a departmental advisor to plan their studies in order to meet the requirements for both majors and their prerequisites.

### **Honours Minor**

- [SC/CHEM 1000 3.00](#); [SC/CHEM 1001 3.00](#);
- at least 24 additional credits from chemistry courses at the 2000 or higher level, for an overall total of at least 30 credits from chemistry courses.

**Note:** some 2000-level chemistry courses require mathematics and physics courses as prerequisites or corequisites. Careful planning is required to ensure that prerequisites for the 2000- and higher-level chemistry courses in which the student is interested are completed.

## ENVIRONMENTAL BIOLOGY

The program core (35 or 36 credits) is defined as:

- [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#));
- [SC/ENVB 2050 4.00](#); [SC/BIOL 2060 3.00](#);
- [SC/BIOL 2070 3.00](#) or [SC/BIOL 2010 4.00](#), [SC/BIOL 2030 4.00](#). (Both [SC/CHEM 2020 3.00](#) and SC/CHEM 2021 3.00 may replace one of the two 4 credit biology courses);
- additional courses as required for a total of at least 18 2000-level credits chosen from the following:  
[SC/BIOL 2010 4.00](#), [SC/BIOL 2020 3.00](#), [SC/BIOL 2021 3.00](#), [SC/BIOL 2030 4.00](#), [SC/BIOL 2040 3.00](#),  
[SC/BIOL 2070 3.00](#), [SC/CHEM 2020 3.00](#), SC/CHEM 2021 3.00;
- [SC/ENVB 3001 2.00](#) or [SC/ENVB 3001 3.00](#); [SC/BIOL 3170 3.00](#);
- [SC/BIOL 4245 3.00](#); [SC/BIOL 4255 3.00](#).

**Note:** both [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) are required as prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#) if they are chosen in the program core.

### Bachelor Program

#### A. General education:

- non-science requirement: 12 credits. [ES/ENVS 1000 6.00](#) is recommended for students interested in taking additional environmental studies courses;
- mathematics: [SC/MATH 1505 6.00](#) or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)), [SC/PHYS 1410 6.00](#), SC/PHYS 1420 6.00 or [SC/PHYS 1010 6.00](#).

#### B. Major requirement:

- the program core, as specified above (35 or 36 credits);
- additional credits from the following list of courses for an overall total of at least 42 credits from environmental biology and biology courses of which at least 12 credits are at the 3000 or higher level:  
[SC/ENVB 3002 2.00](#), [SC/ENVB 3002 3.00](#), [SC/BIOL 3150 4.00](#), [SC/BIOL 3200 3.00](#), [SC/BIOL 3500 3.00](#),  
[SC/ENVB 4080 3.00](#), [SC/BIOL 4085 3.00](#), [SC/ENVB 4090 4.00](#), [SC/ENVB 4095 3.00](#), [SC/ENVB 4230 4.00](#),  
[SC/ENVB 4250 3.00](#), [SC/ENVB 4265 3.00](#), [SC/BIOL 4305 3.00](#);
- [SC/GEOG 1400 6.00](#).

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 18 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 90 credits.

F. Standing requirements: A minimum overall grade point average of 4.00 (C) is required in order to be eligible to graduate with a BSc degree (bachelor program).

## Honours Programs

### Honours Major Program

A. General education:

- non-science requirement: 12 credits. [ES/ENVS 1000 6.00](#) is recommended for students interested in taking additional environmental studies courses;
- mathematics: [SC/MATH 1505 6.00](#) or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#). (**Note:** students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take [SC/MATH 1505 6.00](#).);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)), [SC/PHYS 1410 6.00](#), [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#).

**Note:** both [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) are required as prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#) in the program core.

B. Major requirements:

- The program core as specified above (35 or 36 credits);
- [SC/ENVB 4700 3.00](#);
- additional credits from the following list of courses for an overall total of at least 51 credits from environmental biology and biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: [SC/ENVB 3002 2.00](#), [SC/ENVB 3002 3.00](#), [SC/BIOL 3100 2.00](#), [SC/BIOL 3150 4.00](#), [SC/BIOL 3200 3.00](#), [SC/BIOL 3500 3.00](#), [SC/BIOL 4000 3.00](#), [SC/BIOL 4000 8.00](#), [SC/ENVB 4080 3.00](#), [SC/BIOL 4085 3.00](#), [SC/ENVB 4090 4.00](#), [SC/ENVB 4095 3.00](#), [SC/ENVB 4230 3.00](#), [SC/ENVB 4250 3.00](#), [SC/ENVB 4265 3.00](#), [SC/BIOL 4305 3.00](#);
- [SC/GEOG 1400 6.00](#).

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all environmental biology and biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### Honours Double Major Program

All BSc Honours degree candidates should consult departmental advisors as early as possible concerning course requirements for particular Honours Double Major programs. Possible subject combinations for BSc Honours Double Major degree programs are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section of this calendar.

A. General education:

- non-science requirement: 12 credits. [ES/ENVS 1000 6.00](#) is recommended for students interested in taking additional environmental studies courses:
- mathematics: [SC/MATH 1505 6.00](#) or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#). (**Note:** students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take [SC/MATH 1505 6.00](#).);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)), [SC/PHYS 1410 6.00](#), [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) or [SC/BIOL 1010 6.00](#);
- [SC/ENVB 2050 4.00](#); [SC/BIOL 2060 3.00](#); any two of [SC/BIOL 2010 4.00](#), [SC/BIOL 2020 3.00](#), [SC/BIOL 2021 3.00](#), [SC/BIOL 2030 4.00](#), [SC/BIOL 2040 3.00](#), [SC/BIOL 2070 3.00](#). Both [SC/CHEM 2020 3.00](#) and [SC/CHEM2021 3.00](#) may replace one of these two biology courses;
- [SC/ENVB 3001 2.00](#) or [SC/ENVB 3001 3.00](#);

- additional credits from the following list of courses for an overall total of at least 42 credits from environmental biology and biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: [SC/ENVB 3002 2.00](#), [SC/ENVB 3002 3.00](#), [SC/BIOL 3100 2.00](#), [SC/BIOL 3150 4.00](#), [SC/BIOL 3200 3.00](#), [SC/BIOL 3500 3.00](#), [SC/BIOL 4000 3.00](#), [SC/BIOL 4000 8.00](#), [SC/ENVB 4080 3.00](#), [SC/BIOL 4085 3.00](#), [SC/ENVB 4090 4.00](#), [SC/ENVB 4095 3.00](#), [SC/ENVB 4230 4.00](#), [SC/ENVB 4250 3.00](#), [SC/ENVB 4265 3.00](#), [SC/BIOL 4305 3.00](#);
- the course requirements for the second major.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the above requirements. Satisfied if the second major is another science discipline.

D. Upper level: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all environmental biology and biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Major/Minor Program**

An Honours Major in environmental biology may be combined with an Honours Minor in another subject area in a BSc Honours Major/Minor degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section of this calendar.

A. General education:

- non-science requirement: 12 credits. [ES/ENVS 1000 6.00](#) is recommended for students interested in taking additional environmental studies courses:
- mathematics: [SC/MATH 1505 6.00](#) or six credits from [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#). (**Note:** students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take [SC/MATH 1505 6.00](#).);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#) (prerequisites for [SC/BIOL 2020 3.00](#) and [SC/CHEM 2020 3.00](#)), [SC/PHYS 1410 6.00](#), [SC/PHYS 1420 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- the program core as specified above (35 to 36 credits);
- [SC/ENVB 4700 3.00](#);
- additional credits from the following list of courses for an overall total of at least 51 credits from environmental biology and biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: [SC/ENVB 3002 2.00](#), [SC/ENVB 3002 3.00](#), [SC/BIOL 3100 2.00](#), [SC/BIOL 3150 4.00](#), [SC/BIOL 3200 3.00](#), [SC/BIOL 3500 3.00](#), [SC/BIOL 4000 3.00](#), [SC/BIOL 4000 8.00](#), [SC/ENVB 4080 3.00](#), [SC/BIOL 4085 3.00](#), [SC/ENVB 4090 4.00](#), [SC/ENVB 4095 3.00](#), [SC/ENVB 4230 3.00](#), [SC/ENVB 4250 3.00](#), [SC/ENVB 4265 3.00](#), [SC/BIOL 4305 3.00](#);
- [SC/GEOG 1400 6.00](#);
- the course requirements for the minor.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements. Satisfied if the minor is another science discipline.

D. Upper level: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all environmental biology and biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### Honours Minor

An Honours minor in environmental biology may be combined with an Honours major in another subject area. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section of this calendar.

- [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) or [SC/BIOL 1010 6.00](#);
- [SC/ENVB 2050 4.00](#); [SC/BIOL 2060 3.00](#); any two of [SC/BIOL 2010 4.00](#), [SC/BIOL 2020 3.00](#), [SC/BIOL 2021 3.00](#), [SC/BIOL 2030 4.00](#), [SC/BIOL 2040 3.00](#). (Both [SC/CHEM 2020 3.00](#) and [SC/CHEM 2021 3.00](#) may substitute for one of these two biology courses.);
- [SC/ENVB 3001 2.00](#) or [SC/ENVB 3001 3.00](#);
- additional credits from the following list of courses for an overall total of at least nine credits from environmental biology and biology courses at the 3000 or 4000 level; [SC/ENVB 3002 2.00](#), [SC/ENVB 3002 3.00](#), [SC/BIOL 3150 4.00](#), [SC/BIOL 3200 3.00](#), [SC/BIOL 3500 3.00](#), [SC/ENVB 4080 3.00](#), [SC/BIOL 4085 3.00](#), [SC/ENVB 4090 4.00](#), [SC/ENVB 4095 3.00](#), [SC/ENVB 4230 4.00](#), [SC/ENVB 4250 3.00](#), [SC/ENVB 4265 3.00](#), [SC/BIOL 4305 3.00](#);



- additional credits from the above listed environmental biology and biology courses at the 2000 or higher level, as required for an overall total of at least 30 environmental biology or biology credits.

## ENVIRONMENTAL SCIENCE

This is a Specialized Honours program offered with two streams – Life Science or Physical Science.

The program core is defined as (39 credits): [SC/GEOG 1400 6.00](#); [SC/GEOG 2400 6.00](#); [SC/GEOG 2500 3.00](#) or [SC/GEOG 2600 3.00](#); six credits from [SC/GEOG 2610 3.00](#); [SC/GEOG 3200 3.00](#), [SC/GEOG 3500 3.00](#), [SC/GEOG 4180 4.00](#), [SC/GEOG 4200 3.00](#), [SC/GEOG 4500 3.00](#); six credits from [SC/GEOG 4205 3.00](#), [SC/GEOG 4210 3.00](#), [SC/GEOG 4310 3.00](#), [SC/GEOG 4400 3.00](#), [SC/GEOG 4600 3.00](#); 12 additional credits from geography courses (including three credits in statistics for students in the physical sciences stream).

