The Sciences encompass the various disciplines concerned with the study of the terrestrial and cosmic worlds and their phenomena. The study of science introduces students to methods of enquiry and approaches to learning that emphasize systematic observation, experimentation and critical thinking. Through the disciplines of Astronomy, Biochemistry, Biology, Chemistry, Earth and Ocean Sciences, Mathematics, Microbiology, Physics and Statistics, students have opportunities to engage in scientific discovery, to enhance their knowledge and comprehension of the universe, and to prepare themselves for a diverse range of stimulating careers.

Robert Lipson, BSc, MSc, PhD (Tor), Dean of Science
Robin G. Hicks, BSc (Dalhousie), PhD (Guelph), Associate Dean
Cindy Holder, BA (McGill), MA (Dal), PhD (Arizona), Associate Dean
Advising
General Information

DEGREES AND PROGRAMS OFFERED

The Faculty of Science comprises the Departments of Biochemistry and Microbiology, Biology, Chemistry, Mathematics and Statistics, and Physics and Astronomy, and the School of Earth and Ocean Sciences.

Each department in the faculty offers programs of varying levels of specialization in one or more disciplines leading to the degree of Bachelor of Science (BSc):

- an Honours Program which involves a high level of specialization in a discipline and requires 18 to 36 units in that discipline at the 300 or 400 level
- a Major Program which requires less specialization, usually 15 units in a discipline at the 300 or 400 level
- a General Program which requires 9 units at the 300 or 400 level in each of two disciplines

The disciplines in the faculty and the programs leading to the BSc are shown in the table below. Several of the disciplines may be taken in combination with each other. Details of the combinations offered are presented under the entries for the individual departments.

Students can also combine a program in the Faculty of Science with a program offered in another faculty (see “Interfaculty Program”, page 240).

The Faculty of Science does not offer a Bachelor of Arts degree. However, students may combine a Science program with a non-Science program in an Interfaculty BA. This interfaculty BA degree is awarded by the non-Science faculty.

In most cases, it is possible for students to choose their courses for the first two years so that they can postpone to the end of second year their choice of the program they wish to follow.

<table>
<thead>
<tr>
<th>Faculty of Science Programs</th>
<th>Honours</th>
<th>Major</th>
<th>General</th>
<th>Minor</th>
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<tbody>
<tr>
<td>Astronomy</td>
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<tr>
<td>Biochemistry</td>
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<tr>
<td>Statistics</td>
<td>X</td>
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</tbody>
</table>

Note: All Honours and Major programs may be taken with a Co-operative Education Option

ACADEMIC ADVICE AND PROGRAM PLANNING

Associate Dean, Academic Advising
Cindy Holder BA (McGill), MA (Dal), PhD (Arizona)

Director
Susan Corner, BFA, MA (UVic)

Academic Advisers
Amanda Alfaro, BA, BEd (UVic)
Devin Arnold, BSc (UVic)
Kelly Colby, BA (Whitman), MSc (Ithaca)
Larissa Fielding, BA (TWU)
Shu-Min Huang BA, MA (UVic)
Jessica MacLean, BA (UVic)
Janine Mayers, BA (UVic)
Jennifer Oakes, BA (Athabasca), MA (UVic)
Lori S. Olson, BSc, MPA (UVic)
Patricia Perkins, BSc (UVic)
Sherri Williams, BA, Dipl. Applied Linguistics (UVic), MEd (Memorial)

Administrative Officer
Daisy Williams

Assistant to the Associate Dean
Cat Price
Lara Hannaford

Advising Assistants
Bosa Dosenovic
Ashleigh Lakas

Academic Advising Centre
Students who have been admitted to or plan to enter the Faculty of Science can seek academic advice or information about the programs in the faculty from the Academic Advising Centre, A203, University Centre.

Departmental Advising
Each academic department has advisers generally available throughout the year who can give advice about the courses and programs offered by their department.

Students who are not in attendance at the University when they want advice from a department should contact the Chair of the department for an appointment before coming to the campus.

Transfer Advising
Students planning to transfer to another faculty or university from the UVic Faculty of Science should consult with advisers in the other faculty
Students planning to enter the Faculty of Education from the Faculty of Science should seek advice from the Education Advising Centre.

Students planning to transfer to the Faculty of Engineering to complete a degree in Computer Science should seek advice from the Department of Computer Science.

**Record of Degree Program**

All students continuing in the Faculty of Science must file a Record of Degree Program with the Academic Advising Centre. Please see “Interfaculty Program” (page 240) for details.

**Availability of Courses to Students in Other Faculties**

Generally, courses offered in the Faculty of Science are open to students in other faculties who have satisfied any prerequisite courses. However, some courses or sections are open only to students in the Faculty of Science or to students in specific programs. Restrictions on enrolment are included under individual course descriptions.

Students in other faculties who propose to take courses offered in the Faculty of Science are responsible for determining if the courses can be used for credit in their degree program.

**Definition of a Science Course**

A science course is any one of the following:

- a course offered in the Faculty of Science:
- any course offered by the Department of Computer Science (CSC), all Software Engineering courses (SENG) and Medical Science (MEDS) courses
- a course that a student has taken at another institution for which the student has received transfer credit applicable to the categories defined above or for which the student has received transfer credit for a specified number of science units that are not equated to specific science courses

**Limitation on Enrolment**

Admission to UVic and the Faculty of Science is not a guarantee of placement in particular programs or courses. Departments may limit enrolment for a variety of reasons, and admission requirements may be raised.

**Student Responsibility**

Students are referred to the section "Course Selection Responsibility" (page 40).

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**Faculty Admissions**

The requirements for admission to the Faculty of Science are presented in Undergraduate Admission (see "Admission Requirements", page 33). Applicants should note the following recommended courses for entry to faculty programs:

- Secondary school students who wish to study Biochemistry, Biology or Microbiology are strongly advised to include Biology 12 in their secondary school programs.
- All secondary school students planning to enter the Faculty of Science are advised to include Chemistry 12 in their secondary school programs and to achieve a score of at least 67% in one of Principles of Mathematics 12, Pre-calculus 12, or equivalent.
- Secondary school students who wish to study Astronomy, Chemistry, Earth and Ocean Sciences, or Physics are strongly advised to include Physics 12 in their secondary school programs.

- An approved Language 11 course (see "Year 1 Admission Requirements: BC/Yukon Secondary School Graduate", page 32) is strongly recommended.
- Other prerequisites may be required for entry into courses and programs in particular disciplines. Students should take note of individual program requirements listed under each departmental entry as well as course prerequisites, listed at the end of individual course descriptions. Some Science departments offer courses to help students meet requirements they may not have fulfilled prior to application to the Faculty of Science.

**Transfers from Other Faculties**

- Students in other faculties who wish to transfer into the Faculty of Science during their first session at UVic must have been eligible for admission to the Faculty of Science when they applied for admission to UVic.
- A student who wishes to transfer into the Faculty of Science after completing one or more sessions at UVic should have satisfactory standing as defined in the University regulations (see "Standing", page 51), and must either:
  - have been eligible for admission to the Faculty of Science from secondary school; or
  - have credit for at least 9 units of Science courses including credit for at least 3 units of Mathematics selected from MATH 100, 109, 101, 102, 151.

**Transfers from Colleges and Universities**

To be eligible for admission to the Faculty of Science from a college or another university, a student must have transfer credit for at least 12 units of courses with an average, as determined by UVic, of at least 60% calculated on courses taken most recently (to a maximum of 15 units). This requirement includes repeated and failed courses.

The student should also:

- have been eligible for admission to the Faculty of Science from secondary school; or
- be eligible for transfer credit for at least 9 units of Science courses including credit for at least 3 units of Mathematics selected from MATH 100, 109, 101, 102, 151.

**Other Applicants**

Applicants from institutions other than colleges and universities must satisfy the faculty admission requirements (see "Admission Requirements", page 33) and present work they have completed that is equivalent to that specified for transfers from other faculties, colleges and universities, above.

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**Faculty Academic Regulations**

**Credit for Courses at Other Institutions**

Normal, to be recommended for a degree by the faculty, a student must complete a minimum of 30 units of courses at UVic, including at least 18 of the minimum 21 units at the 300 or 400 level required for all degree programs and including:

- at least 12 of the 15 units at the 300 or 400 level required for the Major Program; or
- at least 6 of the 9 units at the 300 or 400 level required in each discipline of the General program; or
- if the student is in an Honours Program, not more than 6 units at the 300 or 400 level in the discipline of the Honours Program taken at
another institution with the prior approval of the Chair of the relevant department.

Except as permitted by the regulations above, a student who has been admitted to the faculty may not take courses at another institution without the prior written approval, in the form of a Letter of Permission, of the Associate Dean of Academic Advising. To be eligible for a Letter of Permission, a student must have completed or be registered in no fewer than 6.0 units at the University of Victoria.

Students are solely responsible for checking the University of Victoria credit for courses to be taken elsewhere, prior to registration, to make sure that there will be no duplication of course credit already received (see also “Duplicate and Mutually Exclusive Courses”, page 41.)

Upon successful completion of such work, the student must request the other institution to send an official transcript to Undergraduate Records at UVic.

Students who are considering completing their degree requirements at another institution should note that generally other institutions cannot send transcripts of their academic records to Undergraduate Records at UVic in time for Undergraduate Records to be able to determine a student’s eligibility to graduate at the earliest convocation. Such students who complete their degree requirements in the Spring will generally graduate in the Fall and those who complete their degree requirements in the Fall will generally graduate in the Spring.

Students authorized to attend another institution who accept a degree from that institution surrender the right to a UVic degree until they have satisfied UVic’s requirements for a “Second Bachelor’s Degrees” (page 53).

Credit for Courses in Other Faculties

All courses in other faculties are acceptable for use as elective credit in the Faculty of Science, if the regulations of the department offering the courses permit and prerequisites are met.

Substitution of Elective Credit for Required Courses:

With the consent of the department offering the student’s degree, and with the permission of the Associate Dean of Academic Advising, a student may substitute up to 3 units of 300 or 400 level credit for required courses at the 300 and 400 level in a Faculty of Science degree program; such permission is invalidated if a student withdraws from the degree program of the department that provided the consent.

Students should review individual department entries for information on the use or substitution of elective credit.

Substitution of courses for MATH 100

MATH 109 may be used to replace MATH 100 in any program offered by the Faculty of Science. MATH 109 may be used to replace MATH 100 as a prerequisite in any course offered by the Faculty of Science.

Course Challenges

Course challenge is not offered by all departments. Where not specifically referenced in the departmental calendar entry, a student should consult the department directly to determine if course challenge is permitted.

Graduation Standing

The graduation standing of a student in the Faculty of Science is determined in accordance with the University regulations (see “Standing”, page 51) and, for a student enrolled in an Honours Program, in conjunction with any Honours requirements specified by the departments concerned.

In cases of plagiarism and cheating, the Faculty of Science reserves the right to recommend to Senate the withdrawal of the “With Distinction” (see page 56) designation in addition to the penalties outlined in the University “Policy on Academic Integrity” (page 42). Once a degree, diploma or certificate has been awarded by the University Senate, no change can be made to the programs that constitute that credential (see “Application for Graduation”, page 55).

Declaring a Program

All students registered and continuing in the Faculty of Science must submit a Request to Declare Program (RDP) to the Academic Advising Centre after completion of 12.0 units (normally at the end of first term) and before registering for subsequent courses.

Students who have completed 12.0 units but who are still exploring program options may declare their program as Exploratory before registering for subsequent courses, in which case they will be required to identify two possible program areas. Students who declare their program as Exploratory must declare a specific program no later than after completion of 27.0 units (normally at the end of second year) and before registering for subsequent courses. Other program options are available (see below).

The Academic Advising Centre will review the RDP and update the student’s record. Once this process has been completed the student will have access to an on-line degree audit (Curriculum, Advising and Program Planning (CAPP) report). CAPP degree audit reports are not available for students who have selected an Exploratory or Preparatory program (Preparatory program is defined below).

Students who satisfactorily complete the program of courses outlined in their CAPP report and who meet all University graduation requirements will be eligible to be granted their degree, upon submission of an Application to Graduate.

Students should be aware that some combinations of requested programs may not be possible or permitted.

Students may change their program at any time by submitting a Program Change Request to the Academic Advising Centre.

Students who are visiting from another institution are not required to declare a program. This includes incoming exchange students.

Students who have completed 12.0 units and who have been conditionally accepted to another Faculty (excluding Humanities and Social Sciences) are not required to declare a program. Such students may indicate that their program is Preparatory before registering for subsequent courses. Students who indicate that their program is Preparatory and do not transfer to another Faculty or institution must declare a specific program no later than after completing 27.0 units.

Transfer students who enter the University with 12.0 or more units of transfer credit must declare a program before the end of their first term at UVic. Transfer students who enter the University with fewer than 12.0 units of transfer credit must declare a program after completion of 12.0 units of combined UVic and transfer credits.

Students who intend to declare an Honours program must do so by following the requirements outlined in the Calendar entry for that program. Until an application to an Honours program has been approved by the unit offering the program and submitted to the Academic Advising Centre, the student must declare a Major program.

Students seeking to complete a Certificate or Diploma must declare their program in accordance with program instructions.

Time Limit for Degree Completion

Although the Faculty of Science imposes no time limit for the completion of a General or Major program, a department in the faculty may, with the approval of the faculty, impose stated time limits for a General or Major program that it offers. Normally, students who have not completed their degree programs within five calendar years of first registration will be required to satisfy any revisions that may have been made to the program requirements since they first registered.
A student in an Honours Program is expected to complete the program in four years or, for a student in the Co-operative Education Program, in five years. A student who wishes to take longer to complete an Honours Program should seek prior approval from the Chair of the department concerned. Approval is not automatic.

**Faculty Program Requirements**

**Requirements Common to All Bachelor’s Degrees**

A student may proceed to a BSc degree, normally in one of three programs: Honours, Major or General. Combined Honours and Major programs are also offered (see below).

Each candidate for a Bachelor’s degree must:

1. complete at least 3.0 units from each of three areas of study on the following listing:
   - Astronomy
   - Biochemistry
   - Biology
   - Chemistry
   - Earth and Ocean Sciences
   - Marine Science
   - Mathematics
   - Microbiology
   - Physics
   - Statistics
2. have satisfied the “Academic Writing Requirement” (page 40).
3. have received credit for at least 21 units of courses at the 300 or 400 level, of which at least 18 units must have been taken at UVic.
4. have received credit for at least 60 units of university-level courses numbered 100 and above, of which normally at least 30 units have been taken at UVic.
5. have received credit for at least 33 units of science courses (“Definition of a Science Course”, page 237).
6. have satisfied the requirements specified in this Calendar by the department whose program the student has taken.
7. have a graduating grade point average of at least 2.0 (see “Graduating Average” under “Standing at Graduation”, page 56, for details).