### Specialized Honours – Life Sciences stream

#### A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1505 6.00](#), or both [SC/MATH 1013 3.00](#) and [SC/MATH 1014 3.00](#);
- computer science: [LE/CSE 1520 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: [SC/BIOL 1000 3.00](#) and [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)); [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#)

#### B. Major requirements:

- The program core above (39 credits);
- [SC/BIOL 2010 4.00](#); [SC/BIOL 2030 4.00](#); [SC/BIOL 2050 4.00](#); [SC/BIOL 2060 3.00](#);
- one ecology field course ([SC/BIOL 3001 3.00](#) or [SC/BIOL 3001 2.00](#));
- 15 additional credits chosen from the following: a second ecology field course ([SC/BIOL 3002 3.00](#) or [SC/BIOL 3002 2.00](#)), [SC/BIOL 3170 3.00](#), [SC/BIOL 4000 8.00](#), [SC/BIOL 4020 3.00](#), [SC/BIOL 4070 3.00](#), [SC/BIOL 4080 3.00](#), [SC/BIOL 4090 4.00](#), [SC/BIOL 4095 3.00](#), [SC/BIOL 4100 3.00](#), [SC/BIOL 4120 3.00](#), [SC/BIOL 4130 3.00](#), [SC/BIOL 4230 4.00](#), [SC/BIOL 4240 4.00](#), [SC/BIOL 4245 3.00](#), [SC/BIOL 4250 3.00](#), [SC/BIOL 4255 3.00](#), [SC/BIOL 4260 3.00](#), [SC/BIOL 4265 3.00](#), [SC/BIOL 4340 3.00](#), [SC/BIOL 4400 3.00](#), [SC/BIOL 4420 3.00](#);

**Note:** at least 12 credits from the major courses (BIOL or GEOG) must be at the 4000 level.

#### C. Science breadth: satisfied by above requirements.

#### D. Upper level requirement: a minimum of 42 credits at the 3000 or higher level.

E. Additional elective credits, as required for an overall total of at least 120 credits.

F. Standing requirement: To graduate in an Honours program requires successful completion of all Faculty requirements and program required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Specialized Honours – Physical Sciences stream**

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#);
- computer science: [LE/CSE 1540 3.00](#);
- foundational science: [SC/CHEM 1000 3.00](#); [SC/CHEM 1001 3.00](#); [SC/PHYS 1010 6.00](#) or [SC/PHYS 1410 6.00](#).

B. Major requirements:

- The program core above (39 credits);
- [LE/EATS 2010 3.00](#); [LE/EATS 2470 3.00](#);
- [SC/CHEM 2030 3.00](#); [SC/PHYS 2020 3.00](#);
- [SC/MATH 1025 3.00](#); [SC/MATH 2015 3.00](#); [SC/MATH 2270 3.00](#);
- [LE/EATS 3030 3.00](#); [LE/EATS 3130 3.00](#); [LE/EATS 4220 3.00](#);
- six additional credits chosen from [LE/EATS 3040 3.00](#), [LE/EATS 4050 3.00](#), [LE/EATS 4051 3.00](#), [LE/EATS 4120 3.00](#), [LE/EATS 4130 3.00](#), [LE/EATS 4140 3.00](#), [LE/EATS 4150 3.00](#), [LE/EATS 4160 3.00](#), [LE/EATS 4230 3.00](#), [LE/EATS 4240 3.00](#), [LE/EATS 4300 3.00](#) (atmospheric science topics), [SC/MATH 3241 3.00](#).

**Note:** at least 12 credits from the major courses (EATS or GEOG) must be at the 4000 level.

C. Science breadth: satisfied by above requirements.

D. Upper level requirements: at least 42 credits at the 3000 or higher level.

E. Additional elective credits, as required for an overall total of at least 120 credits,

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and program required courses and a minimum credit-weighted grade point average of 5.00 (C+) over all courses completed.

See [Certificate Programs](#) in the Faculty of Science Undergraduate Degree and Certificate Programs section of this calendar.

## Environmental Science Courses

The following list includes required and elective courses in the Specialized Honours BSc program in Environmental Science.

### Geography

[SC/GEOG 2400 6.00](#)

[SC/GEOG 2500 3.00](#)

[SC/GEOG 2600 3.00](#)

[SC/GEOG 2610 3.00](#)

[SC/GEOG 3200 3.00](#)

[SC/GEOG 3500 3.00](#) (cross-listed to: [SC/BIOL 3500 3.00](#))

[SC/GEOG 4180 4.00](#)

[SC/GEOG 4200 3.00](#)

[SC/GEOG 4205 3.00](#)

[SC/GEOG 4210 3.00](#)

[SC/GEOG 4215 3.00](#)

[SC/GEOG 4310 3.00](#)

[SC/GEOG 4400 3.00](#)

[SC/GEOG 4500 3.00](#)

[SC/GEOG 4541 3.00](#)

[SC/GEOG 4600 3.00](#)

### Biology

[SC/BIOL 2010 4.00](#)

[SC/BIOL 2030 4.00](#)

[SC/BIOL 2050 4.00](#)

[SC/BIOL 2060 3.00](#)

[SC/BIOL 3001 3.00](#) (ecology sections)

[SC/BIOL 3001 2.00](#) (ecology sections)

[SC/BIOL 3002 3.00](#) (ecology sections)

[SC/BIOL 3002 2.00](#) (ecology sections)

[SC/BIOL 3170 3.00](#)

[SC/BIOL 4000 8.00](#)

[SC/BIOL 4070 3.00](#)

[SC/BIOL 4080 3.00](#)

[SC/BIOL 4090 4.00](#)

[SC/BIOL 4095 3.00](#)

[SC/BIOL 4100 3.00](#)

[SC/BIOL 4130 3.00](#)  
[SC/BIOL 4230 4.00](#)  
[SC/BIOL 4240 4.00](#)  
[SC/BIOL 4245 3.00](#) (cross-listed to: [ES/ENVS 4110 3.00](#))  
[SC/BIOL 4250 3.00](#)  
[SC/BIOL 4255 3.00](#) (cross-listed to: [ES/ENVS 4111 3.00](#))  
[SC/BIOL 4260 3.00](#)  
[SC/BIOL 4265 3.00](#)  
[SC/BIOL 4340 3.00](#)  
[SC/BIOL 4400 3.00](#)  
[SC/BIOL 4420 3.00](#)

### **Earth and Atmospheric Science**

[LE/EATS 2010 3.00](#)  
[LE/EATS 2470 3.00](#)  
[LE/EATS 3030 3.00](#) (cross-listed to: [SC/PHYS 3080 3.00](#))  
[LE/EATS 3040 3.00](#)  
[LE/EATS 3130 3.00](#) (cross-listed to: [SC/CHEM 3060 3.00](#))  
[LE/EATS 4050 3.00](#)  
[LE/EATS 4051 3.00](#)  
[LE/EATS 4120 3.00](#)  
[LE/EATS 4130 3.00](#)  
[LE/EATS 4140 3.00](#)  
[LE/EATS 4160 3.00](#)  
[LE/EATS 4220 3.00](#)  
[LE/EATS 4230 3.00](#)  
[LE/EATS 4240 3.00](#)

### **GEOGRAPHY**

The program core is defined as (24-27 credits): [SC/GEOG 1400 6.00](#); [AP/GEOG 1410 6.00](#) or [AP/GEOG 1000 6.00](#); [SC/GEOG 2400 6.00](#); [SC/GEOG 2420 3.00](#); [SC/GEOG 2500 3.00](#) or [SC/GEOG 2600 3.00](#) or both [SC/GEOG 4205 3.00](#) and [SC/GEOG 4210 3.00](#).

### **Bachelor Program**

A. General education:

- non-science requirement: 12 credits;

- mathematics: six credits from [SC/MATH 1505 6.00](#), [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: one of [LE/CSE 1520 3.00](#), [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from: [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- the program core (24-27 credits);
- at least twelve credits from science geography courses at the 3000 or 4000 level, for an overall total of at least 36 credits from geography courses.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement.

D. Upper level requirements: a minimum of 18 credits at the 3000 level or above.

E. Additional elective credits, as required, for a total of 90 credits.

F. Standing requirements: a minimum overall grade point average of 4.00 (C) is required in order to be eligible to graduate with a BSc degree (bachelor program).

## Honours Programs

### Specialized Honours Program

A. General education:

- non-science requirement: 12 credits;
- mathematics: six credits from [SC/MATH 1505 6.00](#), [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: one of [LE/CSE 1520 3.00](#), [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from: [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#) , [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- the program core (24-27 credits);
- [SC/GEOG 3540 3.00](#);

- at least 33 additional credits from science geography courses at the 3000 or 4000 level, for an overall total of at least 54 credits from science geography courses (at least 60 from geography courses); of these a minimum of 18 credits must be at the 3000 level or above, including a minimum of 12 credits at the 4000 level;
- at least six credits from non-geography science courses at the 2000 level or higher.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or higher. 21 of these 24 credits, including 3 credits at the 2000 level or higher, are satisfied by the above requirements.

D. Upper level requirements: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required for a total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Double Major Programs**

The Honours Double Major BSc program allows the combination of majors in Geography and Earth and Atmospheric Science (in either the atmospheric science stream or the earth science stream).

A. General education:

- non-science requirement: 12 credits;
- mathematics: six credits from [SC/MATH 1505 6.00](#), [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: one of [LE/CSE 1520 3.00](#), [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from: [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

For the geography and atmospheric science stream:

- the program core, as specified above, including [SC/GEOG 4205 3.00](#) and [SC/GEOG 4210 3.00](#);
- [SC/GEOG 3540 3.00](#);
- at least three credits from the following courses: [SC/GEOG 4000 6.00](#), [SC/GEOG 4310 3.00](#);
- a total of at least 42 credits from geography courses, with a minimum of 18 credits the 3000 or higher level, including at least 12 credits at the 4000 level;
- the requirements for Earth and Atmospheric Science, atmospheric science stream.

For the geography and earth science stream:

- the program core, as specified above, including [SC/GEOG 2600 3.00](#) and [SC/GEOG 2610 3.00](#);
- [SC/GEOG 3540 3.00](#);
- at least nine credits selected from the following courses: [SC/GEOG 4000 6.00](#), [SC/GEOG 4180 4.00](#), [SC/GEOG 4200 3.00](#), [SC/GEOG 4205 3.00](#), [SC/GEOG 4210 3.00](#), [SC/GEOG 4310 3.00](#), [SC/GEOG 4400 3.00](#), [SC/GEOG 4600 3.00](#);
- a total of at least 42 credits from geography courses, with at least 18 credits at the 3000 or higher level, including at least 12 credits at the 4000 level;
- the course requirements for Earth and Atmospheric Science, earth science stream.

C. Science breadth: satisfied by above requirements.

D. Upper level requirements: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for a total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Major/Minor Program**

An Honours Major in geography may be combined with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

A. General education:

- non-science requirement: 12 credits;
- mathematics: six credits from [SC/MATH 1505 6.00](#), [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#);
- computer science: one of [LE/CSE 1520 3.00](#), [LE/CSE 1530 3.00](#) or [LE/CSE 1540 3.00](#);
- foundational science: six credits from: [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- the program core (24-27 credits);
- [SC/GEOG 3540 3.00](#);

- at least 15 additional credits in science geography courses at the 3000 or 4000 level, for an overall total of at least 42 credits in geography courses, of which at least 18 credits must be at the 3000 level or above, including at least 12 credits at the 4000 level;
- the course requirements for the minor.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or higher. 15 of these 24 credits are satisfied by the General Education requirement. Satisfied if the minor is another science discipline.

D. Upper level requirements: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for a total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Minor**

- [SC/GEOG 1400 6.00](#);
- [AP/GEOG 1410 6.00](#);
- six credits in science geography courses at the 4000 level;
- at least 12 credits from science geography courses for an overall total of at least 30 credits from geography courses.

### **INTERNATIONAL BACHELOR OF SCIENCE (IBSC)**

The degree builds on the established strengths of the Honours programs, and combines them with BSc non-science requirements and other required courses outside the major, most of which will be taken in the Faculty of Liberal Arts and Professional Studies, and a mandatory period of study abroad. The program requires students to acquire an international language and to gain international experience on exchange at one of York University's partner institutions abroad.

The principal components will be the following:

#### **International Bachelor of Science (Honours)**

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
  - a minimum of 12 credits of language study in one of the languages offered at York University;
  - a minimum of 12 credits of non-science international content courses;



- an additional six credits of language study or non-science international component courses for a total of 30 credits;
- one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

### **Language Study**

Each student will choose a modern language of study as an integral part of the program. The languages are those offered at York University. No prior knowledge of the language is necessary. All entering students will be given a placement test by the Department of Languages, Literature and Linguistics to determine their appropriate course entry level. All students must successfully complete at least the second university-level course in their chosen language. If entering students are placed in a course above the 1000 level, they must successfully complete 12 credits in that language; if students have a very high level of competence in the language, so that there are not 12 credits which they can do, i.e. the students are placed in the 4000 level, they must successfully complete the six credits in that language and the remaining credits of another language. If entering students already have a second-language competency in one of the designated program languages, they must select an additional language.

Students intending to study abroad in a language other than English should also get an assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

### **International Exchange (Mandatory)**

Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

### **International Content Courses**

Sample list of relevant country, region and thematic courses:

#### **East Asia**

[AP/GEOG 1000 6.00](#)

[AP/HIST 1030 6.00](#)

[AP/HIST 2710 6.00](#)

[AP/HIST 3760 6.00](#)

[AP/HUMA 1400 9.00](#)

[AP/HUMA 2420 9.00](#)

[AP/POLS 2930 6.00](#)

[AP/POLS 3510 3.00](#)

[AP/POLS 3515 3.00](#)

## **Europe**

[AP/GER 3790 6.00](#)

[AP/HIST 2300 6.00](#)

[AP/HIST 3355 6.00](#)

[AP/HIST 3391 6.00](#)

[AP/HUMA 2195 9.00](#)

[AP/POLS 2930 6.00](#)

[AP/POLS 3520 3.00](#)

[AP/RU 3770 6.00](#)

## **Latin America**

[AP/HIST 2720 6.00](#)

[AP/HIST 3731 6.00](#)

[AP/POLS 2930 6.00](#)

[AP/POLS 3553 6.00](#)

## **Themes**

### Health

[AP/ANTH 3190 3.00](#)

[AP/ANTH 3200 3.00](#)

[AP/SOSC 2102 3.00](#)

### Cities

[AP/SOSC 1731 9.00](#)

[AP/SOSC 2730 6.00](#)

[AP/SOSC 3730 6.00](#)

## **Notes:**

1. This list indicates types of courses that will fulfill the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculties of Environmental Studies, Fine Arts and Glendon, will also be acceptable.

2. In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

The following program is available:

### **International Bachelor of Science (iBSc)**

Biology - Specialized Honours, Honours Major, Honours Major/Minor (the Honours Major and Honours Major/Minor include the biomedical science stream) - refer to [Biology](#) in the Programs of Study section.

### **MATHEMATICS AND STATISTICS**

The Department of Mathematics and Statistics offers BA, Honours BA, BSc and Honours BSc degree programs in seven subject areas. Students in the BSc and Honours BSc programs must take courses in foundational science.

- applied mathematics
- computational mathematics (Honours BSc only)
- mathematics
- mathematics for commerce (BA and Honours BA only)
- mathematics for education
- statistics
- international dual degree program (mathematics and statistics) (BSc and Honours BSc only)

The degree programs in each subject area are listed separately below. A student should choose one of these subject areas based on interest and employment goals, but it is possible to change subject areas provided the requirements of the desired subject area can be met.

All Honours degree candidates must complete the mathematics/statistics core: [SC/MATH 1021 3.00](#); [SC/MATH 1131 3.00](#); [SC/MATH 1200 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#); [SC/MATH 2022 3.00](#); [SC/MATH 2030 3.00](#); [SC/MATH 2310 3.00](#) (refer to program specifications below).

### **Bachelor of Arts**

All BA and Honours BA degree candidates must comply with the general education requirements: 24 credits from humanities, modes of reasoning, natural science and social science (refer to the Faculty of Science Regulations Governing Undergraduate Degree Requirements section).

All BA and Honours BA degree candidates, in accordance with their declared programs, must comply with general regulations specified in the Faculty of Science Regulations Governing Undergraduate Degree Requirements section and, in so doing, must also satisfy the course, credit and standing requirements specified below.

### **Bachelor of Arts Program (BA)**

**To graduate in a bachelor program.** A minimum cumulative overall grade point average of 4.00 (C) is required in order to be eligible to graduate with a BA degree (bachelor program).

### **Bachelor of Arts Honours Programs (Honours BA)**

To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Applied Mathematics BA Programs**

#### **Bachelor Program (BA)**

- [LE/CSE 1560 3.00](#);
- [SC/MATH 1021 3.00](#); [SC/MATH 1131 3.00](#); [SC/MATH 1200 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#);
- [SC/MATH 2022 3.00](#); [SC/MATH 2030 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2041 3.00](#); [SC/MATH 2270 3.00](#); [SC/MATH 2310 3.00](#);
- [SC/MATH 3241 3.00](#); [SC/MATH 3260 3.00](#) or [SC/MATH 3170 6.00](#); [SC/MATH 3243 1.00](#);
- additional elective credits, as required for an overall total of at least 90 credits, of which at least 18 credits are at the 3000 level or higher, including at least 12 credits in the major.

#### **Specialized Honours BA Program**

- The mathematics/statistics core (24 credits);
- [LE/CSE 1560 3.00](#);
- [SC/MATH 2001 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2041 3.00](#); [SC/MATH 2270 3.00](#);
- [SC/MATH 3001 3.00](#); [SC/MATH 3241 3.00](#); [SC/MATH 3242 3.00](#); [SC/MATH 3243 1.00](#); [SC/MATH 3271 3.00](#); [SC/MATH 3410 3.00](#);
- [SC/MATH 3260 3.00](#) or [SC/MATH 3170 6.00](#);
- [SC/MATH 4090 3.00](#);
- at least nine additional credits selected from mathematics courses without second digit 5 at the 4000 level, for an overall total of at least 65 credits from major mathematics courses;
- additional elective credits, as required for an overall total of at least 120 credits, of which at least 36 credits are at the 3000 level or higher, at least 18 of which must be at the 4000 level.

## Honours Major, Honours Double Major and Honours Major/Minor BA Program

The Honours Major in applied mathematics may be taken standalone or combined with an Honours Major in another subject area in an Honours Double Major BA or with an Honours Minor in another subject area in an Honours Major/Minor BA program. The double major or major/minor BA may be taken with approved major degree programs in the Faculties of Environmental Studies, Fine Arts, Health, Lassonde School of Engineering, Liberal Arts and Professional Studies, or Science. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

- The applied mathematics Honours Major requirements below;
- the course requirements for the second major or the minor;
- additional elective credits, as required for an overall total of at least 120 credits, of which at least 36 credits are at the 3000 level or higher, at least 18 of which must be at the 4000 level.

### Honours Major BA Program

- The mathematics/statistics core (24 credits);
- [LE/CSE 1560 3.00](#);
- [SC/MATH 2031 1.00](#); [SC/MATH 2041 3.00](#); [SC/MATH 2270 3.00](#);
- [SC/MATH 3241 3.00](#); one of [SC/MATH 3242 3.00](#) or [SC/MATH 3260 3.00](#) or [SC/MATH 3170 6.00](#);  
[SC/MATH 3243 1.00](#); [SC/MATH 3271 3.00](#);
- [SC/MATH 4090 3.00](#);
- nine additional credits at the 4000 level, selected from mathematics courses without second digit 5, for an overall total of at least 53 credits from major mathematics courses.

### Honours Minor BA Program

The Honours Minor in applied mathematics consists of:

- [LE/CSE 1560 3.00](#);
- [SC/MATH 1021 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#);
- [SC/MATH 2310 3.00](#);
- six credits chosen from the following: [SC/MATH 2041 3.00](#), [SC/MATH 2270 3.00](#), either [SC/MATH 2022 3.00](#) or [SC/MATH 2222 3.00](#);
- at least 12 additional credits from mathematics courses without second digit 5 at the 3000 level or higher, including at least one of [SC/MATH 3170 6.00](#) or [SC/MATH 3241 3.00](#) or [SC/MATH 3260 3.00](#).

## Mathematics BA Programs

### Bachelor Program (BA)

- [LE/CSE 1560 3.00](#);

- [SC/MATH 1300 3.00](#) or equivalent; [SC/MATH 1310 3.00](#) or equivalent; [SC/MATH 1021 3.00](#) or equivalent; [SC/MATH 1200 3.00](#);
- [SC/MATH 2022 3.00](#) or equivalent; [SC/MATH 2030 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2310 3.00](#);
- [SC/MATH 3010 3.00](#);
- at least 9 additional credits in mathematics courses without second digit 5 at the 3000 level or higher, for an overall total of at least 34 credits in major mathematics courses;
- additional elective credits, as required for an overall total of at least 90 credits, of which at least 18 credits are at the 3000 level or higher, including at least 12 credits in the major.

**Note:** students who have taken [SC/MATH 1530 3.00](#) and [SC/MATH 1540 3.00](#) may not take [SC/MATH 1300 3.00](#), but will be considered to have credit for [SC/MATH 1300 3.00](#) and may take [SC/MATH 1310 3.00](#).

### Specialized Honours BA Program

- [LE/CSE 1560 3.00](#);
- the mathematics/statistics core (24 credits);
- [SC/MATH 2001 3.00](#); [SC/MATH 2031 1.00](#);
- [SC/MATH 3001 3.00](#); [SC/MATH 3010 3.00](#); [SC/MATH 3021 3.00](#); [SC/MATH 3022 3.00](#);
- [SC/MATH 4011 3.00](#); [SC/MATH 4021 3.00](#); [SC/MATH 4200 3.00](#);
- at least three additional credits in mathematics courses without second digit 5 at the 4000 level;
- at least 15 additional credits in mathematics courses without second digit 5 for a total of at least 67 credits from major mathematics;
- additional elective credits, as required for an overall total of at least 120 credits, of which at least 36 credits are at the 3000 level or higher, at least 18 of which must be at the 4000 level.

### Honours Major, Honours Double Major and Honours Major/Minor BA Program

The Honours Major in mathematics may be taken standalone or combined with an Honours Major in another subject area in a Honours Double Major BA or with an Honours Minor in another subject area in a Honours Major/Minor BA program. The double major or major/minor may be taken with approved major degree programs in the Faculties of Environmental Studies, Fine Arts, Health, Lassonde School of Engineering, Liberal Arts and Professional Studies, or Science. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

The Honours BA program in mathematics may be linked with any Honours Double Major Interdisciplinary BA program in the Faculty of Liberal Arts and Professional Studies. These are: African studies, European studies, Latin American and Caribbean studies, social and political thought, South Asian studies. Students must take at least 42 credits in mathematics and at least 36 credits in the interdisciplinary program. Courses taken to meet mathematics requirements cannot also be used to meet the requirements of the interdisciplinary program. Students in these interdisciplinary programs must take a total of at least 18 credits at the 4000 level, including at least 12 credits in mathematics and six credits in the interdisciplinary program.

## Honours BA Program

- [LE/CSE 1560 3.00](#);
- the mathematics/statistics core (24 credits);
- [SC/MATH 2001 3.00](#); [SC/MATH 2031 1.00](#);
- [SC/MATH 3001 3.00](#); [SC/MATH 3010 3.00](#); [SC/MATH 3021 3.00](#); [SC/MATH 3022 3.00](#);
- [SC/MATH 4011 3.00](#); [SC/MATH 4021 3.00](#); [SC/MATH 4200 3.00](#);
- at least three additional credits in mathematics courses without second digit 5 at the 4000 level for a total of 52 credits from major mathematics courses;
- additional elective credits, as required for an overall total of at least 120 credits, of which at least 36 credits are at the 3000 level or higher, at least 18 of which must be at the 4000 level.

## Honours Minor BA Program

The Honours Minor in mathematics requires:

- [SC/MATH 1021 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#);
- three credits chosen from: [SC/MATH 1019 3.00](#), [SC/MATH 1090 3.00](#), [SC/MATH 1190 3.00](#), [SC/MATH 1200 3.00](#), [SC/MATH 2030 3.00](#) or [SC/MATH 2320 3.00](#);
- [SC/MATH 2022 3.00](#); [SC/MATH 2310 3.00](#);
- 12 additional credits in mathematics courses without second digit 5 at the 3000 level or higher for a total at least 30 credits in mathematics courses.