Students may not combine the following program areas (Honours, Major, General, Minor), with the exception of designated Combined Programs (see page 239 and 240):

- Biochemistry and Microbiology
- Biochemistry and Chemistry for the Medical Sciences
- Chemistry and Chemistry for the Medical Sciences
- Mathematics and Statistics
- Microbiology and Chemistry for the Medical Sciences

**Honours Program**

The Honours Program requires specialization in one or more disciplines in the last two or three years of a degree program and is intended for students of higher academic achievement. Students who plan to undertake graduate studies are strongly advised to follow an Honours Program.

**Admission to an Honours Program**

Admission to an Honours Program is restricted to students who have satisfied the prerequisites and met the minimum GPA specified by the department(s) concerned, and who are judged by the department(s) to have the ability to complete the Honours Program. A student who wishes to be considered for admission to an Honours Program should apply to the Chair or Honours Adviser of the department (approval from both departments is required for admission to Combined Honours programs).

**Requirements of the Honours Program**

A student in an Honours Program must satisfy the requirements common to all bachelor’s degrees in the Faculty of Science, listed above.

Each department has its own requirements for its Honours Programs, which are specified in individual department entries elsewhere in the Calendar. Of the 300- and 400-level course units specified by the department concerned, not more than 6 may be taken at another acceptable post-secondary institution, and then only with the prior approval of the department’s Honours Adviser.

Continuation in an Honours Program requires satisfactory performance as dictated by the department. If, in the opinion of the department, a student’s work at any time is not of Honours standard, the student may be required to transfer to a Major or General program.

Normally, a student should complete the requirements for an Honours Program in four academic years (five years for those students enrolled in the Co-operative Education Program). Students who are undertaking a degree on a part-time basis, and who wish to be considered as candidates for Honours, should discuss the options with the department(s) concerned.

**Honours Programs**

- Astronomy
- Biochemistry
- Biology
- Chemistry
- Earth Sciences
- Mathematics
- Microbiology
- Physics
- Statistics

**Combined Honours Programs**

- Biology and Earth and Ocean Sciences
- Biology and Psychology
- Chemistry and Earth and Ocean Sciences
- Chemistry and Mathematics
- Computer Science and Mathematics
- Computer Science and Statistics
- Mathematics and Statistics
- Physical Geography and Earth and Ocean Sciences
- Physics and Astronomy
- Physics and Biochemistry
- Physics and Computer Science
- Physics and Earth Sciences (Geophysics)
- Physics and Mathematics
- Physics and Ocean Sciences (Ocean-Atmosphere Dynamics)
Double Honours Program
With the joint approval of the departments concerned, a student may be permitted to meet the requirements for an Honours Program in each of two departments in the Faculty of Science, both leading to the BSc degree.

Interfaculty Double Honours Program
If a student elects to complete an Honours Program in the Faculty of Science and a second Honours Program in another faculty, with one program leading to a BA and the other leading to a BSc, the program leading to the degree selected (BA or BSc) must be listed first on the student’s Record of Degree form. TheHonours Program will be listed first on the student’s Curriculum Advising and Program Planning (CAPP) form.

Students completing an Interfaculty program will be subject to the regulations of the faculty in which they are registered.

Joint Honours and Major Program
A student may elect to complete an Honours Program in one area of study together with a Major Program in another area of study, both within the Faculty of Science and both leading to the BSc degree. The Honours Program will be listed first on the student’s Curriculum Advising and Program Planning (CAPP) form.

Interfaculty Joint Honours and Major Program
A student may elect to complete an Honours Program in one faculty together with a Major Program in another faculty. The Honours Program will be listed first on the student’s Curriculum Advising and Program Planning (CAPP) form, and students will be subject to the regulations of the faculty in which they are registered.

If one of the two departments concerned offers a BA Program while the other offers a BSc Program, the student will receive either a BA or a BSc, depending on which is specified by the Honours Program. If the department offering the Major Program offers both a BA and a BSc program, the requirements of the program leading to the degree selected (BA or BSc) must be met in the department offering the option.

MAJOR PROGRAM
The Major Program requires specialization in one discipline in the last two years of a degree program and may permit a student to proceed to graduate study if sufficiently high standing is obtained. The Major Program is also a good preparation for a professional or business career.

Requirements of the Major Program
A student in a Major Program must satisfy the requirements common to all bachelor’s degrees in the Faculty of Science, listed above.

Each department has its own requirements for its Major Programs, which usually include the specification of 15 units of 300- and 400-level course work. At least 12 of these 15 units must be completed at Uvic. A department may also specify and require up to 9 units of courses offered by other departments at the 300 or 400 level.

Major Programs
- Astronomy
- Biochemistry
- Biology
- Chemistry
- Chemistry for the Medical Sciences
- Earth Sciences
- Mathematics
- Microbiology
- Statistics
BA in Mathematics or Statistics
Students who wish to obtain a BA in Mathematics or Statistics should register in either the Faculty of Humanities or the Faculty of Social Sciences, and complete the requirements common to all bachelor’s degrees in that faculty.

GENERAL PROGRAM
The General Program provides students with the opportunity to study broadly in two disciplines in the last two years of a degree program. It is not intended to prepare students for graduate study, although some graduate schools may accept graduates of a General Program if they have achieved sufficiently high standing.

Requirements of the General Program
A student in a General Program must satisfy the requirements common to all bachelor’s degrees in the designated faculty determined by the first subject area listed on the Curriculum Advising and Program Planning (CAPP) form.

The General Program requires:
- Completion of 9 units of course work at the 300 and 400 level in each of the two disciplines, as specified in the General Program requirements of the departments concerned
- At least 6 of the 9 units in each discipline must be completed at UVic

A student may complete a General Program in any two of the following or by completing one of the following and one of the Generals offered in another faculty. The degree will be a BA awarded by either the Faculty of Humanities or the Faculty of Social Sciences unless two Generals in the Faculty of Science are chosen, or one of the BSc Generals in Computer Science, Geography or Psychology is combined with a second BSc General in the Faculty of Science.

- Biochemistry or Microbiology
- Biology
- Chemistry
- Earth Sciences
- Mathematics or Statistics
- Physics

A student may also complete a General Program that combines one of the above disciplines/areas of study with one of the following. The degree will be a BA awarded by either the Faculty of Humanities or the Faculty of Social Sciences.

- "Arts of Canada Program" (see page 323)
- "European Studies" (see page 325)
- "Film Studies Program" (see page 323)
- "Health and Society" (see page 325)
- "Indigenous Studies Program" (see page 325)
- "Social Justice Studies" (see page 327)
- "Technology and Society" (see page 328)

MINOR PROGRAM
A Minor is an optional program that allows students to study in an area outside their Honours, Major or General Program areas. Requirements vary and are specified in the Minor requirements of the department concerned. Where not specified, the requirements for a Minor follow the requirements for the department General Program in one area only.

- No more than 3 units of the 300- and 400-level course work required for the Minor can be taken elsewhere, and at least 6 of the units required for the Minor must be completed at UVic.

- If the Minor requires 9 units of 300- and 400-level course work, these 9 units cannot form part of the 300- and 400-level department requirements for a student’s Honours or Major Program. Corequisite courses in other programs may be counted towards the Minor.
- If the Minor requires less than 9 units of 300- and 400-level course work, no courses at the 300- or 400-level can form part of the requirements for a student’s Honours, Major or General Program or Option. Required or corequisite courses at the 200 level or higher in other programs or options may not be counted toward the Minor.

Only one Minor can be declared on a student’s program.

In addition to department Minors, the following Minors are offered:

Interdisciplinary Minors
- "Applied Ethics" (see page 327)
- "Arts of Canada Program" (see page 323)
- "European Studies" (see page 325)
- "Film Studies Program" (see page 323)
- "Health and Society" (see page 325)
- "Human Dimensions of Climate Change" (see page 327)
- "Indigenous Studies Program" (see page 325)
- "Social Justice Studies" (see page 327)
- "Technology and Society" (see page 328)

Student-Designed Minor
Students may undertake an interdisciplinary Minor that is not listed in the Calendar. In addition to the requirements of the Minors listed above, this student-designed Minor must:

- Include courses from at least two departments, with a minimum of 3 units from each department
- Consist of courses taken only at UVic
- Have structure, coherence and theme; it cannot consist of unrelated courses
- Be approved by the Chair/Adviser of the departments concerned
- Be approved by the Associate Dean of Academic Advising
- Be declared by the end of the student’s third year

Students must discuss their proposed Student-Designed Minor with department Chairs/Advisers before submitting their request to the Associate Dean of Academic Advising. The Student-Designed Interdisciplinary Minor form is available from the Academic Advising Centre, A205, University Centre.

CO-OPERATIVE EDUCATION PROGRAMS
Refer to the general regulations pertaining to "Undergraduate Co-operative Education" Programs of the University of Victoria governing all co-operative education students (page 59).

Admission to, continuation in and completion of Co-operative Education Programs are governed by individual departmental regulations. In general, students participating in the Co-operative Education Program must maintain a GPA of at least 3.5 overall. As a required part of the program, students are employed for specific Work Terms. Normally, the expected number of weeks per work term is 15 and the expected number of hours per week is 35. The minimum number of weeks per work term is 12 and the minimum number of hours per week is 35. This employment is related as closely as possible to the student’s course of studies and individual interest.

Students who are taking double or combined Major degrees, (where each area offers a Co-op program) may, if eligible, enrol in and undertake work terms in both Co-op programs or may, if eligible, enrol in and undertake work terms in only one Co-op program. Students who
complete at least two work terms in each area will have the combined nature of their program noted as part of the Co-op designation on their official records. Students enrolled in combined Major degrees where a minimum of three work terms are required must complete at most two work terms in one department.

In addition to the graduation requirements outlined in “Requirements Common to All Bachelor’s Degrees” (page 239), a student must have a graduating GPA of at least 3.5 in order to graduate with Co-operative Education notation.

Students may withdraw from the Co-operative Education Program at any time during an academic term and remain enrolled in a Major or an Honours Program.

The Faculty of Science offers Co-operative Education Programs in

- Sciences, Mathematics and Statistics
- Physics and Astronomy
- The Honours Program.

The Faculty of Science offers Co-operative Education Programs in Biochemistry and Microbiology, Biology, Chemistry, Earth and Ocean Sciences, Mathematics and Statistics, and Physics and Astronomy. The details of the programs are provided under individual department entries.

### Science Work Experience Program

The Science Work Experience Program is intended for full-time students in the Faculty of Science. Students participating in the Science Work Experience Program will complete one or two terms of full-time, discipline-related work under the supervision of the applicable Science Co-op program. These work experience terms are subject to individual departmental Co-op regulations as well as the general regulations for Undergraduate Co-op programs in the University Calendar, with the exception that work term credit by challenge is not permitted. Work Experience students may transfer to a regular Co-op program, subject to approval from the Co-op Coordinator. Participation in this program is limited. Students should contact the applicable Science Co-op office to discuss entry into this program. Students interested in the Math Work Experience Program should refer to “Computer Science/Mathematics Work Experience Program” (page 99).

### Department of Biochemistry and Microbiology

**Perry Howard, BSc (Waterloo), PhD (Toronto)** Associate Professor and Chair of the Department

- **Juan Ausia, BSc, PhD (Barcelona)**, Professor
- **Alisdair Boraston, BSc, PhD (Brit. Col.)**, Professor
- **Christoph Borchers, BSc, MSc, PhD (Konstanz)**, Professor
- **Martin J. Boulanger, BSc, PhD (Brit. Col.)**, Professor
- **Caroline E. Cameron, BSc, PhD (Victoria)**, Professor
- **Stephen Evans, BSc, PhD (Brit. Col.)**, Professor
- **Caren C. Helbing, BSc (Hons) (Windsor)**, PhD (Western), Professor
- **Francis E. Nano, AB (Oberlin)**, MS, PhD (Ill), Professor
- **Paul J. Romanuik, BSc (Hons) (McMaster)**, Professor
- **Christopher Upton, BSc, PhD (Lond)**, Professor
- **Brad H. Nelson, BSc (Hons) (Brit. Col.)**, PhD (Calif. Berkley), Professor (limited term)
- **Christopher Nelson, BSc, PhD (Brit. Col.)**, Associate Professor
- **John E. Burke, BSc, PhD (Calif. San Diego)**, Assistant Professor
- **Lisa A. Reynolds, BSc (Manchester)**, MSc, PhD (Edinburgh), Assistant Professor
- **Julian J. Lum, BSc, MSc, PhD (Ottawa)**, Associate Professor (limited term)
- **Douglas Brian, BSc (Hons)**, MSc (Waterloo), PhD (Brit. Col.), Assistant Teaching Professor
- **Barbara Currie, BSc (Brit. Col.)**, Senior Microbiology Laboratory Instructor
- **Scott Scholz, Biotechnical Support Centre Manager**

**Rozanne Poulson, BSc, PhD (Wales)**, Co-operative Education Coordinator

**Glen A. Pyhittka, BSc (Brit. Col.)**, Senior Biochemistry Laboratory Instructor

### Visiting, Adjunct and Cross-listed Appointments

- **N. Leigh Anderson, BA, PhD (Cambridge)**, Adjunct Professor
- **Monica Palcic, PhD (Alberta)**, Adjunct Professor
- **Andrew Ross, BSc, PhD (Brit. Col.)**, Adjunct Assistant Professor
- **Peter H. Watson, BA, MA, MB BCHir (Cambridge)**, FRCP (Manitoba), Adjunct Professor
- **John R. Webb, BSc, MSc, PhD (Western Ontario)**, Adjunct Associate Professor

**Biochemistry and Microbiology**

- **Biochemistry**
- **Microbiology**

**Biochemistry and Microbiology Programs**

The department offers Honours, Major, General and Minor Programs in Biochemistry or Microbiology, a Combined Major in Biochemistry or Microbiology and Chemistry, and a Combined Honours and Major in Biochemistry and Physics.

See “Biochemistry and Microbiology Co-operative Education/Internship Program” (page 246).