### Notes:

- In all Honours mathematics programs, [SC/MATH 1021 3.00](#) and/or [SC/MATH 2022 3.00](#) may be replaced by other linear algebra courses, but if the grade obtained in any such replacement course is below A then one of the following courses must be taken in addition to the Honours requirements noted in each program above: [SC/MATH 1019 3.00](#), [SC/MATH 1090 3.00](#), [SC/MATH 1190 3.00](#) or [SC/MATH 2320 3.00](#).
- In order to obtain an Honours BA (120 credits), students must take a total of at least 18 credits at the 4000 level, including at least 12 credits at the 4000 level in each Honours Major or Specialized Honours major.

## Mathematics for Commerce Programs

### Bachelor Program (BA)

Students must complete the following courses or approved substitutes:

- [LE/CSE 1520 3.00](#); [LE/CSE 1530 3.00](#);
- [SC/MATH 1550 6.00](#) or [SC/MATH 1530 3.00](#) and [SC/MATH 1540 3.00](#); [SC/MATH 1581 3.00](#);
- [SC/MATH 2221 3.00](#); [SC/MATH 2222 3.00](#); [SC/MATH 2560 3.00](#); [SC/MATH 2570 3.00](#); [SC/MATH 2581 3.00](#);

- [SC/MATH 3430 3.00](#) or [SC/MATH 4330 3.00](#); [SC/MATH 3170 6.00](#); [SC/MATH 3330 3.00](#);
- additional elective credits, as required for an overall total of at least 90 credits, of which at least 18 credits are at the 3000 level or higher, including at least 12 credits in the major.

### Specialized Honours BA Program

The Specialized Honours BA program in Mathematics for Commerce has only the Actuarial Stream. In comparison to the Honours Actuarial Stream, the emphasis is on preparing students to attain the designation of Associate of the Canadian Institute of Actuaries (CIA), the Society of Actuaries (SOA) and the Casualty Actuarial Society (CAS).

#### Actuarial Stream

- [LE/CSE 1560 3.00](#);
- the mathematics/statistics core (24 credits);
- [SC/MATH 2001 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2270 3.00](#); [SC/MATH 2280 3.00](#); [SC/MATH 2281 3.00](#); [SC/MATH 2131 3.00](#);
- [SC/MATH 3131 3.00](#); [SC/MATH 3132 3.00](#); [SC/MATH 3280 3.00](#); [SC/MATH 3281 3.00](#); [SC/MATH 3330 3.00\\*](#);
- [SC/MATH 4130B 3.00\\*](#); [SC/MATH 4143 3.00](#); [SC/MATH 4280 3.00](#); [SC/MATH 4281 3.00](#); [SC/MATH 4430 3.00](#) or [SC/MATH 4431 3.00](#);
- additional elective credits, as required for an overall total of at least 120 credits, of which at least 36 credits are at the 3000 level or above, at least 18 of which must be at the 4000 level.

\* This course is part of the 'Applied Statistics' Validation by Educational Experience (VEE) requirements of the Canadian Institute of Actuaries. In addition to it, students should take the following courses as electives: [AP/ECON 1000 3.00](#), [AP/ECON 1010 3.00](#) for the 'Economics' VEE and [AP/ECON 2300 3.00](#), [AP/ECON 2350 3.00](#), [AP/ECON 4400 3.00](#), [AP/ECON 4410 3.00](#) for the 'Corporate Finance' VEE. Note that to be granted VEE credit from the Canadian Institute of Actuaries, students must achieve a grade of B or higher in each VEE requirement.

### Honours BA Program

The Honours BA program in Mathematics for Commerce has two streams, and students must complete the requirements of one of the streams. The Operations Research Stream (industrial optimization) and the Actuarial Stream (insurance) require more intensive calculus courses than the BA program in Mathematics for Commerce, starting in first year.

#### Operations Research Stream

- [LE/CSE 1560 3.00](#);
- the mathematics/statistics core (24 credits);
- [SC/MATH 2031 1.00](#); [SC/MATH 2131 3.00](#);
- [SC/MATH 3430 3.00](#) or [SC/MATH 4330 3.00](#); [SC/MATH 3330 3.00](#); [SC/MATH 3170 6.00](#);



- [SC/MATH 4170 6.00](#);
- six additional credits in mathematics courses at the 4000 level.

#### Actuarial Stream

- [LE/CSE 1560 3.00](#);
- the mathematics/statistics core (24 credits);
- [SC/MATH 2031 1.00](#); [SC/MATH 2131 3.00](#); [SC/MATH 2280 3.00](#);
- [SC/MATH 3131 3.00](#); [SC/MATH 3280 3.00](#); [SC/MATH 3281 3.00](#);
- [SC/MATH 3330 3.00](#);
- [SC/MATH 4280 3.00](#); [SC/MATH 4430 3.00](#) or [SC/MATH 4431 3.00](#);
- six additional credits in mathematics courses at the 4000 level.

#### Honours Minor BA Program

Students must complete the following courses or approved substitutes:

- [LE/CSE 1520 3.00](#);
- [SC/MATH 1550 6.00](#) or [SC/MATH 1530 3.00](#) and [SC/MATH 1540 3.00](#); [SC/MATH 1581 3.00](#); [SC/MATH 1021 3.00](#);
- [SC/MATH 2560 3.00](#); [SC/MATH 2570 3.00](#);
- [SC/MATH 3170 6.00](#); [SC/MATH 3330 3.00](#); [SC/MATH 3430 3.00](#) or [SC/MATH 3034 3.00](#).

**Note:** in order to obtain an Honours BA (120 credits), students must take a total of at least 18 credits at the 4000 level, including at least 12 credits at the 4000 level in each Honours Major or Specialized Honours major.

#### Mathematics for Education BA Programs

This is a mathematics program focusing on the needs of students interested in concurrent education or consecutive education with mathematics as a teachable subject.

#### Specialized Honours BA Program

- the mathematics/statistics core (24 credits);
- [LE/CSE 1560 3.00](#);
- [SC/MATH 2031 1.00](#); one of [SC/MATH 2001 3.00](#), [SC/MATH 2131 3.00](#), [SC/MATH 2270 3.00](#) or [SC/MATH 2280 3.00](#);
- [SC/MATH 3090 3.00](#); [SC/MATH 3050 6.00](#) or [SC/MATH 3052 6.00](#);
- [SC/MATH 4100 3.00](#); [SC/MATH 4400 6.00](#);
- nine additional mathematics credits without second digit 5, at the 3000 level or above, including at least three credits at the 4000 level, for a total of 55 credits in mathematics, of which at least 12 are at the 4000 level;

- additional elective credits, as required for an overall total of at least 120 credits, of which at least 36 credits are at the 3000 level or higher, at least 18 of which must be at the 4000 level.

### **Honours Major, Honours Double Major or Honours Major in a Major/Minor BA Program**

The Honours Major in mathematics for education may be taken standalone or combined with an Honours Major in another subject area in an Honours Double Major BA or with an Honours Minor in another subject area in an Honours Major/Minor BA program. The double major may be taken with approved major degree programs in the Faculties of Health, Liberal Arts and Professional Studies or Science. The major/minor may be taken with approved major degree programs in the Faculties of Environmental Studies, Fine Arts, Health, Lassonde School of Engineering, Liberal Arts and Professional Studies, or Science. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

- The mathematics/statistics core (24 credits);
- [LE/CSE 1560 3.00](#);
- [SC/MATH 2031 1.00](#);
- [SC/MATH 3050 6.00](#) or [SC/MATH 3052 6.00](#);
- [SC/MATH 4100 3.00](#);
- at least 12 additional mathematics credits without second digit 5, at the 3000 or 4000 level. At least nine of these additional mathematics credits must be at the 4000 level. [SC/MATH 4400 6.00](#) and one of [SC/MATH 3090 3.00](#) or [SC/MATH 4090 3.00](#) are recommended.
- a total of 46 credits in mathematics is required, of which at least 12 will be at the 4000 level;
- additional elective credits, as required for an overall total of at least 120 credits, of which at least 36 credits are at the 3000 level or above, at least 18 of which must be at the 4000 level.

### **Honours Minor BA Program**

- Three credits of computer science, [LE/CSE 1560 3.00](#) is recommended;
- [SC/MATH 1021 3.00](#); [SC/MATH 1131 3.00](#); [SC/MATH 1200 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#);
- [SC/MATH 2022 3.00](#); [SC/MATH 2030 3.00](#);
- at least nine credits of mathematics without second digit 5 at the 3000 or 4000 level, including at least six credits at the 4000 level, to include:
- [SC/MATH 4100 3.00](#) or [SC/MATH 4400 6.00](#);
- at least three credits above should be chosen from proof-based courses approved by the director, such as [SC/MATH 2001 3.00](#), [SC/MATH 3050 6.00](#) or [SC/MATH 3052 6.00](#), [SC/MATH 3020 6.00](#), [SC/MATH 3140 6.00](#), [SC/MATH 3260 3.00](#), [SC/MATH 4160 3.00](#);
- a total of 33 credits in mathematics without second digit 5 is required, of which at least six will be at the 4000 level.

## Statistics BA Programs

### Bachelor Program (BA)

- [LE/CSE 1560 3.00](#);
- [SC/MATH 1021 3.00](#); [SC/MATH 1131 3.00](#); [SC/MATH 1200 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#);
- [SC/MATH 2022 3.00](#); [SC/MATH 2030 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2131 3.00](#); [SC/MATH 2310 3.00](#);
- [SC/MATH 3330 3.00](#); [SC/MATH 3131 3.00](#);
- at least three additional credits in mathematics courses at the 3000 or 4000 level with third digit 3, and three additional credits at the 3000 level or higher in mathematics without second digit 5, for a total of at least 40 credits from major mathematics courses;
- additional elective credits, as required for an overall total of at least 90 credits, of which at least 18 credits are at the 3000 level or higher, including at least 12 credits in the major.

**Note:** Students who have taken [SC/MATH 1530 3.00](#) or [SC/MATH 1550 6.00](#) may not take [SC/MATH 1300 3.00](#), but will be considered to have credit for [SC/MATH 1300 3.00](#) and may take [SC/MATH 1310 3.00](#).

### Specialized Honours BA Program

- [LE/CSE 1560 3.00](#);
- the mathematics/statistics core (24 credits);
- [SC/MATH 2001 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2131 3.00](#);
- [SC/MATH 3001 3.00](#); [SC/MATH 3330 3.00](#); [SC/MATH 3131 3.00](#); [SC/MATH 3132 3.00](#); [SC/MATH 3430 3.00](#);
- [SC/MATH 4330 3.00](#); [SC/MATH 4939 3.00](#); [SC/MATH 4730 3.00](#);
- three additional credits in mathematics courses at the 4000 level with third digit 3;
- nine additional credits in mathematics courses without second digit 5, for an overall total of at least 67 credits from major mathematics courses;
- additional elective credits, as required for an overall total of at least 120 credits, of which at least 36 credits are at the 3000 level or higher, at least 18 of which must be at the 4000 level.

### Honours BA Program

- [LE/CSE 1560 3.00](#);
- the mathematics/statistics core (24 credits);
- [SC/MATH 2031 1.00](#); [SC/MATH 2131 3.00](#);
- [SC/MATH 3330 3.00](#); [SC/MATH 3131 3.00](#); [SC/MATH 3132 3.00](#); [SC/MATH 3430 3.00](#);
- [SC/MATH 4330 3.00](#); [SC/MATH 4939 3.00](#); [SC/MATH 4730 3.00](#);
- three additional credits in mathematics courses at the 4000 level with third digit 3.

### **Honours Double Major BA Program**

The Honours BA program described above may be pursued jointly with any other Honours bachelor's degree programs in the Faculties of Environmental Studies, Fine Arts, Health, Lassonde School of Engineering, Liberal Arts and Professional Studies or Science. For further details on requirements, refer to the listings for specific Honours programs that may be pursued jointly with other Faculties.

The Honours BA program in Statistics may be linked with any Honours Double Major interdisciplinary BA program in the Faculty of Liberal Arts and Professional Studies. Students must take at least 42 credits in mathematics and at least 36 credits in the interdisciplinary program. Courses taken to meet mathematics requirements cannot also be used to meet the requirements of the interdisciplinary program. Students in these interdisciplinary programs must take a total of at least 18 credits at the 4000 level, including at least 12 credits in mathematics and six credits in the interdisciplinary program.

### **Honours Major/Minor BA Program**

The Honours BA program described above may be pursued jointly with any Honours Minor bachelor's degree program in the Faculties of Environmental Studies, Fine Arts, Health, Liberal Arts and Professional Studies or Science. For further details on requirements, refer to the listings for specific Honours programs that may be pursued jointly with other Faculties.

### **Honours Minor BA Program**

The Honours Minor in statistics requires:

- first-year calculus (six credits at the 1000 level without second digit 5);
- [SC/MATH 1021 3.00](#); [SC/MATH 1131 3.00](#);
- [SC/MATH 2022 3.00](#); [SC/MATH 2030 3.00](#); [SC/MATH 2131 3.00](#);
- [SC/MATH 3330 3.00](#); [SC/MATH 3131 3.00](#); [SC/MATH 3430 3.00](#);
- [SC/MATH 4330 3.00](#); [SC/MATH 4730 3.00](#).

### **Notes:**

- Students who have taken [SC/MATH 1530 3.00](#) or [SC/MATH 1550 6.00](#) may not take [SC/MATH 1300 3.00](#), but will be considered to have credit for [SC/MATH 1300 3.00](#) and may take [SC/MATH 1310 3.00](#).
- In order to obtain an Honours BA (120 credits), students must take a total of at least 18 credits at the 4000 level, including at least 12 credits at the 4000 level in each Honours Major or Specialized Honours major.

## Bachelor of Science Programs

The mathematics/statistics honours core is defined as (24 credits): [SC/MATH 1021 3.00](#); [SC/MATH 1131 3.00](#); [SC/MATH 1200 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#); [SC/MATH 2022 3.00](#); [SC/MATH 2030 3.00](#); [SC/MATH 2310 3.00](#).

## Applied Mathematics BSc Programs

### Bachelor Program (BSc)

A. General education:

- non-science requirement: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#);

B. Major requirements:

- [SC/MATH 1021 3.00](#); [SC/MATH 1131 3.00](#); [SC/MATH 1200 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#);
- [SC/MATH 2022 3.00](#); [SC/MATH 2030 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2041 3.00](#); [SC/MATH 2270 3.00](#); [SC/MATH 2310 3.00](#);
- [SC/MATH 3241 3.00](#); [SC/MATH 3260 3.00](#) or [SC/MATH 3170 6.00](#); [SC/MATH 3243 1.00](#);
- six or three additional credits selected from mathematics courses without second digit 5 at the 3000 or higher level, for a total at least 12 credits in mathematics at the 3000 level or above.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements;

D. Upper level: a minimum of 18 credits must be at the 3000 level or above;

E. Additional elective credits, as required, for an overall total of 90 credits.

F. Standing requirement: A minimum overall grade point average of 4.00 (C ) is required in order to be eligible to graduate with a BSc degree (bachelor program).

## Specialized Honours BSc Program

### A. General education:

- non-science requirement: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

### B. Major requirements:

- the mathematics/statistics core (24 credits);
- [SC/MATH 2001 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2041 3.00](#); [SC/MATH 2270 3.00](#);
- [SC/MATH 3001 3.00](#); [SC/MATH 3241 3.00](#); [SC/MATH 3242 3.00](#); [SC/MATH 3260 3.00](#) or [SC/MATH 3170 6.00](#); [SC/MATH 3410 3.00](#); [SC/MATH 3243 1.00](#); [SC/MATH 3271 3.00](#);
- [SC/MATH 4090 3.00](#);
- at least nine additional credits selected from mathematics courses without second digit 5 at the 4000 level, for an overall total of at least 65 credits from major mathematics courses;

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements;

D. Upper level: a minimum of 42 credits must be at the 3000 level or above;

E. Additional elective credits, as required, for an overall total of 120 credits for the Honours program.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

## Honours Major, Honours Double Major and Honours Major/Minor BSc Programs

An Honours Major in applied mathematics may be taken standalone or combined with an Honours Major in another subject area in an Honours Double Major BSc degree program or with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section. Students should consult with a departmental advisor to plan their studies in order to meet the requirements for both majors and their prerequisites.

- the applied mathematics Honours Major requirements below;
- the course requirements for the second major or the minor;

## Honours BSc Major

### A. General education:

- non-science requirement: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

### B. Major requirements:

- the mathematics/statistics core (24 credits);
- SC/MATH 2031 1.00; [SC/MATH 2041 3.00](#); [SC/MATH 2270 3.00](#);
- [SC/MATH 3241 3.00](#); one of [SC/MATH 3242 3.00](#), [SC/MATH 3260 3.00](#) or [SC/MATH 3170 6.00](#); [SC/MATH 3243 1.00](#); [SC/MATH 3271 3.00](#);
- [SC/MATH 4090 3.00](#);
- nine additional credits at the 4000 level, selected from mathematics courses without second digit 5, for an overall total of at least 53 credits from major mathematics courses;
- the course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements. Satisfied if the second major or the minor is another science discipline.

D. Upper level: a minimum of 42 credits must be at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed, subject to the following exception. In addition, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed is required to graduate in an Honours Double Major program where biology is the other major.

## Honours Minor

- [LE/CSE 1560 3.00](#);
- [SC/MATH 1021 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#);
- [SC/MATH 2310 3.00](#); two of [SC/MATH 2041 3.00](#), [SC/MATH 2022 3.00](#) (or [SC/MATH 2222 3.00](#)), [SC/MATH 2270 3.00](#) (six credits);

- at least 12 more credits, including at least one of [SC/MATH 3170 6.00](#) or [SC/MATH 3241 3.00](#) or [SC/MATH 3260 3.00](#), and the remaining credits from mathematics courses without second digit 5 at the 3000 level or higher, for an overall total of at least 30 credits from major mathematics courses.

### Computational Mathematics BSc Program

### Specialized Honours BSc Program

#### A. General education:

- non-science requirement: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: satisfied within the major requirements;
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

#### B. Major requirements:

- the mathematics/statistics core (24 credits);
- [LE/CSE 1020 3.00](#); [LE/CSE 1030 3.00](#); [LE/CSE 2031 3.00](#); [SC/MATH 2041 3.00](#);
- [SC/MATH 2031 1.00](#); [SC/MATH 2131 3.00](#); [SC/MATH 2270 3.00](#);
- [SC/MATH 3090 3.00](#); [SC/MATH 3241 3.00](#); [SC/MATH 3242 3.00](#); [SC/MATH 3243 1.00](#); [SC/MATH 3271 3.00](#);
- [SC/MATH 4090 3.00](#);

In addition, students must choose from one of two areas of concentration, and in each case complete the courses listed:

#### Applied and Industrial Mathematics concentration

- [SC/MATH 3170 3.00](#); [SC/MATH 4141 3.00](#); [SC/MATH 4170 6.00](#).

#### Financial Mathematics concentration

- [SC/MATH 2280 3.00](#); [SC/MATH 2281 3.00](#);
- [AP/ECON 1000 3.00](#); [AP/ECON 1010 3.00](#);
- [SC/MATH 3330 3.00](#); [SC/MATH 4143 3.00](#); [SC/MATH 4430 3.00](#) or [SC/MATH 4431 3.00](#);
- an additional three credits in mathematics courses without second digit 5 at the 4000 level.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Fifteen of these 24 credits, including three at the 2000 level, are satisfied by the above requirements.



D. Upper level: a minimum of 42 credits must be at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

## **Mathematics BSc Programs**

### **Bachelor Program (BSc)**

A. General education:

- non-science requirement: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- [SC/MATH 1021 3.00](#) or equivalent; [SC/MATH 1300 3.00](#) and [SC/MATH 1310 3.00](#) or equivalents; [SC/MATH 1200 3.00](#);
- [SC/MATH 2030 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2022 3.00](#) or equivalent; [SC/MATH 2310 3.00](#);
- [SC/MATH 3010 3.00](#);
- at least nine additional credits from major (i.e. without second digit 5) mathematics courses, at the 3000 level or higher, for a total of at least 34 credits from major mathematics courses.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 18 credits must be at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 90 credits.

F. Standing requirements: A minimum overall grade point average of 4.00 (C ) is required in order to be eligible to graduate with a BSc degree (bachelor program).

## Honours Programs

### Specialized Honours BSc Program

#### A. General education:

- non-science requirement: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

#### B. Major requirements:

- the mathematics/statistics core (24 credits);
- [SC/MATH 2001 3.00](#); [SC/MATH 2031 1.00](#);
- [SC/MATH 3001 3.00](#); [SC/MATH 3010 3.00](#); [SC/MATH 3021 3.00](#); [SC/MATH 3022 3.00](#);
- SC/MATH 4011 3.00; [SC/MATH 4021 3.00](#); [SC/MATH 4200 3.00](#);
- at least three additional credits from major mathematics courses at the 4000 level ;
- at least 15 additional credits from major (i.e. without second digit 5) mathematics courses, or approved or equivalent courses, for a total of at least 67 credits from major mathematics courses;

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 42 credits must be at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirement: To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### Honours Major, Honours Double Major and Honours Major/Minor BSc Programs

An Honours Major in mathematics may be taken stand-alone or combined with an Honours Major in another subject area in an Honours Double Major BSc degree program or with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section. Students should consult with a departmental advisor to plan their studies in order to meet the requirements for both majors and their prerequisites.

## Honours BSc Major

### A. General education:

- non-science requirement: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

### B. Major requirements:

- the mathematics/statistics core (24 credits);
- [SC/MATH 2001 3.00](#); [SC/MATH 2031 1.00](#);
- [SC/MATH 3001 3.00](#); [SC/MATH 3010 3.00](#); [SC/MATH 3021 3.00](#); [SC/MATH 3022 3.00](#);
- [SC/MATH 4011 3.00](#); [SC/MATH 4021 3.00](#); [SC/MATH 4200 3.00](#);
- at least three additional major (i.e. without second digit 5) mathematics credits at the 4000 level, for a total of at least 52 credits from major mathematics courses.
- the course requirements for the second major or the minor.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements. Satisfied if the second major or the minor is another science discipline.

D. Upper level: a minimum of 42 credits must be at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed, subject to the following exception. In addition, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed is required to graduate in an Honours Double Major program where biology is the other major.

## Honours Minor

- [SC/MATH 1021 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#);
- one of [SC/MATH 1019 3.00](#), [SC/MATH 1090 3.00](#), [SC/MATH 1190 3.00](#), [SC/MATH 1200 3.00](#), [SC/MATH 2030 3.00](#) or [SC/MATH 2320 3.00](#);
- [SC/MATH 2022 3.00](#); [SC/MATH 2310 3.00](#);
- at least 12 credits from major (i.e. without second digit 5) mathematics courses, or approved or equivalent courses, at the 3000 or higher level, for an overall total of at least 30 mathematics credits.