### Program Requirements

**Notes on Course Requirements**

- Courses may be taken in different sequences and in different years from those indicated provided the corequisite and prerequisite requirements are satisfied. However, students must be extremely careful in planning programs that differ from the normal sequence and pay close attention to scheduling conflicts.
- Failure to take courses in the years indicated may delay graduation.
- Directed studies courses are normally only available to students with a minimum cumulative GPA of 5.0 and fourth-year standing in the Biochemistry or Microbiology programs.
- Students should consult the department concerning courses offered in a particular year.
- The department does not offer the E grade and supplemental examinations.

### Honours Programs

Admission to the Honours program is by permission of the department. Students who wish to be admitted to one of the Honours programs should apply to the department on completion of their third year. The general requirement for admission is a GPA of at least 6.0 in BCMB 301A/B, BIOC 300A/B, MICR 302, MICR 303.

The Biochemistry and Microbiology Honours programs offers students an intensive, advanced experience in academic studies and research. Students normally begin their Honours program in the fall term and are expected to complete the final year requirements of the Honours program in two consecutive academic terms. However, students in the Honours Biochemistry and Microbiology Co-operative Education Program may begin in the spring term, undertake a work term during the summer months, and complete in the fall term to fulfill the final year requirements in three consecutive terms.

An Honours degree will be awarded to students obtaining a minimum GPA of 5.5 in 300- and 400-level department courses. Students must achieve a minimum grade of B+ in BCMB 499A and 499B.
If a student fails to meet the standards for the Honours degree, but does meet the Major degree requirements, the department may recommend the appropriate class of Major degree.

**Biochemistry Program Requirements**

### Honours Program

#### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tr>
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<td>3.0</td>
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<tr>
<td>MATH 100 or 109 and 101, or 102 and 151(^1)</td>
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<tr>
<td>PHYS 102A and 102B; or 110 and 111; or 120 and 130</td>
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<td>CHEM 213, 231, 232</td>
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<td>MICR 200A, 200B</td>
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<td>STAT 255 or equivalent</td>
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#### Third Year

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#### Fourth Year

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1. Students anticipating a Physical Biochemistry focus should take MATH 100 and 101.

### General and Minor Programs

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#### Second Year

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#### Third and Fourth Years

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### Microbiology Program Requirements

#### Honours Program

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#### General and Minor Programs

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### Second Year

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### Third Year

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### Fourth Year

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### First Year

<table>
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### Second Year

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### Combined Major in Microbiology and Chemistry

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### Combines Biochemistry and Physics Program

### Combined Honours in Biochemistry and Physics

### First Year

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### Second Year

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### Third Year

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### Combined Biochemistry and Physics Program Requirements

1. For students with Chemistry 11 and Mathematics 12 or equivalents.
2. For students with Chemistry 12 and Mathematics 12 or equivalents.
3. The Physics requirement may also be satisfied by PHYS 120 and 130.
4. CHEM 231 may be taken in the second term of the first year, and 1.5 units of these electives postponed.
5. BIOL 225 may be taken in the third year as a corequisite to BIOC 300A and 300B. Alternatively, CHEM 245 may be deferred to the fall term of the third year.
6. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.

### Combined Microbiology and Chemistry Program

### Combined Major in Microbiology and Chemistry

### First Year

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### Second Year

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### Third Year

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### Fourth Year

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<td>BCMB 499A and 499B, or PHYS 429A and 499</td>
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1. For students with Chemistry 11 and Mathematics 12 or equivalents.
2. For students with Chemistry 12 and Mathematics 12 or equivalents.
3. The Physics requirement may also be satisfied by PHYS 120 and 130.
4. CHEM 231 may be taken in the second term of the first year, and 1.5 units of these electives postponed.
5. BIOL 225 may be taken in the third year as a corequisite to BIOC 300A and 300B. Alternatively, CHEM 245 may be deferred to the fall term of the third year.
6. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.
Fourth Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 317, 321A, 323</td>
<td>4.5</td>
</tr>
<tr>
<td>PHYS electives¹</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 460A, 460B</td>
<td>0.0</td>
</tr>
<tr>
<td>Electives</td>
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<tr>
<td>Total</td>
<td>18.0</td>
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</table>

1. Chosen from courses listed in Note 7 in the Notes on Course Requirements in Physics and Astronomy’s Program Requirements.

Combined Major in Biochemistry and Physics

First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>BIOL 18</td>
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<tr>
<td>CHEM 101, 102</td>
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<tr>
<td>CSC 110 or 111</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 120 and 130, or 110 and 111</td>
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</tr>
<tr>
<td>Electives</td>
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<tr>
<td>Total</td>
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Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
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<tbody>
<tr>
<td>BIOL 225</td>
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<td>CHEM 231, 232</td>
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<tr>
<td>MATH 200, 204, 211</td>
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<tr>
<td>MICR 200A</td>
<td>1.5</td>
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<tr>
<td>PHYS 215, 216, 248</td>
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Third Year

<table>
<thead>
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<th>Course</th>
<th>Credit</th>
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<tbody>
<tr>
<td>BCMB 301A</td>
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</tr>
<tr>
<td>BIOC 300A, 300B</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 213, 245</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 342, 346</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 229, 325, 326</td>
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<tr>
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</tbody>
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Fourth Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two of BIOC 401, 403, 404, 408, 409</td>
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</tr>
<tr>
<td>PHYS 317; 321A, 323</td>
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<tr>
<td>PHYS electives¹</td>
<td>4.5</td>
</tr>
<tr>
<td>Electives</td>
<td>3.0</td>
</tr>
<tr>
<td>Total</td>
<td>15.0</td>
</tr>
</tbody>
</table>

1. Chosen from Physics and Astronomy courses (or other approved courses) numbered 300 or higher. PHYS 432 is strongly recommended.

Co-op Education/Internship Program Requirements

Entry into the Biochemistry and Microbiology Co-operative Program is restricted to students who are enrolled in an Honours or Major Program offered by the department. To qualify for entry and continuation in the Co-operative Education Program, students must be enrolled on a full-time basis and must normally maintain a B average (4.5) in Biochemistry and Microbiology courses, and overall. Students are also required to satisfactorily complete four work terms. The first work term is undertaken in the Summer following the second academic year. After the first work term, academic and work terms alternate. Each work term will be recorded on the student's academic record and transcript (as COM, N/X, or F/X).

Students who are taking double or combined Major degrees programs, who wish to participate in a combined Co-op program, should refer to the Faculty of Science “Co-operative Education Programs” regulations (page 241).

A student may at any time during an academic term transfer from the Biochemistry and Microbiology Co-operative Education Program to a Biochemistry and Microbiology program.

The department also offers two optional Internship Programs. In the Co-op Internship Program, students are required to satisfactorily complete 12 or 16 months of consecutive work term placements, beginning in the Spring or Summer of the third academic year. In the Post-Study Internship Program, students are required to satisfactorily complete a minimum of four months of work beginning after completion of their academic coursework and before graduation; students should apply four to six months before completion of their academic coursework.

Applications and further information about the Co-operative Education Program and Internship options in Biochemistry and Microbiology are available from the department or at <www.uvic.ca/bioccoop>.

Department of Biology

Barbara J. Hawkins, BSF (UBC), PhD (Cant), Professor and Chair of the Department

Geraldine A. Allen, BSc, MSc (UBC), PhD (Oregon St), Professor and Curator of the Herbarium

Bradley R. Anholt, BSc (Alberta), MSc (Calgary), PhD (UBC), Professor

Francis Y.M. Choy, BSc (Manitoba), MSc, PhD (N Dakota), Professor

C. Peter Constabel, BSc (Saskatchewan), MSc (UBC), PhD (Montreal), Professor

Kerry R. Delaney, BSc (UBC), PhD (Princeton), Professor

John F. Dower, BSc (Memorial), PhD (UVic), Professor

Patrick T. Gregory, BSc (Toronto), MSc, PhD (Manitoba), Professor

William E. Hintz, BSc (Carleton), MSc, PhD (Toronto), Professor

Francis Juanes, BSc (McGill), MSc (SFU), PhD (Stony Brook), Professor, Liber Erro Chair in Fisheries Research

Kim M. Juniper, BSc (Alberta), PhD (Cant NZ), Professor and BC Leadership Chair in Marine Ecosystems and Global Change

Ben F. Koop, BSc, MSc (Texas Tech), PhD (Wayne St), FRSC, Professor, CRC Tier I Chair in Genomics and Molecular Biology

Asit Mazumder, BSc, MSc (Chittagong), MSc, PhD (Waterloo) Professor

Steve Perlman, BSc, MSc, PhD (Toronto), MA (Rochester), PhD (Chicago), Professor

Verena J. Tunnicliffe, BSc (McMaster), MPhil, PhD (Yale), FRSC, Professor, CRC Tier I in Deep Ocean Research

Patrick von Aderkas, BSc (Guelph), PhD (Manchester), Professor

Gautam B. Awatramani, BS (Rochester), PhD (SUNY Buffalo), Associate Professor, CRC Tier II in Synaptic Physiology

Julia K. Baum, BSc (McGill), MSc, PhD (Dalhousie), Associate Professor

Robert L. Chow, BSc (Toronto), PhD (NYU), Associate Professor
Biology Programs

Students have the opportunity to study Biology at one of the following levels of concentration: General, Minor, Major or Honours. BSc Honours and Major Programs are intended for those planning to become professional biologists. Both require a core of Biology courses, corequisite courses in the other sciences and a selection of upper-level courses suited to the interests of individual students. The Honours Program requires undergraduates to undertake a research project including the writing and defense of an Honours thesis. Students intending to pursue research or continue their studies for MSc or PhD degrees should consider the Honours Program. The distinctive characteristic of BSc or BA General Programs is the variety of course options possible. Students in these programs may wish to combine a concentration in Biology with one in another science area (BSc) or an arts area (BA). Such interdisciplinary programs may be advantageous to students considering a postgraduate degree in the Health Sciences or Education.

Biology Courses for Non-Majors

The Biology department offers several courses for students not undertaking an undergraduate program in Biology. These courses cover areas of Biology of general interest and relevance. Courses in this category include BIOL 150A, 150B, 334, 351, 359, and 400. Certain other courses may be taken with the permission of the instructor.

Biology Courses Offered Through the Bamfield Marine Sciences Centre

Marine Science courses (MRNE courses in the course listings) are offered at the Bamfield Marine Sciences Centre, the majority during the summer months. Registration information for the Summer Program is available from the Biology department and our website: <www.bms.bc.ca>.

Bamfield Marine Sciences Centre also offers a 7.5 unit Fall Program. Students accepted into this program will have at least third-year standing in Biology. Contact the Biology department for further information.

Biology courses taken by students at the University of Victoria will be treated as if they had been offered by the Biology department at the University of Victoria in determining the student’s grade point averages, and in satisfying University, faculty, and departmental program requirements.

See “Biology Co-operative Education Program” (page 252).
PROGRAM REQUIREMENTS

Notes on Course Requirements

- Biology 12 is normally required for entry into Major, Honours, General or Minor Programs. Students with Biology 11 only are required to take BIOL 150B to enter Majors, Honours or General Programs.
- The prerequisite for BIOL 184 is one of Biology 11, Biology 12, BIOL 150A, 150B, 186, or passing a placement exam. The prerequisite for BIOL 186 is one of Biology 11, Biology 12, BIOL 150A, 150B, 184, or passing a placement exam. The placement exam will be given in the first week of classes in each term.
- Major and Honours students are expected to participate fully in all aspects of laboratory work including handling live and preserved organisms. Laboratory work using animals is reviewed annually by the UVic Animal Care Committee and complies with guidelines established by the Canadian Council on Animal Care. Students who are unwilling to use animals and plants for educational purposes will not normally be able to complete a Major or Honours Program. The General Program provides an alternative for students in such a position. Students who have ethical or health concerns that interfere with normal program requirements should write to the Chair of the Biology department. This should be done at least six weeks before the beginning of the term in which the course of concern is being offered.
- Students from outside the Department of Biology wanting to take BIOL courses are encouraged to take BIOL 150A and B or BIOL 186 and 184, and as many as possible of BIOL 215, 225 and 230. Students who wish to take upper-level courses should contact the undergraduate adviser or instructor to determine which core courses are most suitable as prerequisites.
- Students considering going on to professional schools (e.g., Medicine, Dentistry, Veterinary Science) should include the Science, Math and English courses that are prerequisite to entry into these professional programs. Three units of PHYS are required for most first-year preprofessional programs. Students contemplating entry into Medicine after the third year should consult with the department.
- Students considering a teaching career are advised to consider the following programs:
  - for Senior Secondary level: a BSc Major or Honours
  - for Junior Secondary School and Elementary level: a BSc or BA General Program
  - for teacher certification: consult the Faculty of Education.
- Because of the importance of biometrics in most biological work, students in Biology programs should consider taking additional STAT courses.
- Students may be required to meet part of the expenses involved in required field trips.
- The department does not offer supplemental examinations.

Notes on Biology Upper Level Electives

Biology upper level electives should be chosen with the student's full program in mind. Students cannot expect to be admitted to courses without the prerequisites.

Course Challenge

The Department of Biology does not permit students to gain credit by course challenge.

Honours Program

Honours students complete the program of required courses shown below and the Biology electives as described for the Major, and in addition take BIOL 460 (1.0) and BIOL 499A and 499B (3.0) in their fourth year. Of the remaining 9 units to complete the 61 unit degree requirement, at least 3 units must be from an additional course(s) in Biology chosen in consultation with the department.

Any prospective Honours students should first discuss proposed thesis research with a faculty member and obtain the member's consent to serve as thesis supervisor. The student should then apply to the departmental Honours Adviser for admission to the Honours Program before May 1 in the third year of studies. However, applications will be accepted up to the end of fall registration in the fourth year of studies. The completed thesis will be examined by a small committee including the supervisor. Applicants should have and maintain a GPA of at least 6.0 in all department courses.

A student who obtains a minimum GPA of 5.5 and a minimum grade of A- in BIOL 499A and 499B, will receive an Honours in Biology. A student with a GPA of less than 5.5 will receive a Major in Biology, regardless of the grade obtained in BIOL 499A and 499B. The submission date for the thesis is the last day of lectures.

Proficiency in more than one language is often required in graduate studies. Students planning graduate work are encouraged to elect one or two language courses.

Concentration in Forest Biology

The Department of Biology offers a concentration in Forest Biology. Students have the option to declare this concentration, and must complete the courses noted below within the Bachelor of Science, Major and Honours programs. The chosen concentration will appear on students' transcripts.