**Note:** in all Mathematics Honours programs, [SC/MATH 1021 3.00](#) and/or [SC/MATH 2022 3.00](#) may be replaced by other linear algebra courses, but if the grade obtained in any such replacement course is below A then one of the following courses must be taken above and beyond the normal Honours requirements: [SC/MATH 1019 3.00](#), [SC/MATH 1090 3.00](#), [SC/MATH 1190 3.00](#), [SC/MATH 2320 3.00](#).

### **Mathematics for Education BSc Programs**

This is a mathematics program focusing on the needs of students interested in concurrent education or consecutive education with mathematics as a teachable subject.

### **Specialized Honours BSc Program**

A. General education:

- non-science requirement: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- the mathematics/statistics core (24 credits);
- [SC/MATH 2031 1.00](#); one of [SC/MATH 2001 3.00](#), [SC/MATH 2131 3.00](#), [SC/MATH 2270 3.00](#), or [SC/MATH 2280 3.00](#);
- [SC/MATH 3050 6.00](#) or [SC/MATH 3052 6.00](#); [SC/MATH 3090 3.00](#);
- [SC/MATH 4100 3.00](#); [SC/MATH 4400 6.00](#);
- nine additional credits from mathematics courses (i.e. without second digit 5) at the 3000 or higher level, of which at least three credits are at the 4000 level, for a total of 55 credits in mathematics.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 42 credits must be at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

## Honours Major, Honours Double Major and Honours Major/Minor BSc Programs

An Honours Major in mathematics for education may be taken stand-alone or combined with an Honours Major in another subject area in an Honours Double Major BSc degree program or with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section. Students should consult with a departmental advisor to plan their studies in order to meet the requirements for both majors and their prerequisites.

### Honours BSc Major

#### A. General education:

- non-science: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

#### B. Major requirements:

- the mathematics/statistics core (24 credits);
- [SC/MATH 2031 1.00](#);
- [SC/MATH 3050 6.00](#) or [SC/MATH 3052 6.00](#);
- [SC/MATH 4100 3.00](#);
- 12 additional credits selected from SC/MATH courses (without second digit 5) at the 3000 level or higher. At least nine of these additional mathematics credits must be at the 4000 level. [SC/MATH 4400 6.00](#), and one of [SC/MATH 3090 3.00](#) or [SC/MATH 4090 3.00](#) recommended;
- a total of 46 credits in mathematics is required, including at least 12 credits at the 4000 level;
- the courses for the second major or the minor.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements. Satisfied if the second major or the minor is another science discipline.

D. Upper level: a minimum of 42 credits must be at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed, subject to the following exception. In addition, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed is required to graduate in an Honours Double Major program where biology is the other major.

### Honours Minor

- three credits of computer science ([LE/CSE 1560 3.00](#) recommended);
- [SC/MATH 1021 3.00](#), [SC/MATH 1131 3.00](#), [SC/MATH 1200 3.00](#), [SC/MATH 1300 3.00](#), [SC/MATH 1310 3.00](#);
- [SC/MATH 2022 3.00](#), [SC/MATH 2030 3.00](#);
- at least nine credits from major (i.e. without second digit 5) mathematics courses at the 3000 or higher level including [SC/MATH 4100 3.00](#) or [SC/MATH 4400 6.00](#);
- three credits, which may be among the choices above, selected from proof-based courses approved by the director (such as [SC/MATH 2001 3.00](#), [SC/MATH 3020 6.00](#), [SC/MATH 3050 6.00](#) or [SC/MATH 3052 6.00](#), [SC/MATH 3140 6.00](#), [SC/MATH 3260 3.00](#), [SC/MATH 4160 3.00](#)).

### Statistics BSc Programs

#### Bachelor Program (BSc)

A. General education:

- non-science: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- [SC/MATH 1021 3.00](#); [SC/MATH 1131 3.00](#); [SC/MATH 1200 3.00](#); [SC/MATH 1300 3.00](#); [SC/MATH 1310 3.00](#);
- [SC/MATH 2022 3.00](#); [SC/MATH 2030 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2131 3.00](#); [SC/MATH 2310 3.00](#);
- [SC/MATH 3330 3.00](#); [SC/MATH 3131 3.00](#);
- at least three additional credits in mathematics courses with third digit 3 at the 3000- or 4000-level, and three additional credits in mathematics courses without second digit 5 for a total of at least 40 credits from major mathematics courses.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 18 credits must be at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 90 credits.

F. Standing requirements: A minimum overall grade point average of 4.00 (C ) is required in order to be eligible to graduate with a BSc degree (bachelor program).

### **Specialized Honours BSc Program**

A. General education:

- non-science: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: Six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

B. Major requirements:

- the mathematics/statistics core (24 credits);
- [SC/MATH 2001 3.00](#); [SC/MATH 2031 1.00](#); [SC/MATH 2131 3.00](#);
- [SC/MATH 3001 3.00](#); [SC/MATH 3330 3.00](#); [SC/MATH 3131 3.00](#); [SC/MATH 3132 3.00](#); [SC/MATH 3430 3.00](#);
- [SC/MATH 4330 3.00](#); [SC/MATH 4939 3.00](#); [SC/MATH 4730 3.00](#);
- three additional credits from 4000-level mathematics courses with third digit 3;
- nine additional credits from major (second digit not 5) mathematics courses, for a total of at least 67 credits from major mathematics courses.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 42 credits must be at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

## Honours Major, Honours Double Major and Honours Major/Minor BSc Program

An Honours Major in statistics may be taken standalone or combined with an Honours Major in another subject area in an Honours Double Major BSc degree program, or with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section. Students should consult with a departmental advisor to plan their studies in order to meet the requirements for both majors and their prerequisites.

### Honours BSc Major

#### A. General education:

- non-science: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1560 3.00](#);
- foundational science: six credits from [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1410 6.00](#) or [SC/PHYS 1010 6.00](#).

#### B. Major requirements:

- the mathematics/statistics core (24 credits);
- [SC/MATH 2031 1.00](#); [SC/MATH 2131 3.00](#);
- [SC/MATH 3330 3.00](#); [SC/MATH 3131 3.00](#); [SC/MATH 3132 3.00](#); [SC/MATH 3430 3.00](#);
- [SC/MATH 4330 3.00](#); [SC/MATH 4939 3.00](#); [SC/MATH 4730 3.00](#);
- three additional credits from 4000-level mathematics courses with third digit 3 for an overall total of at least 52 credits from major mathematics courses;
- the course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor.

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the above requirements. Satisfied if the second major or the minor is another science discipline.

D. Upper level: a minimum of 42 credits must be at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits .

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed, subject to the following exception. In addition, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed is required to graduate in an Honours Double Major program where biology is the other major.



## Honours Minor

- First-year calculus (six credits at the 1000 level without second digit 5);
- [SC/MATH 1021 3.00\\*](#); [SC/MATH 1131 3.00](#);
- [SC/MATH 2022 3.00](#); [SC/MATH 2030 3.00](#); [SC/MATH 2131 3.00](#);
- [SC/MATH 3330 3.00](#); [SC/MATH 3131 3.00](#); [SC/MATH 3430 3.00](#);
- [SC/MATH 4330 3.00](#); [SC/MATH 4730 3.00](#).

\*Note: [SC/MATH 1025 3.00](#) will be accepted in this program, but is not recommended.

## International Dual Degree in Mathematics and Statistics (BSc and Honours BSc)

In collaboration with the Dipartimento di Matematica Pura ed Applicata at the University of L'Aquila (Italy), the Department of Mathematics and Statistics offers an International Dual Degree program Mathematics and Statistics (BSc and Specialized Honours BSc only). This program is particularly demanding and will be of interest to students with academic performances of B average and better. Students in the program, after two years of study at York, but before the completion of the York degree requirements, will be eligible to study as York international exchange students for up to one year at the University of L'Aquila, earn York credits for specified courses taken at L'Aquila towards their York degree program, and at the same time fulfill the degree requirements for the Laurea di primo livello at L'Aquila, the Italian equivalent of a 90-credit BSc. All exchanges under this program are administered by York International in collaboration with the Ufficio Internazionale at the University of L'Aquila.

Upon completion of the York degree requirements, students of the University of L'Aquila studying as exchange students at York are eligible to earn a York degree in this program.

All BSc and Honours BSc degree candidates must satisfy a specified non-science requirement in lieu of the non-science requirements of the Faculty of Science, as follows. For students whose home university is York, the specified non-science requirement consists of: [AP/IT 1000 6.00](#) or equivalent; the course Lingua e Cultura Italiana offered by the University of L'Aquila (three York credits) or equivalent; three more credits, in accordance with the non-science requirements of the Faculty of Science. (Note in particular that for York students in the program, [AP/IT 1000 6.00](#) is exempted from Restriction 2 in the non-science requirements of the Faculty of Science). For students whose home university is the University of L'Aquila, the specified non-science requirement consists of: Lingua Inglese 1, 2 offered by the University of L'Aquila (six York credits) or equivalent; [AP/HUMA 1220 9.00](#) or equivalent.

## Bachelor Program (BSc)

A. General education:

- non-science requirement: 12 credits;
- mathematics: satisfied within major requirements;
- computer science: [LE/CSE 1530 3.00](#); [LE/CSE 1560 3.00](#);
- foundational science: [SC/PHYS 1410 6.00](#).

B. Major requirements:

- [SC/MATH 1021 3.00](#); [SC/MATH 1131 3.00](#); [SC/MATH 1200 3.00](#); [SC/MATH 1300 3.00](#), [SC/MATH 1310 3.00](#);
- [SC/MATH 2001 3.00](#); [SC/MATH 2022 3.00](#); [SC/MATH 2030 3.00](#); [SC/MATH 2270 3.00](#); [SC/MATH 2310 3.00](#); [SC/MATH 2320 3.00](#);
- [SC/MATH 3020 6.00](#); [SC/MATH 3170 6.00](#); [SC/MATH 3241 3.00](#); [SC/MATH 3271 3.00](#); [SC/MATH 3410 3.00](#).

C. Science breadth: at least 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the General Education requirement.

D. Upper level requirement: a minimum of 18 credits at the 3000 level or above (satisfied by the above requirements).

E. Additional elective credits, as required, for an overall total of 90 credits.

F. Standing requirements: A minimum overall grade point average of 4.00 is required in order to be eligible to graduate with a BSc degree (bachelor program).

### **Specialized Honours BSc Program**

A. General Education:

- non-science requirement: 12 credits;
- mathematics: satisfied within the major requirements;
- computer science: [LE/CSE 1530 3.00](#); [LE/CSE 1560 3.00](#);
- foundational science: [SC/PHYS 1410 6.00](#).

B. Major requirements:

- the mathematics/statistics core;
- [SC/MATH 2001 3.00](#); [SC/MATH 2270 3.00](#); [SC/MATH 2320 3.00](#);
- [SC/MATH 3020 6.00](#); [SC/MATH 3170 6.00](#); [SC/MATH 3241 3.00](#); [SC/MATH 3271 3.00](#); [SC/MATH 3410 3.00](#);
- at least 12 additional credits from SC/MATH courses at the 4000 level.

C. Science breadth: at least 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. Nine of these 24 credits are satisfied by the General Education requirement.

D. Upper level requirement: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in a Specialized Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

**Note:** for an up-to-date list of equivalent courses offered at the University of L'Aquila, contact the Department of Mathematics and Statistics.

## MATHEMATICS FOR EDUCATION

see [Mathematics and Statistics](#)

## PHYSICS AND ASTRONOMY

In addition to the programs defined below, the Department of Physics and Astronomy also offers a Specialized Honours BSc degree stream in space science whose degree requirements are specified in a separate entry in the Faculty of Science Programs of Study section.

The program core is defined to be (24 credits): [SC/PHYS 1010 6.00](#); [SC/PHYS 2010 3.00](#); [SC/PHYS 2020 3.00](#); [SC/PHYS 2040 3.00](#); [SC/PHYS 2060 3.00](#); [SC/PHYS 3040 6.00](#). (**Note:** all program core courses require mathematics prerequisites or corequisites.)