The concentration will require a minimum of 7 courses, including a capstone research or field experience, as follows:
- BIOL 324 and 366;
- One of BIOL 325, 326, 438;
- Three\(^1\) of BIOL 312, 325, 326, 329, 330, 415, 418, 438, 449, 457, 458;
- One of BIOL 418, 499B, 490J.

Note:
1. BIOL 499B credit may be counted toward the Forest Biology Concentration only if the thesis topic is approved by the department

Concentration in Marine Biology

The Department of Biology offers a concentration in Marine Biology. Students have the option to declare this concentration, and must complete the courses noted below within the Bachelor of Science, Major and Honours programs. The chosen concentration will appear on students' transcripts.

The concentration will require a minimum of 7 courses as follows:
- One of BIOL 311, EOS 311, MRNE 435;
- One of BIOL 319, MRNE 430;
- One of BIOL 322, 335, MRNE 410, 412;
- Four of BIOL 321, 322, 323, 335, 336, 370, 438, 446, 461, 466, 490D, MRNE 410, 412, 415, 420, 425, 437, 440, 445; MRNE 400, 401, 402 with permission of the department.

Note: Students may count only one of MRNE 400, 401, 402 in the Marine Biology Concentration.

Concentration in Neurobiology

The Department of Biology offers a concentration in Neurobiology. Students have the option to declare this concentration, and must complete the courses noted below within the Bachelor of Science, Major
Course Requirements

Honours Program

<table>
<thead>
<tr>
<th>Year</th>
<th>BIOL 184 or 190B, and 186 or 190A</th>
<th>BIOL 101, 102</th>
<th>CHEM 101, and 102 or 231</th>
<th>MATH 100 or 109 and 101, or 102 and 151</th>
<th>PHYS 102; or 102A and 102B; or 110 and 111; or 120 and 130</th>
<th>Electives</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
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<td>3.0</td>
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</table>

Second Year

<table>
<thead>
<tr>
<th>BIOL 299</th>
<th>BIOL 211, 225, 230</th>
<th>CHEM 231, and 232 or 235</th>
<th>STAT 255 or 260</th>
<th>Science elective</th>
<th>Electives</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>4.5</td>
<td>3.0</td>
<td>1.5</td>
<td>1.5</td>
<td>3.0</td>
<td>15.0</td>
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Third Year

<table>
<thead>
<tr>
<th>BIOL upper-level electives</th>
<th>Science electives</th>
<th>Electives</th>
<th>Total</th>
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<tbody>
<tr>
<td>9.0</td>
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Fourth Year

<table>
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<th>BIOL upper-level electives</th>
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<tbody>
<tr>
<td>4.0</td>
<td>6.0</td>
<td>6.0</td>
<td>16.0</td>
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</table>

Total units: 60.0

Major Program

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<th>Year</th>
<th>BIOL 184 or 190B, and 186 or 190A</th>
<th>CHEM 101, 102</th>
<th>MATH 100 or 109 and 101, or 102 and 151</th>
<th>PHYS 102; or 102A and 102B; or 110 and 111; or 120 and 130</th>
<th>Electives</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>First Year</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
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<td>3.0</td>
<td>15.0</td>
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Second Year

<table>
<thead>
<tr>
<th>BIOL 299</th>
<th>BIOL 211, 225, 230</th>
<th>CHEM 231, and 232 or 235</th>
<th>STAT 255 or 260</th>
<th>Science elective</th>
<th>Electives</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>1.5</td>
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Third Year

<table>
<thead>
<tr>
<th>BIOL upper-level electives</th>
<th>Science electives</th>
<th>Electives</th>
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</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
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<td>15.0</td>
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Fourth Year

<table>
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<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>6.0</td>
<td>6.0</td>
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</table>

Total units: 60.0

BA

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<th>Year</th>
<th>BIOL 184 or 190B, and 186 or 190A</th>
<th>CHEM 101, 102</th>
<th>MATH 100 or 109 and 101, or 102 and 151</th>
<th>PHYS 102; or 102A and 102B; or 110 and 111; or 120 and 130</th>
<th>Electives</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>15.0</td>
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</table>

Second Year

<table>
<thead>
<tr>
<th>BIOL 299</th>
<th>BIOL 211, 225, 230</th>
<th>CHEM 231, and 232 or 235</th>
<th>STAT 255 or 260</th>
<th>Science elective</th>
<th>Electives</th>
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<tbody>
<tr>
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<td>3.0</td>
<td>1.5</td>
<td>1.5</td>
<td>3.0</td>
<td>15.0</td>
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</tbody>
</table>

Third Year

<table>
<thead>
<tr>
<th>BIOL upper-level electives</th>
<th>Science electives</th>
<th>Electives</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>3.0</td>
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<td>15.0</td>
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</table>

Fourth Year

<table>
<thead>
<tr>
<th>BIOL 460, 499A, 499B</th>
<th>BIOL upper-level electives</th>
<th>Electives</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>6.0</td>
<td>6.0</td>
<td>16.0</td>
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</tbody>
</table>

Total units: 60.0

Note: BIOL 499B credit may be counted toward the Neurobiology Concentration only if the thesis topic is approved by the department. Recommended: BIOL 360, PSYC 345A, PSYC 451D.
### Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>BIOL 215 or 225</td>
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<tr>
<td>Electives</td>
<td>13.5</td>
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<td><strong>Total</strong></td>
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### Third and Fourth Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
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<td>BIOL 200-level or above</td>
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<tr>
<td>Electives</td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>

### Program Requirements

1. Biology 12 is normally required for entry into the Combined Biology and Earth Science program. Students with Biology 11 only are required to take BIOL 150B.
2. Students should note that EOS 240 is a prerequisite for several upper-level EOS courses (EOS 316, 335, 403, 408, 416, 420, 425, 440, 450, 460).
3. EOS 300 is strongly recommended for all students.
4. The 19.5 units of electives in third and fourth years must include 9 units of 300-level or above in second area of concentration for the General Program.

### Combined Biology and Earth and Ocean Sciences Program Requirements

#### Notes on Course Requirements

1. Biology 12 is normally required for entry into the Combined Biology and Earth Science program. Students with Biology 11 only are required to take BIOL 150B.
2. Students should note that EOS 240 is a prerequisite for several upper-level EOS courses (EOS 316, 335, 403, 408, 416, 420, 425, 440, 450, 460).
3. EOS 300 is strongly recommended for all students.

### Combined Honours Program in Biology and Earth and Ocean Sciences

Admission to the Combined Honours Biology and Earth Sciences Program requires the permission of both the Department of Biology and the School of Earth and Ocean Sciences. To receive an Honours degree, a student must obtain: (1) a minimum graduating GPA of 5.5 overall; (2) a minimum GPA of 6.0 in 5 EOS or Biology courses at the 300 and 400 level; and a minimum grade of A- in BIOL 499A and 499B or EOS 499A and 499B.

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 184 or 190B, and 186 or 190A</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 101, 102</td>
<td>3.0</td>
</tr>
<tr>
<td>EOS 110, 120</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 102; or 102A and 102B; or 110 and 111; or 120 and 130</td>
<td>3.0</td>
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<tr>
<td><strong>Total</strong></td>
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### Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 215, 225</td>
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<tr>
<td>BIOL 230</td>
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<td>CHEM 231, 245</td>
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</tr>
<tr>
<td>EOS 201, 205, 240</td>
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### Third and Fourth Years

<table>
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<th>Units</th>
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<td>EOS 300 or 460</td>
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<table>
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<th>Units</th>
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<tbody>
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<td>BIOL 184 or 190B, and 186 or 190A</td>
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<tr>
<td>CHEM 101, 102</td>
<td>3.0</td>
</tr>
<tr>
<td>EOS 110, 120</td>
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<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 102; or 102A and 102B; or 110 and 111; or 120 and 130</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15.0</strong></td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 215, 225</td>
<td>3.0</td>
</tr>
<tr>
<td>BIOL 230</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 231, 245</td>
<td>3.0</td>
</tr>
<tr>
<td>EOS 201, 205, 240</td>
<td>4.5</td>
</tr>
</tbody>
</table>

### Third and Fourth Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 330</td>
<td>1.5</td>
</tr>
<tr>
<td>One of BIOL 355, 370, 457</td>
<td>1.5</td>
</tr>
<tr>
<td>EOS 300 or 460</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Combined Biology and Psychology Program Requirements

Both Major and Honours BSc degrees are offered in the Combined Biology and Psychology Program. These are not joint degrees in Biology and Psychology, but single degree programs composed of a selected combination of courses from each of the departments. These programs are intended for students with interests and career goals in any area of neuroscience, including neuroethology, human biology, medicine, dentistry, or nursing. Students should consult with undergraduate advisers in both departments when planning their course schedules.

Combined Honours in Biology and Psychology

Core Course Requirements

BIOL 184 or 190B, and 186 or 190A¹ ......................................................... 3.0
PSYC 100A, 100B .................................................................................... 3.0
BIOL 225¹ ...................................................................................... 1.5
PSYC 201 ...................................................................................... 1.5
PSYC 210 ...................................................................................... 1.5
PSYC 251 or 215A ........................................................................... 1.5

Upper-level Biology and Psychology Courses

BIOL 365 ......................................................................................... 1.5
BIOL 367 ......................................................................................... 1.5
Three of BIOL 309, 345, 404, 409B, 432, 447, 448 ..................... 4.5
PSYC 351D .................................................................................... 1.5
PSYC 345A .................................................................................... 1.5
One of PSYC 351B, 451D ............................................................... 1.5
BIOL or PSYC 300 or 400-level elective ........................................... 3.0

Electives⁵ .......................................................................................... 13.5

Total units ..................................................................................... 60.0 or

Other Requirements

One of MATH 100 or 109, 102 ............................................................ 1.5
CHEM 101 and 102 .......................................................................... 3.0
CHEM 231 and 232 .......................................................................... 3.0
BIOL 299 or 300A ............................................................................ 1.5
PHYS 102; or 102A and 102B; or 110 and 111 .............................. 3.0
1.5 units of CSC, any level ............................................................... 1.5
Electives⁵ .......................................................................................... 13.5

Total units ..................................................................................... 60.0 or

Combined Major in Biology and Psychology

Core Course Requirements

BIOL 184 or 190B, and 186 or 190A¹ ......................................................... 3.0
PSYC 100A, 100B .................................................................................. 3.0
BIOL 225¹ ...................................................................................... 1.5
PSYC 201 ...................................................................................... 1.5
PSYC 210 ...................................................................................... 1.5
PSYC 251 or 215A ........................................................................... 1.5

Upper-level Biology and Psychology Courses

BIOL 365 ......................................................................................... 1.5
BIOL 367 ......................................................................................... 1.5
Three of BIOL 309, 345, 404, 409B, 432, 447, 448 ..................... 4.5
PSYC 351D .................................................................................... 1.5
PSYC 345A .................................................................................... 1.5
One of PSYC 351B, 451D ............................................................... 1.5
BIOL or PSYC 300 or 400-level elective ........................................... 3.0

Other Requirements

ENGL 135 ...................................................................................... 1.5
PSYC 300A and 300B⁶ or STAT 255 and 256; or STAT 260 and 261 .................................................. 3.0

Other Courses of Potential Interest (Electives)⁶

- BIOL 215, 230, 307, 321, 322, 335, 360, 361, 400
- BIOL 300A (required for BIOL 360, 361, medical school), 300B (required for BIOL 361, medical school)
- MATH 101, 377, or other MATH courses
- PHIL 100, 201, 203, 220, 460
- EPHE 141, 241B, 341
- 1. BIOL 184 (or 190B), 186 (or 190A) and 225 require a minimum grade of C+ in each.
2. Admission and Graduation Standing requirements for the Honours program are governed by the regulations for the department in which the Honours thesis is taken.
3. Students registering for BIOL 499A, 499B must also take BIOL 460 (Honours Seminar).
4. Students planning to do an Honours thesis or a graduate degree in Psychology are advised to take PSYC 300A and 300B. Students interested in a graduate degree in Psychology are advised to take PSYC 400A and/or 401 as electives.
5. At least 21 units of upper-level courses are required to satisfy university requirements.
6. Students planning to undertake graduate studies in psychology are advised to acquire experience in a research laboratory through paid, volunteer, or Directed Studies positions. Students registering for BIOL 499A/B must also take BIOL 460 (Honours Seminar).

**Biology Co-operative Education Program**

See “Co-operative Education Programs” for the Faculty of Science (page 241). See also the general regulations pertaining to “Undergraduate Co-operative Education” Programs of the University of Victoria governing all co-operative education students (page 59).

**Biology Co-op Program Requirements**

Entry into the Biology Co-operative Education Program is open to students who are enrolled in an Honours or Major Program offered by the Biology department. To qualify for entry and continuation in the Co-operative Education Program, students must be enrolled on a full-time basis and must maintain a B average (5.0) in Biology courses and overall. A minimum of four work terms is required to graduate with Co-op designation. The first work term is undertaken in the Winter or Summer of the second academic year. After the first work term, academic terms and work terms normally alternate. Each work term will be recorded on the student’s academic record and transcript (as COM, N/X or F/X).

Students who are taking double or combined Major degrees programs, who wish to participate in a combined Co-op program, should refer to the regulations for the Faculty of Science “Co-operative Education Programs” found on page 241.

A student may transfer from the Biology Co-operative Education Program to a regular Biology program at any time during an academic term. Applications and further information may be obtained from the UVic website (Biology Co-operative Education Program: <www.uvic.ca/biocoop>) or by contacting the office directly at: 250-721-8637.

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**Department of Chemistry**

Neil Burford, BSc (Wales), PhD (Calgary), FCIC, Professor and Chair of the Department

Cornelia Bohne, BSc, PhD (Sao Paulo), FCIC, PChem, Professor

Alexandre G. Brolo, BSc, MSc (Sao Paulo), PhD (Waterloo), PChem, Professor and Director of CAMTEC

David A. Harrington, BSc (Canterbury), PhD (Auckland), PChem, Professor

Robin G. Hicks, BSc (Dalhousie), PhD (Guelph), Professor and Associate Dean of Science

Fraser Hof, BSc (Alberta) PhD (Scripps), PChem, Professor

Robert Lipson, BSc, MSc, PhD (Toronto), FCIC, Professor and Dean of Science

J. Scott McIndoe, BSc, MSc, PhD (Waiako), Professor

Matthew Moffitt, BSc, PhD (McGill), Professor

Frank C.J.M. van Vegel, MEng, PhD (Twente), Professor

Peter C. Wan, BSc, PhD (Toronto), FCIC, Professor

David J. Berg, BSc (Victoria), PhD (UC-Berkeley), PChem, Associate Professor

Natia Frank, BA (Bard), MSc (UC-Madison), PhD (UC-San Diego), Associate Professor

Dennis K. Hore, BSc (McMaster), PhD (Queens), Associate Professor

Irina Paci, BSc (Al.I.Cuja) BEd, PhD (Queens), Associate Professor

Lisa Rosenberg, BSc (Memorial), PhD (British Columbia), Associate Professor

Jeremy Wulff, BSc (Victoria), PhD (Calgary), PChem, Associate Professor

Katherine Elvira, MSc, PhD (Imperial), Assistant Professor

Lori Aasebo, Secretary

Sean Adams, Scientific Glassblower

Christopher Barr, BSc (Waterloo), MSc (Guelph), Senior Scientific Assistant

Sandra Baskett, BA (Vancouver Island), Graduate Secretary

David E. Berry, BSc (Liverpool), PhD (Bristol), Laboratory Supervisor

Jane Browning, BSc, PhD (Bristol), Scientific Assistant and Senior Laboratory Instructor

Sandra Carlson, BA (Victoria), Department Secretary

Arkady Futerman, BSc, MSc (Ben-Gurion, Israel), BMus (Alaska), Coordinator, Co-operative Education Program

Corrina Ewan, BSc (Victoria), Scientific Assistant

Kelli L. Fawkes, BSc (Victoria), Scientific Assistant and Senior Laboratory Instructor

Ori Granot, BSc, PhD (Tel Aviv), Senior Scientific Assistant

Shubha Hosalli, BEng (Mysore), Electronics Technician

Stanislav Konorov, MSc, PhD (Moscow), Senior Scientific Assistant

Andrew Macdonald, Electronics Technician

Peter Marx, BSc, PhD (British Columbia), PChem, Senior Laboratory Instructor

Rosemary Pulez, BSc (Victoria), Administrative Officer

Monica Reimer, BSc (Calgary), Senior Laboratory Instructor

Alan W. Taylor, BSc, MSc (Victoria), PhD (British Columbia), Senior Laboratory Instructor

**Adjunct Appointments**

Christopher Gill, BSc (Acadia), PhD (British Columbia), Adjunct Associate Professor

Coreen Hamilton, BSc (McGill), PhD (Alberta), Adjunct Associate Professor

Jessie A. Key, BSc (Thompson Rivers), PhD (Alberta), Adjunct Assistant Professor

Eric Krogh, BSc (Toronto), PhD (Victoria), Adjunct Associate Professor

Jeffrey Paci, BSc, MSc (Toronto), PhD (Queens), Adjunct Assistant Professor

**Emeritus Professors**

Walter J. Balfour, BSc (Aberdeen), PhD (McMaster), DSc (Aberdeen), FCIC, Professor Emeritus

Penelope W. Coddington, BSc, PhD (Michigan State), Professor Emerita

Thomas W. Dingle, BSc, PhD (Alberta), Associate Professor Emeritus

Thomas M. Fyles, BSc (Victoria), PhD (York), FCIC, PChem, Professor Emeritus

Terence E. Gough, BSc, PhD (Leicester), FCIC, Professor Emeritus

Alexander D. Kirk, BSc, PhD (Edinburgh), FCIC, Adjunct and Professor Emeritus

Alexander McCauley, BSc, PhD, DSc (Glasgow), CChem, MRS Chem, FCIC, Adjunct and Professor Emeritus

Reginald H. Mitchell, BA, MA, PhD (Cambridge), FCIC, Professor Emeritus

Gerald A. Poulton, BA, PhD (Saskatchewan), Associate Professor Emeritus

Stephen R. Stobart, BSc, PhD (Nottingham), Professor Emeritus

Paul R. West, BSc, PhD (McMaster), FCIC, PChem, Associate Professor Emeritus

**Chemistry General Office**

Phone: 250-721-7152
Fax: 250-721-7147
Email: chem@uvic.ca
Web: <www.uvic.ca/science/chemistry>
CHEMISTRY PROGRAMS

The Department of Chemistry offers a variety of programs leading to the BSc degree. These are intended to provide students with the opportunity of undertaking either specialized studies in Chemistry, or a broader program with Chemistry as a focal point supplemented by other disciplines. These programs provide preparation for a wide range of careers requiring a background in Chemistry.

The Honours and Major Programs are designed for those students wishing to embark on careers as professional chemists. In the Honours degree, a student undertakes an in-depth study of Chemistry with other supporting physical sciences. Each student will participate in a short research project in the final year of study. The Honours Program requires 30 units of Chemistry courses within a total of 60 units for the degree. 4.5 units of Mathematics, 3 units of Physics, 1.5 units of Biochemistry, and 1.5 units of another science are corequisites. On graduation as a chemist, the candidate may either enter employment in a variety of industries or proceed to graduate school and the higher qualifications of MSc and PhD.

The Major Program does not require a research project. The program requires 27 units of Chemistry courses. 4.5 units of Mathematics, 3 units of Physics, 1.5 units of Biochemistry, and 1.5 units of another science are corequisites. The degree is sufficiently specialized to present an attractive background in Chemistry to a prospective employer and to provide the opportunity for students maintaining high averages to continue to graduate school. Both the Honours and Major programs are suitable for students intending to enter a career in teaching at the secondary level.

The Chemistry for the Medical Sciences Program is a BSc Majors Program for students who have a strong interest in Chemistry, but who ultimately plan on entering professional programs in the medical sciences – pharmacy, medical school, dentistry, veterinary medicine, etc. While still providing a rigorous training in Chemistry, the ChemMedSci BSc allows students to customize their degree program more than would be possible in the traditional Chemistry Majors stream. This allows students to better fit into their schedules the non-chemistry offerings that may be required to prepare them for the future professional program of their choice.

A student may complete a Minor in Chemistry by completing the first- and second-year requirements and the third-year Chemistry courses required for the General Program in Chemistry in conjunction with the requirements for an Honours or Major Program offered by another department (which need not be in the Faculty of Science).

The department also offers considerable scope for students wishing to include Chemistry as part of a BSc or BA General Program. Students with this training will frequently find career opportunities in industry, at both the technical and managerial levels, as well as in business, teaching and many other occupations. The influence of Chemistry in modern society is considered in CHEM 300A, a course intended for non-scientists who have successfully completed at least 15 units of university credit.

See “Chemistry Co-operative Education Program”, (page 257).

PROGRAM REQUIREMENTS

Notes on Course Requirements
- Courses may be taken in different sequences and in different years than those indicated provided the corequisite and prerequisite requirements are satisfied. However, students must be extremely careful in planning programs that differ from the normal sequence. Students who do not take CHEM 213 in the second year might find it difficult to complete their program in the normal time period.
- Safety glasses or goggles must be worn by all students in laboratories. Chemistry department laboratory notebooks may be purchased in the University Bookstore.

Course Challenge
The Department of Chemistry does not permit students to receive credit by course challenge.

Credit for Previously Offered Courses
Students with credit in the following courses which are no longer offered may make the specified substitutions in any undergraduate program:

- CHEM 235 for CHEM 232
- CHEM 352 for CHEM 452
- CHEM 353 for CHEM 453

Fourth-year Course Selection
For up-to-date information on fourth-year course offerings, please see the Chemistry department’s website at <www.uvic.ca/science/chemistry> or contact the department at <chem@uvic.ca>.

Honours Programs
Students require the permission of the department to enter an Honours Program and should contact the department in their second year of studies (or later).

To graduate with an Honours degree in Chemistry, students must achieve a graduating GPA of at least 5.5.

Chemistry Program Requirements

Honours Program

<table>
<thead>
<tr>
<th>First Year</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 091 and 101</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 231</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 110 and 111</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
<td>4.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 212, 213, 222, 232, 245</td>
<td>7.5</td>
</tr>
<tr>
<td>One of MATH 200, 202</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>6.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third and Fourth Years</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 299</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 318, 324, 335, 347, 361, 362, 363, 364</td>
<td>12.0</td>
</tr>
<tr>
<td>CHEM 452 and 453</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 499A, 499B</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
<td>10.5</td>
</tr>
</tbody>
</table>

1. For students with Chemistry 11 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
2. For students with Chemistry 12 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
3. CHEM 231 may also be taken in the second year. If CHEM 231 is taken in the second year, an additional 1.5 units of electives should be taken in the first year.
4. Physics requirement may also be satisfied by PHYS 120 and 130.
5. May be replaced by BIOC 300A.
6. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.
## Major Program

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 091 and 101&lt;sup&gt;1&lt;/sup&gt;, or 101&lt;sup&gt;2&lt;/sup&gt;</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 231&lt;sup&gt;3&lt;/sup&gt;</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 110 and 111&lt;sup&gt;4&lt;/sup&gt;</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
<td>4.5</td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 212, 213, 222, 232, 245</td>
<td>7.5</td>
</tr>
<tr>
<td>One of MATH 200, 202</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>6.0</td>
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</table>

### Third and Fourth Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>BIOC 300A and 300B&lt;sup&gt;8&lt;/sup&gt;</td>
<td>3.0</td>
</tr>
<tr>
<td>One of CHEM 212&lt;sup&gt;4&lt;/sup&gt;, 222, 245&lt;sup&gt;5&lt;/sup&gt;</td>
<td>1.5</td>
</tr>
<tr>
<td>Two of CHEM 361&lt;sup&gt;9&lt;/sup&gt;, 362&lt;sup&gt;9&lt;/sup&gt;, 363&lt;sup&gt;9&lt;/sup&gt;, 364&lt;sup&gt;9&lt;/sup&gt;</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 337 and 437</td>
<td>3.0</td>
</tr>
<tr>
<td>Three 300- or 400-level CHEM lecture courses</td>
<td>4.5</td>
</tr>
<tr>
<td>Two of ANTH 250, BIOL 230, ENGL 303, EPHE 141, 155, 241, 242, MICR 200A, BIOL 331, PSYC 251&lt;sup&gt;5,6,7&lt;/sup&gt;</td>
<td>3.0</td>
</tr>
<tr>
<td>Two of ANTH 352, BCMB 301A, 301B, BIOL 432, 436, 439, 447, MEDS 301, 325, 410, MICR 303, 402, STAT 355&lt;sup&gt;5,6,10&lt;/sup&gt;</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives&lt;sup&gt;11,12&lt;/sup&gt;</td>
<td>10.5</td>
</tr>
</tbody>
</table>

**Total 3rd & 4th**                                                 **30.0**

1. For students with Chemistry 11 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
2. For students with Chemistry 12 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
3. Most medical schools require two first year English courses; as a result, students are encouraged to take a second English course at some point of their degree.
4. Students interested in pursuing the co-op option are encouraged to take CHEM 212, and to do so prior to their first work term. This course may also be useful for identifying job opportunities after graduation.
5. Credits for any of these courses will be granted only once per course.
6. Some of these courses may require prerequisites other than those listed as required courses in the ChemMedSci program. Students are advised to check prerequisite requirements well in advance of the year in which they plan to take these courses.
7. PSYC 215A may be taken instead of PSYC 251.
8. BIOC 299 plus one of either BIOC 360 or 361 in lieu of BIOC 300A and 300B may be acceptable. Students planning on this option need to consult with the Program Adviser.
9. 0.75 unit laboratory course. Two must be taken in which the course content differs for a total of 1.5 units.
10. In any given year, some of these courses may not be offered, or may be restricted to students in a specialized program of study. In this event, additional 300- or 400-level courses may be substituted, with the permission of the Chemistry Department.
11. A total of 21 units of 300- and 400-level courses are required for graduation.
12. Students planning on a career in chemistry involving additional graduate study or accreditation as a Professional Chemist are advised to take at least one additional 1.5 units of Chemistry courses numbered 300 or higher as part of their program electives in the third and fourth year.

## Major Program in Chemistry for the Medical Sciences

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 091, 101, 102&lt;sup&gt;1&lt;/sup&gt;; or 101, 102&lt;sup&gt;2&lt;/sup&gt;</td>
<td>3.0</td>
</tr>
<tr>
<td>BIOL 184, 186</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 102; or 102A and 102B; or 110 and 111 or 120 and 130</td>
<td>3.0</td>
</tr>
<tr>
<td>One of ENGL 135, 146, 147&lt;sup&gt;3&lt;/sup&gt;</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>1.5</td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 213</td>
<td>1.5</td>
</tr>
<tr>
<td>One of CHEM 212&lt;sup&gt;4&lt;/sup&gt;, 222, 245&lt;sup&gt;5&lt;/sup&gt;</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 231, 232</td>
<td>3.0</td>
</tr>
<tr>
<td>BIOL 225</td>
<td>1.5</td>
</tr>
<tr>
<td>STAT 255 or 260</td>
<td>1.5</td>
</tr>
<tr>
<td>Two of ANTH 250, BIOL 230, ENGL 303, EPHE 141, 155, 241, 242, MICR 200A, 200B, PHIL 331, PSYC 251&lt;sup&gt;5,6,7&lt;/sup&gt;</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
<td>3.0</td>
</tr>
</tbody>
</table>

## General and Minor Programs

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 091 and 101&lt;sup&gt;1&lt;/sup&gt;, or 101&lt;sup&gt;2&lt;/sup&gt;</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 110 and 111&lt;sup&gt;3&lt;/sup&gt;</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives&lt;sup&gt;4&lt;/sup&gt;</td>
<td>6.0</td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 212, 213, 222, 231, 232, 245</td>
<td>9.0</td>
</tr>
<tr>
<td>Electives</td>
<td>6.0</td>
</tr>
</tbody>
</table>
Third and Fourth Years

6 units of additional Chemistry lecture courses numbered above 300, plus two of 361, 362,
363, 364 ................................................................. 9.0
Electives ................................................................. 21.0

1. For students with Chemistry 11 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
2. For students with Chemistry 12 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
3. Physics requirement may also be satisfied by PHYS 120 and 130.
4. CHEM 231 may also be taken in the second term of first year, and 1.5 units of these electives postponed.
5. Must include 9.0 units of 300 level or above in a second area of concentration for the General program.
6. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.