### Bachelor Program

Students may follow a stream emphasizing physics or astronomy.

A. General education:

- non-science: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#);
- computer science: [LE/CSE 1541 3.00](#);
- foundational science: [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#).

B. Major requirements:

### Physics Stream

- [SC/MATH 1025 3.00](#);
- the program core, as specified above (24 credits, including 6 credits at the 3000 level);

- [SC/MATH 2015 3.00](#); [SC/MATH 2271 3.00](#);
- [SC/PHYS 2030 3.00](#); [SC/PHYS 2213 3.00](#); [SC/PHYS 3090 3.00](#), [SC/PHYS 3220 3.00](#); [SC/PHYS 4061 3.00](#);
- six credits from: [SC/PHYS 3010 3.00](#), [SC/PHYS 3020 3.00](#), [SC/PHYS 3030 3.00](#).

### Astronomy Stream

- [SC/MATH 1025 3.00](#); [SC/PHYS 1070 3.00](#);
- the program core, as specified above (24 credits including 6 credits at the 3000 level);
- [SC/MATH 2015 3.00](#); [SC/MATH 2271 3.00](#);
- [SC/PHYS 2070 3.00](#); [SC/PHYS 2213 3.00](#);
- [SC/PHYS 3220 3.00](#); six credits from: [SC/PHYS 3010 3.00](#), [SC/PHYS 3020 3.00](#), [SC/PHYS 3030 3.00](#), [SC/PHYS 3090 3.00](#);
- [SC/PHYS 4270 4.00](#).

C. Science breadth: satisfied by above requirements.

D. Upper level requirements: a minimum of 18 credits at the 3000 level or above.

E. Additional elective credits, as required for a total of 90 credits.

F. Standing requirement: A minimum overall grade point average of 4.00 (C) is required in order to be eligible to graduate with a BSc degree (bachelor program).

### Honours Programs

#### Specialized Honours Program

Students may follow a stream emphasizing physics, applied physics or astronomy.

A. General education:

- non-science: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#);
- computer science: [LE/CSE 1541 3.00](#);
- foundational science: [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#).

B. Major requirements:

**Physics Stream**

- [SC/MATH 1025 3.00](#);
- the program core, as specified above (24 credits including six credits at the 3000 level);
- [SC/MATH 2015 3.00](#); [SC/MATH 2271 3.00](#); [SC/PHYS 2030 3.00](#); [SC/PHYS 2213 3.00](#);
- [SC/PHYS 3010 3.00](#); [SC/PHYS 3020 3.00](#); [SC/PHYS 3030 3.00](#); [SC/PHYS 3090 3.00](#), [SC/PHYS 3220 3.00](#);
- [SC/PHYS 4010 3.00](#); [SC/PHYS 4020 3.00](#); [SC/PHYS 4061 3.00](#);
- two of [SC/PHYS 4011 3.00](#), [SC/PHYS 4040 3.00](#), [SC/PHYS 4050 3.00](#);
- either [SC/PHYS 4210 3.00](#) or [SC/PHYS 4062 3.00](#); and [SC/PHYS 4211 3.00](#);
- three additional credits in PHYS courses at the 3000 level or higher.

**Applied Physics Stream**

- [SC/MATH 1025 3.00](#);
- the program core, as specified above (24 credits including six credits at the 3000 level);
- [SC/MATH 2015 3.00](#); [SC/MATH 2271 3.00](#); [SC/PHYS 2030 3.00](#); [SC/PHYS 2213 3.00](#);
- [SC/PHYS 3010 3.00](#); [SC/PHYS 3020 3.00](#); [SC/PHYS 3030 3.00](#); [SC/PHYS 3050 3.00](#); [SC/PHYS 3090 3.00](#), [SC/PHYS 3150 3.00](#); [SC/PHYS 3220 3.00](#);
- [SC/PHYS 4010 3.00](#); [SC/PHYS 4020 3.00](#); [SC/PHYS 4050 3.00](#); [SC/PHYS 4061 3.00](#); [SC/PHYS 4211 3.00](#); [SC/PHYS 4310 3.00](#);
- either [SC/PHYS 4210 3.00](#) or [SC/PHYS 4062 3.00](#);
- six credits from [SC/MATH 3241 3.00](#), [SC/PHYS 3250 3.00](#), [SC/PHYS 3280 3.00](#), [SC/PHYS 4120 3.00](#), [SC/PHYS 4250 3.00](#).

**Astronomy Stream**

- [SC/MATH 1025 3.00](#); [SC/PHYS 1070 3.00](#);
- the program core, as specified above (24 credits including six credits at the 3000 level);
- [SC/MATH 2015 3.00](#); [SC/MATH 2271 3.00](#); [SC/PHYS 2030 3.00](#); [SC/PHYS 2070 3.00](#); [SC/PHYS 2213 3.00](#);
- [SC/PHYS 3010 3.00](#); [SC/PHYS 3020 3.00](#); [SC/PHYS 3030 3.00](#); [SC/PHYS 3070 3.00](#); [SC/PHYS 3090 3.00](#); [SC/PHYS 3220 3.00](#);
- [SC/PHYS 4010 3.00](#); [SC/PHYS 4020 3.00](#); [SC/PHYS 4061 3.00](#); [SC/PHYS 4070 3.00](#); [SC/PHYS 4270 4.00](#);
- [SC/PHYS 4210 3.00](#) or [SC/PHYS 4211 3.00](#);
- one of [SC/PHYS 4011 3.00](#), [SC/PHYS 4040 3.00](#), [SC/PHYS 4050 3.00](#) or [SC/PHYS 4120 3.00](#);
- one of [SC/PHYS 3280 3.00](#), [SC/PHYS 4060 3.00](#), [SC/PHYS 4110 3.00](#), [SC/PHYS 4330 3.00](#) or [LE/EATS 4630 3.00](#);
- three additional credits from PHYS, EATS or MATH courses at the 3000 level or higher.

C. Science breadth: satisfied by above requirements.

D. Upper level requirements: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required for a total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

### **Honours Major, Honours Double Major and Honours Major/Minor Programs**

An Honours Major in physics and astronomy may be taken stand-alone or combined with an Honours Major in another subject area in an Honours Double Major BSc degree program, or with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section. Students should consult with a departmental advisor to plan their studies in order to meet the requirements for both majors and their prerequisites.

**Note:** if the other major or the minor is biology or environmental biology, the foundational science requirement will be met by taking [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) and [SC/PHYS 1010 6.00](#).

### **Honours Major**

Students may follow a stream emphasizing physics or astronomy.

A. General education:

- non-science: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#);
- computer science: [LE/CSE 1541 3.00](#);
- foundational science: [SC/CHEM 1000 3.00](#) and [SC/CHEM 1001 3.00](#).

B. Major requirements:

### **Physics Stream**

- [SC/MATH 1025 3.00](#);
- the program core, as specified above (24 credits including six credits at the 3000 level);
- [SC/PHYS 2213 3.00](#);
- [SC/PHYS 3220 3.00](#);
- six credits from [SC/PHYS 3010 3.00](#), [SC/PHYS 3020 3.00](#), [SC/PHYS 3030 3.00](#), [SC/PHYS 3090 3.00](#);

- [SC/PHYS 4061 3.00](#);
- at least nine credits from PHYS courses at the 4000 level, for an overall total of at least 48 credits from PHYS courses;
- the requirements for the second major or the minor, in Honours Double Major or Honours Major/Minor BSc programs.

### Astronomy Stream

- [SC/MATH 1025 3.00](#); [SC/PHYS 1070 3.00](#);
- the program core, as specified above (24 credits including six credits at the 3000 level);
- [SC/PHYS 2070 3.00](#); [SC/PHYS 2213 3.00](#);
- [SC/PHYS 3220 3.00](#); six credits from [SC/PHYS 3010 3.00](#), [SC/PHYS 3020 3.00](#), [SC/PHYS 3030 3.00](#), [SC/PHYS 3090 3.00](#);
- [SC/PHYS 4270 4.00](#);
- eight additional credits in PHYS at the 4000 level for an overall total of at least 54 credits from PHYS courses;
- the requirements for the second major or the minor, in Honours Double Major or Honours Major/Minor BSc programs.

**Note:** the following courses are required as prerequisites or corequisites for the courses above: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#); [SC/MATH 1025 3.00](#); [SC/MATH 2015 3.00](#); [SC/MATH 2271 3.00](#).

C. Science breadth: a total of 24 credits in science disciplines outside the major, of which at least three credits must be at the 2000 level or above (satisfied by the above requirements).

D. Upper level requirements: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required for a total of 120 credits.

F. Standing requirement: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed, subject to the exception in the following note. In addition, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed is required to graduate in an Honours Double Major program where biology is the other major.

### Honours Minor

Students may follow a stream in physics or a stream in astronomy in the minor subject area.

**Note:** the following courses are required as prerequisites or corequisites for the courses below: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#); [SC/MATH 1025 3.00](#); [SC/MATH 2015 3.00](#); [SC/MATH 2271 3.00](#).

## Physics Stream

- the program core, as specified above (24 credits including six credits at the 3000 level);
- [SC/PHYS 2213 3.00](#); [SC/PHYS 3220 3.00](#);
- three credits from [SC/PHYS 3010 3.00](#), [SC/PHYS 3020 3.00](#), [SC/PHYS 3030 3.00](#), [SC/PHYS 3090 3.00](#) for an overall total of 33 credits from PHYS courses.

## Astronomy Stream

- the program core, as specified above (24 credits including six credits at the 3000 level);
- [SC/PHYS 1070 3.00](#);
- [SC/PHYS 2070 3.00](#); [SC/PHYS 2213 3.00](#); [SC/PHYS 3070 3.00](#) or [SC/PHYS 4270 4.00](#);
- three credits from [SC/PHYS 3010 3.00](#), [SC/PHYS 3020 3.00](#), [SC/PHYS 3030 3.00](#), [SC/PHYS 3090 3.00](#) for an overall total of at least 39 credits from PHYS courses.

## BSC HONOURS SCIENCE AND BSC SCIENCE

The Honours BSc Science and the bachelor BSc Science programs have no declared major. These programs are appropriate for a student who wishes to enrol in a broader range of courses at the 3000 and 4000 levels than can normally be undertaken in Honours or bachelor programs.

To declare Honours science or bachelor science requires successful completion of at least 24 credits and permission of the science program adviser. The candidate is expected to provide a rationale for this choice of program and a study plan. The study plan must comply with general regulations specified in the Faculty of Science Regulations Governing Undergraduate Degree Requirements section.

All bachelor and Honours BSc degree candidates must complete the following:

### A. General education:

- non-science requirement: 12 credits;
- mathematics: six credits from: [SC/MATH 1505 6.00](#), [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1025 3.00](#), [SC/MATH 1300 3.00](#), [SC/MATH 1310 3.00](#);

**Note:** [SC/MATH 1300 3.00](#) is a course credit exclusion for [SC/MATH 1013 3.00](#); [SC/MATH 1310 3.00](#) is a course credit exclusion for [SC/MATH 1014 3.00](#).

- computer science: three credits chosen from [LE/CSE 1520 3.00](#), [LE/CSE 1530 3.00](#), [LE/CSE 1540 3.00](#) or [LE/CSE 1020 3.00](#);
- foundational science: six credits chosen from [SC/BIOL 1000 3.00](#), [SC/BIOL 1000 3.00](#), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1010 6.00](#), [SC/PHYS 1410 6.00](#), [SC/PHYS 1420 6.00](#).



B. Major requirements: Courses must be approved by the Science program advisor.

C. Science breadth: Satisfied by major requirements.

D. Upper level requirements: For the bachelor program, a minimum of 18 credits in science courses at the 3000 level or above. For the Honours program, a minimum of 42 credits in science courses at the 3000 level or above, of which at least 12 credits must be at the 4000 level.

E. Additional elective credits as required for a total of 90 credits for the bachelor program, 120 for the Honours program.

F. Standing requirements: A minimum overall grade point average of 4.00 (C ) is required to be eligible to graduate with a bachelor degree, and a minimum overall grade point average of 5.00 (C+) for the Honours BSc degree.

## SCIENCE AND TECHNOLOGY STUDIES

The program core is defined as: [SC/STS 2411 3.00](#); one of [SC/STS 2010 3.00](#) or [SC/STS 2210 3.00](#); [SC/STS 4501 6.00](#).

### Bachelor Program

#### A. General Education:

- Non-science requirement: 12 credits;
- Mathematics: six credits from: [SC/MATH 1505 6.00](#), [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1300 3.00](#), [SC/MATH 1310 3.00](#), [SC/MATH 1021 3.00](#), [SC/MATH 1025 3.00](#); (note that [SC/MATH 1013 3.00](#) and [SC/MATH 1300 3.00](#) are course credit exclusions, as are [SC/MATH 1014 3.00](#) and [SC/MATH 1310 3.00](#));
- Computer science: three credits from [LE/CSE 1520 3.00](#), [LE/CSE 1530 3.00](#), [LE/CSE 1540 3.00](#) or [LE/CSE 1020 3.00](#);
- Foundational science: six credits from: [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1010 6.00](#) or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#).

#### B. Major requirements:

- The program core as specified above (12 credits);
- an additional 18 credits from the approved science and technology studies major courses including at least 12 major credits at the 3000 level or above, for a total of a minimum of 30 credits from science and technology studies major courses,
- at least 18 science credits at the 2000 level or higher non-science and technology studies major courses..

- C. Science breadth: satisfied within the major requirements.
- D. Upper level requirements: a minimum of 18 credits at the 3000 level or above.
- E. Additional credits, as required, for an overall total of 90 credits .
- F. Standing requirements: a minimum overall grade point average of 4.00 (C) is required in order to be eligible to graduate with a BSc degree (bachelor program).

## Honours Programs

### Specialized Honours Program

#### A. General education:

- non-science requirement: 12 credits;
- mathematics: six credits from: [SC/MATH 1505 6.00](#), [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1300 3.00](#), [SC/MATH 1310 3.00](#), [SC/MATH 1021 3.00](#), [SC/MATH 1025 3.00](#); (note that [SC/MATH 1013 3.00](#) and [SC/MATH 1300 3.00](#) are course credit exclusions, as are [SC/MATH 1014 3.00](#) and [SC/MATH 1310 3.00](#));
- computer science: three credits from LE/CSE 1520 3.00, [LE/CSE 1530 3.00](#), [LE/CSE 1540 3.00](#) or [LE/CSE 1020 3.00](#);
- foundational science: six credits from: [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1010 6.00](#) or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#).

#### B. Major requirements:

- the program core as specified above (12 credits);
- an additional 42 credits from the approved science and technology studies major courses (for a total of 54 science and technology studies credits, including at least 18 credits at the 3000 or higher level, of which at least 12 are at the 4000 level);
- at least 18 science credits at the 2000 level or higher that are not science and technology studies courses.

- C. Science breadth: satisfied within the major requirements.
- D. Upper level requirements: a minimum of 42 credits at the 3000 level or above.
- E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 over all courses completed.

### **Honours Double Major and Honours Major/Minor Programs**

An Honours Major in science and technology studies may be combined with an Honours Major in another subject area in a BSc Double Major degree program, or with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

Students should consult with a departmental adviser to plan their studies in order to meet the program requirements for both majors and their prerequisites.

#### A. General education:

- non-science requirement: 12 credits;
- mathematics: six credits from: [SC/MATH 1505 6.00](#), [SC/MATH 1013 3.00](#), [SC/MATH 1014 3.00](#), [SC/MATH 1300 3.00](#), [SC/MATH 1310 3.00](#), [SC/MATH 1021 3.00](#), [SC/MATH 1025 3.00](#); (note that [SC/MATH 1013 3.00](#) and [SC/MATH 1300 3.00](#) are course credit exclusions, as are [SC/MATH 1014 3.00](#) and [SC/MATH 1310 3.00](#));
- computer science: three credits from LE/CSE 1520 3.00, [LE/CSE 1530 3.00](#), [LE/CSE 1540 3.00](#) or [LE/CSE 1020 3.00](#);
- foundational science: six credits from: [SC/BIOL 1000 3.00](#), [SC/BIOL 1001 3.00](#) (or [SC/BIOL 1010 6.00](#)), [SC/CHEM 1000 3.00](#), [SC/CHEM 1001 3.00](#), [SC/PHYS 1010 6.00](#) or [SC/PHYS 1410 6.00](#) or [SC/PHYS 1420 6.00](#).

#### B. Major requirements:

- The program core as specified above (12 credits);
- an additional 30 credits from the approved science and technology studies major courses , including at least 18 credits at the 3000 or higher level, of which at least 12 are at the 4000 level, for a total of 42 credits in science and technology studies;
- at least 18 science credits at the 2000 level or higher level non-science and technology studies courses;  
Note: would be met if the second major or the minor is in another science discipline;
- the course requirements for the second major or the minor.

C. Science breadth: satisfied by the above requirements.

D. Upper level requirements: a minimum of 42 credits at the 3000 level or above.

E. Additional credits, as required, for an overall total of 120 credits.

F. Standing requirements: To graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses and a minimum cumulative credit-weighted grade point average of 5.00 over all courses completed, subject to the following exception. In addition, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all biology courses completed is required to graduate in the Honours Double Major program where biology is the other major.

### **Honours Minor**

- The program core as specified above (12 credits);
- an additional 18 credits from the approved science and technology studies major courses (for a total of 30 credits in science and technology studies).

### **List of Science and Technology Studies Courses**

The following courses are cross-listed between the Faculty of Science and the Faculty of Liberal Arts and Professional Studies to form the core courses selections for the Science and Technology Studies BSc degree options.

Mandatory for all science and technology studies majors:

[SC/STS 2411 3.00](#)

One of SC/STS 2010 3.00 or SC/STS 2210 3.00

[SC/STS 4501 6.00](#)

Options for all science and technology studies majors (number of credits varies for degree type):

[SC/STS 2010 3.00](#)

[SC/STS 2110 3.00](#)

SC/STS 2210 3.00

SC/STS 3226 3.00

[SC/STS 3500 3.00](#)

SC/STS 3506 3.00

[SC/STS 3550 6.00](#)

[SC/STS 3561 3.00](#)

[SC/STS 3600 3.00](#)

[SC/STS 3725 3.00](#)

[SC/STS 3726 3.00](#)

[SC/STS 3730 3.00](#)

[SC/STS 3740 3.00](#)

[SC/STS 3755 3.00](#)

[SC/STS 3760 3.00](#)

[SC/STS 3765 3.00](#)

[SC/STS 3775 3.00](#)

[SC/STS 3780 3.00](#)

[SC/STS 3790 3.00](#)

[SC/STS 3970 3.00](#)

[SC/STS 3975 3.00](#)

SC/STS 4227 3.00

SC/STS 4228 3.00

SC/STS 4230 3.00

[SC/STS 4700 3.00](#)

[SC/STS 4700 6.00](#)

[SC/STS 4710 6.00](#)

SC/STS 4780 3.00

## SPACE SCIENCE

The Department of Physics and Astronomy, Faculty of Science with the Department of Earth and Space Science and Engineering, Lassonde School of Engineering, jointly offers a Specialized Honours degree in space science. After completing a two-year foundational curriculum, space science students may choose one of two options: the first, which focuses upon the observation of the earth and atmosphere from space, is provided by the Department of Earth and Space Science and Engineering, Lassonde School of Engineering; the second, which focuses upon space astronomy and space exploration, is provided by the Department of Physics and Astronomy, Faculty of Science. Students in good standing may transfer Faculties if necessary to follow the stream of their choice. Courses for the third and fourth years for each option are noted below.

The space science core is defined as: [LE/EATS 1010 3.00](#); [LE/EATS 1011 3.00](#); [SC/MATH 1025 3.00](#); [SC/PHYS 1070 3.00](#); [LE/CSE 2501 1.00](#); [LE/EATS 2030 3.00](#); [LE/EATS 2470 3.00](#); [SC/MATH 2015 3.00](#); [SC/MATH 2271 3.00](#); [SC/PHYS 2010 3.00](#); [SC/PHYS 2020 3.00](#); [SC/PHYS 2030 3.00](#); [SC/PHYS 2040 3.00](#); [SC/PHYS 2060 3.00](#); [SC/PHYS 2213 3.00](#).

**Note:** alternatively the first year engineering core would be an acceptable substitute for the first year courses.

All Honours BSc degree candidates are encouraged to complete a non-credit industrial internship (normally salaried). This provides experience in a four-month to 12-month placement, normally after the third year of study.

### Specialized Honours

A. General education:

- non-science requirement: 12 credits;
- mathematics: [SC/MATH 1013 3.00](#); [SC/MATH 1014 3.00](#);
- computer science: [LE/CSE 1541 3.00](#);

- foundational science: [SC/PHYS 1010 6.00](#); and one of [SC/CHEM 1000 3.00](#) or [SC/CHEM 1001 3.00](#).

B. Major requirements:

#### Earth and Atmospheric Science stream

- the space science core as specified above:
- [LE/EATS 3030 3.00](#); [LE/EATS 3040 3.00](#); [LE/EATS 3280 3.00](#) ; [LE/EATS 3300 3.00](#); [LE/EATS 3610 4.00](#); [SC/MATH 3241 3.00](#); [SC/MATH 3271 3.00](#); [SC/PHYS 3310 3.00](#);
- [LE/EATS 4020 3.00](#) or [SC/PHYS 4250 3.00](#); [LE/EATS 4220 3.00](#); [LE/EATS 4230 3.00](#); [LE/EATS 4630 3.00](#);
- at least 12 credits from: [LE/EATS 4000 3.00](#), [LE/EATS 4130 3.00](#), [LE/EATS 4140 3.00](#), [LE/EATS 4160 3.00](#), [LE/EATS 4610 3.00](#), [SC/PHYS 4110 3.00](#), [SC/PHYS 4330 3.00](#), [SC/PHYS 4360 3.00](#).

#### Physics and Astronomy stream

- the space science core as specified above:
- [SC/PHYS 3020 3.00](#); [SC/PHYS 3040 6.00](#); [SC/PHYS 3050 3.00](#); [SC/PHYS 3070 3.00](#); [SC/PHYS 3150 3.00](#); [SC/PHYS 3250 3.00](#); [SC/PHYS 3280 3.00](#);
- three credits from: [SC/PHYS 3010 3.00](#), [SC/PHYS 3030 3.00](#), [SC/PHYS 3080 3.00](#), [SC/PHYS 3090 3.00](#), [SC/PHYS 3220 3.00](#), [SC/PHYS 3310 3.00](#), other courses approved by the Department of Physics and Astronomy;
- [SC/PHYS 4110 3.00](#); [SC/PHYS 4330 3.00](#); [SC/PHYS 4350 6.00](#);
- at least 11 credits from: [LE/EATS 4610 3.00](#), [SC/PHYS 4010 3.00](#), [SC/PHYS 4020 3.00](#), [SC/PHYS 4040 3.00](#), [SC/PHYS 4050 3.00](#), [SC/PHYS 4070 3.00](#), [SC/PHYS 4120 3.00](#), [SC/PHYS 4270 4.00](#), [SC/PHYS 4310 3.00](#), [SC/PHYS 4360 3.00](#), [SC/PHYS 4410 3.00](#).

C. Science breadth: satisfied by above requirements.

D. Upper level requirement: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

#### STATISTICS

see [Mathematics and Statistics](#)