Combined Chemistry and Biochemistry or Microbiology

Program Requirements

Students may obtain a Combined Major in Chemistry and Biochemistry or Chemistry and Microbiology.

Combined Major in Chemistry and Biochemistry

First Year

BIOL 186 ................................................................. 1.5
CHEM 091 and 101, or 101 ........................................... 1.5
CHEM 102 ............................................................ 1.5
MATH 100 or 109, 101 .................................................. 3.0
PHYS 110 and 111 ................................................... 3.0
Electives ................................................................. 4.5

Second Year

BIOL 225 ................................................................. 1.5
CHEM 212, 213, 222, 231, 232, 245 .................................. 9.0
MICR 200A and 200B .................................................. 3.0
STAT 255 or 260 ..................................................... 1.5

Third and Fourth Years

BCMB 301A, 301B ..................................................... 3.0
BCMB 406A, 406B ..................................................... 3.0
MICR 302, 303 .......................................................... 3.0
Two of MICR 402, 405, 408 ........................................... 3.0
E electives ................................................................. 6.0

1. For students with Chemistry 11 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
2. For students with Chemistry 12 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
3. Physics requirement may also be satisfied by PHYS 120 and 130.
4. CHEM 231 may be taken in the second term of the first year, and 1.5 units of these electives postponed.
5. BIOL 225 may be taken in the third year as a corequisite to BCMB 300A and 300B.
   Alternatively, CHEM 245 may be deferred to the Fall term of the third year.

Combined Chemistry and Mathematics Program

Requirements

For a BSc degree in the Combined Chemistry and Mathematics Program students may take a Major or Honours Program. These programs are not joint degrees in Chemistry and Mathematics, but a single degree program composed of a selected combination of courses from each of the departments.

Students opting for either of these combined programs must contact the Departments of Chemistry and Mathematics and Statistics. Each student will be assigned an adviser from each of these departments. Students considering proceeding to graduate work in either Chemistry or Mathematics must consult with their adviser prior to making their final choice of courses.

Honours Program in Chemistry and Mathematics

First and Second Years

CHEM 091 and 101, or 101 ........................................... 1.5
Combined Chemistry and Earth and Ocean Sciences Program Requirements

Both Majors and Honours BSc degrees are offered in the Combined Chemistry and Earth and Ocean Sciences Program. This program exposes students to the fields of geochemistry and chemical oceanography while providing a firm basis in the principles of chemistry. Students considering this program must contact the Chemistry department and the School of Earth and Ocean Sciences where an adviser from each discipline will be assigned. Students considering graduate studies in either Chemistry or Earth and Ocean Sciences must consult with their adviser from the appropriate discipline before making their final choices of courses.

Honours Program in Chemistry and Earth and Ocean Sciences

First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 091, 101, 102, 103</td>
<td>3.0</td>
</tr>
<tr>
<td>EOS 110, 120</td>
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<td>MATH 100 or 109, 101</td>
<td>3.0</td>
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<tr>
<td>PHYS 110 and 111</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
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</tbody>
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Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 212, 213, 222, 231, 245</td>
<td>7.5</td>
</tr>
<tr>
<td>EOS 201, 205, 240</td>
<td>4.5</td>
</tr>
<tr>
<td>EOS 202 or 260</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 202</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Third and Fourth Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 299</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 347, 452, 453</td>
<td>4.5</td>
</tr>
<tr>
<td>Two of CHEM 318, 324, 335, 361, 362, 363, 364</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 499A, 499B</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 301, 312</td>
<td>3.0</td>
</tr>
<tr>
<td>at least two of which must be numbered 400 or higher</td>
<td></td>
</tr>
<tr>
<td>STAT 355 or 359</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>7.5</td>
</tr>
</tbody>
</table>

1. For students with Chemistry 11 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
2. For students with Chemistry 12 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
3. Physics requirement may also be satisfied by PHYS 120 and 130.
4. May be replaced by BIOC 300A.
5. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.

Program Requirements

Combined Chemistry and Earth and Ocean Sciences

Major Program in Chemistry and Mathematics

First and Second Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>CHEM 102, 212, 213, 222, 231, 232, 245</td>
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Third and Fourth Years

<table>
<thead>
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<th>Course</th>
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<tbody>
<tr>
<td>BIOC 299</td>
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<tr>
<td>CHEM 347, 452, 453</td>
<td>4.5</td>
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<tr>
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<tr>
<td>at least two of which must be numbered 400 or higher</td>
<td></td>
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<tr>
<td>STAT 355 or 359</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>7.5</td>
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</tbody>
</table>

1. For students with Chemistry 11 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
2. For students with Chemistry 12 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
3. Physics requirement may also be satisfied by PHYS 120 and 130.
4. May be replaced by BIOC 300A.
5. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.

Electives

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
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Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>MATH 100 or 109, 101</td>
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<tr>
<td>PHYS 110 and 111</td>
<td>3.0</td>
</tr>
<tr>
<td>STAT 260</td>
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Third and Fourth Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>BIOC 299</td>
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</tr>
<tr>
<td>CHEM 347, 452, 453</td>
<td>4.5</td>
</tr>
<tr>
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<tr>
<td>CHEM course numbered 300 or higher</td>
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<tr>
<td>MATH 301, 312</td>
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</tr>
<tr>
<td>Two of MATH 322, 335, 342, 346, 365, 377, 379, STAT 355 or 359</td>
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</tr>
<tr>
<td>MATH course numbered 400 or higher</td>
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<tr>
<td>Electives</td>
<td>10.5</td>
</tr>
</tbody>
</table>

1. For students with Chemistry 11 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
2. For students with Chemistry 12 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
3. Physics requirement may also be satisfied by PHYS 120 and 130.
4. May be replaced by BIOC 300A.
5. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.

Major Program in Chemistry and Earth and Ocean Sciences

First Year

<table>
<thead>
<tr>
<th>Course</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CHEM 091, 101, 102, 103</td>
<td>3.0</td>
</tr>
<tr>
<td>EOS 110, 120</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
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<tr>
<td>PHYS 110 and 111</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
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Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 212, 213, 222, 231, 245</td>
<td>7.5</td>
</tr>
<tr>
<td>EOS 201, 205, 240</td>
<td>4.5</td>
</tr>
<tr>
<td>EOS 202 or 260</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 202</td>
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Third and Fourth Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>BIOC 299</td>
<td>1.5</td>
</tr>
<tr>
<td>Four of CHEM 232, 318, 324, 347, 452, 453</td>
<td>6.0</td>
</tr>
<tr>
<td>Two of CHEM 361, 362, 363, 364</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 499A, 499B</td>
<td>3.0</td>
</tr>
<tr>
<td>EOS 225, STAT 255 (or 260)</td>
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<tr>
<td>EOS 300 or 460</td>
<td>1.5</td>
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<tr>
<td>EOS 316, 335, 403, 425</td>
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<tr>
<td>EOS 340 or 410</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Total 3rd & 4th                                                        30.0   

1. CHEM 150 may be taken instead of CHEM 101.
2. For students with Chemistry 11 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
3. For students with Chemistry 12 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
4. Physics requirement may also be satisfied by PHYS 120 and 130.
5. EOS 202 and 300 are recommended for students interested in geologic field studies (202 is prerequisite for 300); EOS 260 and 460 are recommended for students interested in biosphere evolution (260 is prerequisite for 460).
6. May be replaced by BIOC 300A.
7. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.
First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EOS 110, 120</td>
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<tr>
<td>MATH 100 or 109, 101</td>
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<tr>
<td>PHYS 110 and 111</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
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</tbody>
</table>

Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>CHEM 212, 213, 222, 231, 245</td>
<td>7.5</td>
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<tr>
<td>EOS 201, 205, 240</td>
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<td>1.5</td>
</tr>
<tr>
<td>MATH 202</td>
<td>1.5</td>
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Third and Fourth Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>BIOC 299</td>
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<tr>
<td>Four of CHEM 232, 318, 324, 347, 452, 453</td>
<td>6.0</td>
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<tr>
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<td>3.0</td>
</tr>
<tr>
<td>EOS 225, STAT 255 (or 260)</td>
<td>3.0</td>
</tr>
<tr>
<td>EOS 300 or 460</td>
<td>1.5</td>
</tr>
<tr>
<td>EOS 316, 335, 403, 425</td>
<td>6.0</td>
</tr>
<tr>
<td>EOS 340 or 410</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Total 3rd & 4th .................................................. 30.0

1. CHEM 150 may be taken instead of CHEM 101.
2. For students with Chemistry 11 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
3. For students with Chemistry 12 and Principles of Mathematics 12 or Pre-Calculus 12 or equivalents.
4. Physics requirement may also be satisfied by PHYS 120 and 130.
5. EOS 202 and 300 are recommended for students interested in geologic field studies (202 is prerequisite for 300); EOS 260 and 460 are recommended for students interested in biosphere evolution (260 is prerequisite for 460).
6. May be replaced by BIOC 300A.
7. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.
8. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.

Chemistry Co-operative Education Program

See “Co-operative Education Programs” for the Faculty of Science (page 241). See also the general regulations pertaining to “Undergraduate Co-operative Education” Programs of the University of Victoria governing all co-operative education students (page 59).

Chemistry Co-op Program Requirements

To enter and remain in the Chemistry Co-operative Education Program, students must normally maintain a GPA of 4.5 in Chemistry courses and overall. Students are also required to complete satisfactorily a minimum of four work terms. A student may at any time during an academic term transfer from the Chemistry Co-operative Education Program to a regular Chemistry program.

Students in the Co-op program may commence work terms after one full year of course work, and normally will alternate terms of academic study and work experience, with the following conditions:
1. Students’ work terms should include work with at least three different employers.
2. Two consecutive work terms (totaling 8 months) may be included with permission.

3. Two of the work terms must be subsequent to the student passing all required 100- and 200-level chemistry courses and 3.0 units of third-year chemistry courses.

Students who do not take CHEM 213 in the second year might find it difficult to complete their program in the normal time period.

Each work term is recorded on the student’s academic record and transcript (as COM, N/X or F/X). Some employers keep work term reports confidential, but at least two work term reports must be evaluated as satisfactory by the department in order to complete the program.

Students who are taking double or combined Major degrees programs, who wish to participate in a combined Co-op program, should refer to the regulations for the Faculty of Science “Co-operative Education Programs” found on page 241.

Applications and further information about the Co-operative Education Program in Chemistry are available from the department or at <www.uvic.ca/chemcoop>.

School of Earth and Ocean Sciences

Dante Canil, BSc (Windsor), PhD (Alta), FRSC, Professor
Laurence Coogan, BSc (Liverpool), PhD (Leicester), Professor
Jay Cullen, BSc (McGill), PhD (Rutgers), Professor
Stanley E. Dosso, BSc, MSc (UVic), PhD (UBC), Professor and Director of the School
John F. Dower, BSc (Memorial), PhD (UVic), Professor
Kathryn M. Gillis, BSc (Queen’s), PhD (Dal), Professor and Associate Dean of Science
S. Kim Juniper, BSc (Alta), PhD (Canterbury), Professor (BC Leadership Chair) and Chief Scientist, Ocean Networks Canada
Adam Monahan, BSc (Calg), MSc, PhD (UBC), Professor
Thomas F. Pedersen, BSc (UBC), PhD (Edin), FRSC, FANG, Professor
Vera Pospelova, PhD (McGill), Professor
Verena J. Tunnicliffe, BSc (McM), M Phil, PhD (Yale), FRSC, Professor (Canada Research Chair)
Andrew J. Weaver, BSc (UVic), PhD (UBC), FRSC, Professor
Michael J. Whiticar, BSc (UBC), PhD (Christian Albrechts), Professor
Colin Goldblatt, BSc, PhD (East Anglia), Associate Professor
Roberta C. Hamme, BA (Pomona), MSc, PhD (Wash), Associate Professor (Canada Research Chair)
Jody M. Klymak, BSc (UVic), MSc, PhD (Wash), Associate Professor
Diana E. Varela, BSc (UNS, Arg), MA (Boston), PhD (UBC), Associate Professor
Lucinda Leonard, BA (Trinity), PhD (UVic), Assistant Professor Limited Term

Professional Staff

Diane Luszniak, BSc (UVic), PhD (Nottingham)
Duncan Johannessen, BSc (UBC), MSc (Dalhousie), Senior Laboratory Instructor
David Nelles, BSc (UBC), Senior Laboratory Instructor
Terry Russell, BA (UVic), Administrative Officer
Jody Spence, BSc, PhD (UVic), Senior Scientific Assistant - ICP-MS and Geochemistry Facilities
Sarah Thornton, BSc (UBC), MSc (Alaska), Senior Laboratory Instructor
Ed Wiebe, BSc, MSc (UVic), Scientific Assistant

Visiting, Adjunct and Limited Term Appointments

Kristin Morell, BSc (Wellesley), MSc, PhD (Penn State), Adjunct Assistant Professor
The School offers the following BSc degree programs:

**EARTH AND OCEAN SCIENCES PROGRAMS**

- **General, Minor, Major and Honours in Earth Sciences**
- **Combined Major and Honours in Physics and Earth Sciences (Geophysics)**
- **Combined Major and Honours in Physics and Ocean Sciences (Ocean-Atmosphere Dynamics)**
- **Combined Major and Honours in Chemistry and Earth and Ocean Sciences**
- **Combined Major and Honours in Physical Geography and Earth and Ocean Sciences**
- **Combined Major and Honours in Biology and Earth and Ocean Sciences**
- **Minor in Ocean Sciences**

The Earth Sciences programs require a core of earth sciences courses, corequisite courses in the other sciences, and a selection of electives suited to the interests of individual students.

Combined Honours and Major programs offered in collaboration with the Department of Physics and Astronomy provide specialization in either Geophysics or Ocean-Atmosphere Dynamics and allow students to apply basic principles of physics and mathematics to fundamental global processes affecting the earth and oceans.

Combined Honours and Major programs offered in collaboration with the Department of Chemistry expose students to the fields of geochemistry while providing a firm basis in the principles of chemistry.

Combined Honours and Major programs offered in collaboration with the Department of Geography are aimed at students whose interests span the fields of physical geography and earth sciences.

Combined Honours and Major programs offered in collaboration with the Department of Biology offer students the opportunity to combine interests in both disciplines.

Students may take a Minor Program in Earth and Ocean Sciences along with a Major or Honours Program in another discipline. Such interdisciplinary programs may be advantageous to students considering a postgraduate degree in Environmental Studies, Geophysics, Geography, Oceanography, Atmospheric Sciences or Education. Students intending
to pursue research or continue their studies for MSc or PhD degrees should consider the Honours Programs.

The distinctive character of the BSc General Program is the breadth of course options possible. Students in this program combine a concentration in earth sciences with one in another science area (BSc) or an arts area (BA).

The Minor in Ocean Sciences is intended to provide students with a broad overview of oceanography, focusing on its essentially interdisciplinary nature.

**Professional Registration**

Completion of the Earth Science Honours or Major program, with an appropriate selection of courses (including a geomorphology elective), is intended to fulfill the academic requirements for designation as a Professional Geoscientist (PGeo) under the discipline of Geology from the Association of Professional Engineers and Geoscientists of BC (APEGBC). The Combined Physical Geography and Earth and Ocean Science program, with an appropriate selection of courses, is intended to fulfill the APEGBC academic requirements for PGeo. Designation under the discipline of Environmental Geoscientist. APEGBC has requirements of students beyond course work, and reserves the right to set standards and change requirements at any time. Therefore, the School of Earth and Ocean Sciences, Department of Geography, and University of Victoria assume no responsibility for students’ acceptance into APEGBC during or after completion of their program. For more information, see the SEOS website <www.uvic.ca/science/seos/undergrad/programs/apeg> and the APEGBC website <www.apeg.bc.ca>.

See “School of Earth and Ocean Sciences Co-operative Education Program” (page 265).

**Program Requirements**

**Course Availability and Information**

Students should consult the School concerning courses offered in any particular year. Some fourth-year courses are offered in alternate years.

The names of course instructors, together with the required and recommended texts for each course, are available from the School.

**Field Courses**

Earth Sciences 300 and 400 are scheduled outside of the normal term time at off-campus locations on dates specified by the School. Students are required to meet part of the expenses involved and will be advised of such expenses during the Fall term. Students should contact the School for further information.

**Honours Programs**

Students will normally apply for admission to the SEOS Honours Program at the end of the third year of their undergraduate Earth Sciences Program or combined program, although they may apply as early as the end of their second year and as late as the beginning of their last year. The general requirement for admission to the Honours Program is a cumulative GPA of 5.5 in 200-, 300-, and 400-level courses at the time of application.

**Honours Graduation Standing**

An Honours degree requires:

- a graduating GPA of at least 5.5
- minimum grade of B+ in EOS 499A and 499B

If a student fails to meet the standards for the Honours degree, while meeting the Major degree requirements, the student may graduate with the appropriate Major degree.

**Minor in Ocean Sciences**

A student may declare a Minor in Ocean Sciences when enrolled in an Honours, Major, or General Program offered by SEOS or another department or school (which need not be in the Faculty of Science), along with the following courses:

- EOS/GEOG 120 and one of EOS/GEOG 110, EOS 340, 365
- EOS 311, 312, 313, 314
- Two of EOS 315, 403, 408, 410, 425, 431, 433, 445; BIOL 319, 322, 335, 446; PHYS 426; EOS 490 or BIOL 490D or 3 units from a 400-level MRNE course offered through the Bamfield Marine Sciences Centre may be taken provided an appropriate oceans-related topic is chosen and with permission of department.

Students normally consult the School’s Ocean Science Adviser before admission to the Ocean Science Minor Program at the end of the first or second year of their undergraduate program.

**Earth Sciences Program Requirements**

**Honours in Earth Sciences**

**First Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
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<td>BIOL 150A or 184 or 190A</td>
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</tr>
<tr>
<td>CHEM 101, 102</td>
<td>3.0</td>
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<td>PHYS 110 and 111</td>
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<td>1.5</td>
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<tr>
<td><strong>Total</strong></td>
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**Second Year**

<table>
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<th>Credits</th>
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<tr>
<td>STAT 255 or 260</td>
<td>1.5</td>
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<tr>
<td>Electives</td>
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<tr>
<td><strong>Total</strong></td>
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**Third Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
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<td>Electives</td>
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<td><strong>Total</strong></td>
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**Fourth Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>EOS 499A, 499B</td>
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<tr>
<td>EOS upper-level electives</td>
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<tr>
<td>EOS 400-level elective</td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>

1. Students who have completed Biology 11 and 12 should take BIOL 184.
2. CHEM 150 may be taken instead of CHEM 101.
3. Physics requirement may also be satisfied by PHYS 102 and 110, or PHYS 102A and 102B and 110, or PHYS 120 and 130.
4. Students should consider taking BIOL 215 as one of their electives.
5. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.
Major in Earth Sciences

First Year

BIOL 150A or 184 or 190A1 ................................................................. 1.5
CHEM 101, 102 .................................................................................. 3.0
EOS 110, 120 .................................................................................... 3.0
MATH 100 or 109, 101 ..................................................................... 3.0
PHYS 110 and 1113 .......................................................................... 3.0
Electives .......................................................................................... 1.5
Total .............................................................................................. 15.0

Second Year

CHEM 245 ......................................................................................... 1.5
EOS 201, 202, 205, 210, 240 ........................................................... 9.0
MATH 202 ......................................................................................... 1.5
STAT 255 or 260 ............................................................................. 1.5
Electives .......................................................................................... 1.5
Total .............................................................................................. 15.0

Third Year

EOS 225, 300, 316, 330, 335, 340 ..................................................... 9.0
Two of EOS 3114, 312, 313, 314, 4085, 4255, 431, 4335 ..................... 3.0
Electives .......................................................................................... 3.0
Total .............................................................................................. 15.0

Fourth Year

EOS 400, 460 ..................................................................................... 3.0
EOS 400-level8 elective ..................................................................... 1.5
Electives .......................................................................................... 10.5
Total .............................................................................................. 15.0

1. Students who have completed Biology 11 and 12 should take BIOL 184.
2. CHEM 150 may be taken instead of CHEM 101.
3. Physics requirement may also be satisfied by PHYS 102 and 110, or PHYS 102A and 102B and 110, or PHYS 120 and 130.
4. Students should consider taking BIOL 215 as one of their electives.
5. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.

General and Minor in Earth Sciences

The School of Earth and Ocean Sciences General and Minor Program is designed to offer a flexible program with maximum choice for students with a general interest in Earth Sciences. Students interested in a professional career or graduate studies in the field are strongly advised to take the Honours or Major Program.

First Year

CHEM 1011, 102 .............................................................................. 3.0
EOS 110, 120 .................................................................................. 3.0
MATH 100 or 109, 101 .................................................................. 3.0
PHYS 102; or PHYS 102A and 102B; or 110 and 111; or 120 and 130 .... 3.0
Electives .......................................................................................... 3.0
Total .............................................................................................. 15.0

Second Year

CHEM 245 ......................................................................................... 1.5
EOS 201, 202, 205, 240 .............................................................. 6.0
Electives ......................................................................................... 7.5
Total .............................................................................................. 15.0

Third and Fourth Years

EOS Electives ................................................................................ 9.0
Electives2, 3 .................................................................................. 21.0
Total .............................................................................................. 30.0

1. CHEM 150 may be taken instead of CHEM 101.
2. In choosing electives, it is recommended that students consider the prerequisite requirements for EOS electives in Years 3 and 4.
3. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.
4. Must include 9.0 units of 300 level or above in a second area of concentration for the General Program.

Combined Physics and Earth Sciences (Geophysics)

Program Requirements

Admission to the Combined Physics and Earth Sciences (Geophysics) Program requires the permission of both the Department of Physics and Astronomy and the School of Earth and Ocean Sciences.

Combined Honours in Physics and Earth Sciences (Geophysics)

First Year

CHEM 1011, 102 .............................................................................. 3.0
CSC 110 or 111 ............................................................................... 1.5
EOS 110, 120 .................................................................................. 3.0
MATH 100 or 109, 101 .................................................................. 3.0
PHYS 120 and 130; or 110 and 111 .................................................. 3.0
Electives ......................................................................................... 1.5
Total .............................................................................................. 15.0

Second Year

EOS 201, 202, 205 ................................................................. 4.5
EOS 210 or PHYS 210 ................................................................. 1.5
MATH 200, 204, 211 ................................................................. 4.5
PHYS 216, 229, 248 ................................................................. 4.5
Total .............................................................................................. 15.0

Third Year

EOS 300 .......................................................................................... 1.5
EOS 427 or PHYS 427 or electives2, 3 ............................................. 1.5
MATH 342, 346 ............................................................................... 3.0
MATH breadth electives4 ................................................................ 1.5
Electives2 ......................................................................................... 1.5
Total .............................................................................................. 16.5
### Fourth Year

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>EOS 410, 480</td>
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<tr>
<td>EOS 427 or PHYS 427 or electives(^{2,3})</td>
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<tr>
<td>EOS 499A, 499B; or PHYS 429A, 499</td>
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<tr>
<td>PHYS 460A and 460B</td>
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<tr>
<td>EOS or PHYS electives(^{2,3,5})</td>
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<td><strong>Total</strong></td>
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</table>

1. CHEM 150 may be taken instead of CHEM 101.
2. In choosing these electives, it is recommended that students consider the prerequisite requirements for EOS or PHYS electives in Year 4.
3. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered. One of EOS 427 or PHYS 427 is required in the program, and may be taken in either third or fourth year.
4. Chosen from courses listed in Note 7 in the Notes on Course Requirements in Physics and Astronomy’s Program Requirements.
5. Chosen from EOS and PHYS courses numbered 300 and above.

**Combined Major in Physics and Earth Sciences (Geophysics)**

#### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHEM 101(^1), 102</td>
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<td>CSC 110 or 111</td>
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<td>EOS 110, 120</td>
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<td>MATH 100 or 109, 101</td>
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<tr>
<td>PHYS 120 and 130; or 110 and 111</td>
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<td>Electives</td>
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#### Second Year

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<tbody>
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<td>MATH 200, 204, 211</td>
<td>4.5</td>
</tr>
<tr>
<td>PHYS 216, 229, 248</td>
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<tr>
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#### Third Year

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<tbody>
<tr>
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</tr>
<tr>
<td>MATH 342, 346</td>
<td>3.0</td>
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<tr>
<td>PHYS 215, 317, 321A, 325, 326</td>
<td>7.5</td>
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<tr>
<td>Electives(^2)</td>
<td>1.5</td>
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<tr>
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#### Fourth Year

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<tbody>
<tr>
<td>EOS 410, 480</td>
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<td>EOS 427 or PHYS 427 or electives(^{2,3})</td>
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</tr>
<tr>
<td>MATH breadth electives(^4)</td>
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<tr>
<td>PHYS 323, 411</td>
<td>3.0</td>
</tr>
<tr>
<td>EOS or PHYS electives(^{2,3,5})</td>
<td>4.5</td>
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<tr>
<td>Electives</td>
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<td><strong>Total</strong></td>
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**Combined Physics and Ocean Sciences (Ocean-Atmosphere Dynamics) Program Requirements**

Admission to the Combined Physics and Ocean Sciences (Ocean-Atmosphere Dynamics) Program requires the permission of both the Department of Physics and Astronomy and the School of Earth and Ocean Sciences.

**Combined Honours in Physics and Ocean Sciences (Ocean-Atmosphere Dynamics)**

#### First Year

<table>
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<tbody>
<tr>
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<tr>
<td>EOS 110, 120</td>
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<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 120 and 130; or 110 and 111</td>
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<tr>
<td>Electives</td>
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<tr>
<td><strong>Total</strong></td>
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#### Second Year

<table>
<thead>
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<tbody>
<tr>
<td>EOS 340</td>
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<tr>
<td>MATH 200, 204, 211</td>
<td>4.5</td>
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<tr>
<td>PHYS 215, 216, 229, 248</td>
<td>6.0</td>
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<td>Electives(^2)</td>
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<tr>
<td><strong>Total</strong></td>
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#### Third Year

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<tr>
<td>PHYS 317, 321A, 323, 325, 326</td>
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<tr>
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#### Fourth Year

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<td>PHYS 460A and 460B</td>
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<td>PHYS 321B, 410, 411, 422, 426</td>
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<td>EOS electives(^4)</td>
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<td>PHYS electives(^5)</td>
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Combined Major in Physics and Ocean Sciences (Ocean-Atmosphere Dynamics)

**First Year**

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<td>PHYS 110 and 111</td>
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**Second Year**

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<th>Course</th>
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<tbody>
<tr>
<td>EOS 340</td>
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<td>4.5</td>
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<tr>
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<tr>
<td>Electives</td>
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**Third Year**

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<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>MATH 342, 346</td>
<td>3.0</td>
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<tr>
<td>MATH breadth electives</td>
<td>3.0</td>
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<td>PHYS 317, 321A, 325, 326</td>
<td>6.0</td>
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<tr>
<td>Electives</td>
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**Fourth Year**

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<th>Course</th>
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<tbody>
<tr>
<td>EOS 431, 433</td>
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<td>PHYS 323, 411, 426</td>
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<td>Electives</td>
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<td><strong>Total</strong></td>
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Combined Chemistry and Earth and Ocean Sciences Program Requirements

**Combined Honours in Chemistry and Earth and Ocean Sciences**

Admission into the Combined Honours Chemistry and Earth and Ocean Sciences Program requires the permission of both the Department of Chemistry and the School of Earth and Ocean Sciences.

**First Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>CHEM 091, 101, 102, or 101, 102</td>
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</tr>
<tr>
<td>EOS 110, 120</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 100 or 109, 101</td>
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<tr>
<td>PHYS 110 and 111</td>
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<tr>
<td>Electives</td>
<td>3.0</td>
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<tr>
<td><strong>Total</strong></td>
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**Second Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 212, 213, 222, 231, 245</td>
<td>7.5</td>
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<tr>
<td>EOS 201, 205, 240</td>
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<td>EOS 202 or 260</td>
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<td>MATH 202</td>
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**Third and Fourth Years**

<table>
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<td>Two of CHEM 361, 362, 363, 364</td>
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<tr>
<td>EOS 300 or 460</td>
<td>1.5</td>
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<tr>
<td>EOS 225, 316, 335, 403, 425</td>
<td>7.5</td>
</tr>
<tr>
<td>EOS 340 or 410</td>
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<tr>
<td>EOS 499A, 499B or CHEM 499A, 499B</td>
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<tr>
<td>STAT 255 or 260</td>
<td>1.5</td>
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<td>Electives</td>
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<td><strong>Total</strong></td>
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</tbody>
</table>

1. CHEM 150 may be taken instead of CHEM 101.
2. For students with Chemistry 11 and Pre-Calculus 12 or equivalents.
3. For students with Chemistry 12 and Pre-Calculus 12 or equivalents.
4. Physics requirement may also be satisfied by PHYS 120 and 130.
5. EOS 202 and 300 are recommended for students interested in geologic field studies (202 is prerequisite for 300); EOS 260 and 460 are recommended for students interested in biosphere evolution (260 is prerequisite for 460).
6. May be replaced by BIOC 300A.
7. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.
8. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.

Combined Major in Chemistry and Earth and Ocean Sciences

**First Year**

<table>
<thead>
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<th>Course</th>
<th>Units</th>
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<tbody>
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<td>CHEM 091, 101, 102, or 101, 102</td>
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<tr>
<td>EOS 110, 120</td>
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<td>MATH 100 or 109, 101</td>
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<td>PHYS 110 and 111</td>
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### First Year

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<tbody>
<tr>
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<td><strong>Total</strong></td>
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### Second Year

<table>
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<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>CHEM 212, 213, 221, 231, 245</td>
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<tr>
<td>EOS 201, 205, 240</td>
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<td>EOS 202 or 260&lt;sup&gt;5&lt;/sup&gt;</td>
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### Third and Fourth Years

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<tr>
<td>BIOC 299&lt;sup&gt;6&lt;/sup&gt;</td>
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<tr>
<td>Four of CHEM 232, 318, 324, 452, 453</td>
<td>6.0</td>
</tr>
<tr>
<td>Two of CHEM 361&lt;sup&gt;7&lt;/sup&gt;, 362&lt;sup&gt;7&lt;/sup&gt;, 363&lt;sup&gt;7&lt;/sup&gt;, 364&lt;sup&gt;7&lt;/sup&gt;</td>
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<td>EOS 300 or 460&lt;sup&gt;5&lt;/sup&gt;</td>
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<td>EOS 225, 316, 335, 403&lt;sup&gt;6&lt;/sup&gt;, 425&lt;sup&gt;6&lt;/sup&gt;</td>
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<td>EOS 340 or 410</td>
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<tr>
<td>Electives</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>30.0</strong></td>
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1. CHEM 150 may be taken instead of CHEM 101.
2. For students with Chemistry 11 and Pre-Calculus 12 or equivalents.
3. For students with Chemistry 12 and Pre-Calculus 12 or equivalents.
4. Physics requirement may also be satisfied by PHYS 120 and 130.
5. EOS 202 and 300 are recommended for students interested in geologic field studies (202 is prerequisite for 300); EOS 260 and 460 are recommended for students interested in biosphere evolution (260 is prerequisite for 460).
6. May be replaced by BIOC 300A.
7. This 0.75 unit laboratory course must be taken twice, over two terms in which the course content differs, for a total of 1.5 units.
8. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.

### Combined Geography and Earth and Ocean Sciences Program Requirements

Students intending to pursue this combined program must consult with the Undergraduate Adviser in either the School of Earth and Ocean Sciences or the Department of Geography after completing first-year requirements.

### Combined Honours in Physical Geography and Earth and Ocean Sciences

Admission to the Combined Honours Geography and Earth and Ocean Sciences Program requires the permission of both the Department of Geography and the School of Earth and Ocean Sciences.

#### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101&lt;sup&gt;1&lt;/sup&gt;, 102</td>
<td>3.0</td>
</tr>
<tr>
<td>EOS 110, 120</td>
<td>3.0</td>
</tr>
<tr>
<td>GEOG 101A</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 110 and 111&lt;sup&gt;2&lt;/sup&gt;</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15.0</strong></td>
</tr>
</tbody>
</table>

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1. CHEM 150 may be taken instead of CHEM 101.
2. Physics requirement may also be satisfied by PHYS 102 and 110; or PHYS 102A and 102B and 110; or PHYS 120 and 130.
3. GEOG 226, STAT 255 and 260: Students who already have credit for an introductory statistics course numbered 200 or above from another academic unit must consult with a Geography or SEOS Undergraduate Adviser before registering in either GEOG 226, STAT 255, 260. See “Credit Limit—Beginning Level Statistics Courses” (page 42).
4. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.

### Combined Major in Physical Geography and Earth and Ocean Sciences

#### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 245</td>
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</tr>
<tr>
<td>EOS 201, 202, 205, 210, 240</td>
<td>7.5</td>
</tr>
<tr>
<td>GEOG 222</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 202</td>
<td>1.5</td>
</tr>
<tr>
<td>One of STAT 255, 260, GEOG 226&lt;sup&gt;3&lt;/sup&gt;</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15.0</strong></td>
</tr>
</tbody>
</table>

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2. May be replaced by BIOC 300A.
3. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.
### Third and Fourth Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EOS 225, 316, 340</td>
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</tr>
<tr>
<td>EOS 300 or GEOG 477</td>
<td>1.5</td>
</tr>
<tr>
<td>EOS 450 or GEOG 476</td>
<td>1.5</td>
</tr>
<tr>
<td>Two of EOS 335, 410, 425, 480</td>
<td>3.0</td>
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<tr>
<td>GEOG 228, 370, 376</td>
<td>4.5</td>
</tr>
<tr>
<td>Two of GEOG 319, 322, 325, 328</td>
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</tr>
<tr>
<td>Upper-level EOS or GEOG electives</td>
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<td>Electives</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>30.0</strong></td>
</tr>
</tbody>
</table>

1. CHEM 150 may be taken instead of CHEM 101.
2. Physics requirement may also be satisfied by PHYS 102 and 110; or PHYS 102A and 102B and 110; or PHYS 120 and 130.
3. GEOG 226, STAT 255 and 260: Students who already have credit for an introductory statistics course numbered 200 or above from another academic unit must consult with a Geography or SEOS Undergraduate Adviser before registering in either GEOG 226, STAT 255, STAT 260. See “Credit Limit—Beginning Level Statistics Courses” (page 42).
4. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.

### Combined Biology and Earth and Ocean Sciences Program Requirements

#### Notes on Course Requirements

1. Biology 11 and 12 are normally required for entry into the Combined Biology and Earth and Ocean Sciences program. Students without Biology 11 and 12 are required to take BIOL 150A and 150B.
2. Students should note that EOS 240 is a prerequisite for several upper-level EOS courses (EOS 316, 335, 403, 408, 416, 420, 425, 440, 450, 460).

### Combined Honours in Biology and Earth and Ocean Sciences

Admission to the Combined Honours Biology and Earth and Ocean Sciences Program requires the permission of both the Department of Biology and the School of Earth and Ocean Sciences. To receive an Honours degree, a student must obtain: (1) a minimum graduating GPA of 5.5 overall; (2) a minimum GPA of 6.0 in SEOS or Biology courses at the 300 and 400 level; and a minimum grade of A- in BIOL 499A and 499B or EOS 499A and 499B.

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOL 184 or 190B, and 186 or 190A</td>
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<tr>
<td>CHEM 101, 102</td>
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</tr>
<tr>
<td>EOS 110, 120</td>
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</tr>
<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
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<tr>
<td>PHYS 102; or 102A and 102B; or 110 and 111; or 120 and 130</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
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</tr>
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</table>

### Second Year

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
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<tr>
<td>BIOL 230</td>
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<tr>
<td>CHEM 231, 245</td>
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<tr>
<td>EOS 201, 205, 240</td>
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</tr>
<tr>
<td>EOS 202 or 260</td>
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<td>MATH 202</td>
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### Second Year

<table>
<thead>
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<tbody>
<tr>
<td>BIOL 330</td>
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<tr>
<td>One of BIOL 355, 370, 457</td>
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<td>EOS 300 or 460</td>
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<td>EOS 225, 330, 335</td>
<td>4.5</td>
</tr>
<tr>
<td>STAT 255 or 260</td>
<td>1.5</td>
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</table>
Department of Mathematics and Statistics

Christopher J. Bose, BSc (UBC), MSc, PhD (Tor), Professor
Florin N. Diacu, MMath (Bucharest), PhD (Heidelberg), Professor
Roderick Edwards, BA, BSc (UVic), MSc (Heriot-Watt), PhD (UVic), Professor
Florin N. Diacu, MMath (Bucharest), PhD (Heidelberg), Professor
Jing Huang, MSc (Acad Sinica), PhD (SFU), Professor

Boualem Khouider, BSc (Algiers), MA, PhD (Montreal), Professor
Marcelo Laca, BSc (Uruguay), MA (Calif, Santa Bar), PhD (Calif, Berk), Professor
Mary Lesperance, BA (Windsor), BSc (UVic), MMath, PhD (Waterloo), Professor
Gary MacGillivray, BSc, MSc (UVic), PhD (SFU), Professor
Christina Mynhardt, BA, MA, PhD (Rand Afrikaans Univ.), Professor
Ian F. Putnam, BSc (UVic), PhD (Calif, Berk), FRSC, Professor
Anthony Quas, BA (Cambridge), Cert. (Cambridge), PhD (Warwick), Professor
and Acting Chair
Ahmed Ramzi Sourour, BSc, CEng (Cairo), MSc, PhD (lIl), Professor
Min Tsao, BSc (Lanzhou), MSc, PhD (SFU), Professor
Jane (Juan-Juan) Ye, BSc (Xiamen), MBA, PhD (Dal), Professor
Julie Zhou, BSc (Nanjing), MSc, PhD (Alberta), Professor
Ryan Budney, BSc (Alberta), PhD (Cornell), Associate Professor
Laura Cowen, BSc (SFU), MMath (Waterloo), PhD (SFU), Associate Professor
Peter Dukes, BSc (UVic), MSc (Toronto), PhD (Cal Tech), Associate Professor
Heath Emerson, BSc, MSc (UVic), PhD (Penn State), Associate Professor
Slom Ibrahim, BSc, MSc, PhD (Tunis), Professor
Junling Ma, BSc, MSc (Xi’an Jiaotong), PhD (Princeton), Associate Professor
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David Goluskin, BS (UColorado), MS (Columbia), PhD (Columbia), Assistant Professor
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Kelly Choo, BSc (UBC), MSc (UVic), Coordinator, Systems and Administration
Carol Anne Sargent, BA (Ottawa), JD (UVic), Administrative Officer

Emeritus

Ernest J. Cockayne, MA (Oxon), MSc (McGill), PhD (UBC), Professor Emeritus
Roger R. Davidson, BSc (Queen’s), MA (Tor), PhD (Florida St), Professor Emeritus
David J. Leeming, BSc (UBC-Vic Coll), MA (Ore), PhD (Ala), Professor Emeritus
Reinhard Illner, Dip (Heidelberg), PhD (Bonn), Professor Emeritus
C. Robert Miers, BA (Knox Coll), MA, PhD (Calif, LA), Professor Emeritus
William E. Pfaffenberger, BA, MA, PhD (Ore), Professor Emeritus
John Phillips, BSc (UVic), MA, PhD (Ore), Professor Emeritus
William J. Reed, BSc, MMath (McGill), PhD (UBC), Professor Emeritus
Hari M. Srivastava, BSc, MSc (Allahabad), PhD (Jodhpur), FRAS (Lond), FNASc (India), FIMA (UK), FVPI, FFAAS (Washington, DC), CMath, FMRAS (Belgium), FACC (Spain), FFA (India), Professor Emeritus
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School of Earth and Ocean Sciences Co-operative Education Program

Students intending to register in Earth Sciences Major or Honours Programs may wish to combine their academic programs with relevant and productive work experience in industry, business and government. See “Co-operative Education Programs” for the Faculty of Science (page 241). See also the general regulations pertaining to “Undergraduate Co-operative Education” Programs of the University of Victoria governing all co-operative education students (page 59).

Co-op Program Requirements

Entry into the SEOS Co-op Program is restricted to students enrolled in a Major or Honours Program in SEOS and attending UVic on a full-time basis. To qualify for entry and continuation in the Co-op Program a student must normally maintain a GPA of 5.0 in SEOS courses and a GPA of 4.5 overall. In addition to academic grades, acceptance will be based on individual interest, abilities and aptitudes, and a formal interview. A student is required to satisfactorily complete at least four Work Terms, each of which will be recorded on the student’s academic record and transcript (as COM, N/X or F/X).

Students who are taking double or combined Major degrees programs, who wish to participate in a combined Co-op program, should refer to the regulations for the Faculty of Science "Co-operative Education Programs" found on page 241.

A student may at any time during an academic term transfer from the SEOS Co-operative Program to a regular SEOS program. “Work Term Credit By Challenge” (page 61) is permitted in the SEOS Co-op Program.

Students transferring from other post-secondary institutions may apply to enter the Co-op Program when applying for admission to UVic. Co-op students interrupting their academic or work term program may apply for reinstatement in the Co-op Program upon return to UVic, but readmission is not guaranteed.

Applications and further information concerning the Co-op Program in SEOS may be obtained from the School or at <www.uvic.ca/eoscoop>.
Students interested in a Bachelor of Arts degree should register in the Faculty of Humanities or the Faculty of Social Sciences; complete the requirements common to all bachelor’s degrees in that faculty, and satisfy the requirements for the General, Major or Honours Program in Mathematics or the General, Major or Honours Program in Statistics described below.

Students may also complete a Minor in Mathematics or Statistics. See “Mathematics and Statistics Co-operative Education Program” (page 271).

PROGRAM REQUIREMENTS

Notes on Course Requirements

1. Any student who has been awarded a UBC-SFU-UVIC-UNBC Calculus Examination Certificate can receive credit for MATH 100 with the letter grade corresponding to the examination score.

2. Credit by course challenge is not offered. Any students who demonstrate to the department that they have mastered the material of a course may be granted advanced placement. For this purpose a score of 4 or 5 on the AP Calculus test will constitute mastery of MATH 100.

3. The prerequisite for MATH 100 is a minimum grade of 73% in either Principles of Mathematics 12 or Pre-calculus 12; or a minimum grade of C+ in MATH 120; or a PASS on the MATH 100 pretest. The pretest will be given in the first week of classes each term.

4. All courses within the Department of Mathematics and Statistics which require a calculator will permit only the use of a specific department-selected calculator. Detailed information about calculator restrictions will be given at the beginning of these courses.

5. All students taking a Major or Honours in Mathematics are strongly advised to take at least one University course in Physics.

Honours Programs

Students who wish to be admitted to an Honours Program in the department should apply in writing to the Chair of the department on completion of their second year. Normally a student will be admitted to the third year of an Honours Program in the department only if the student has achieved a GPA of at least 6.5 in the second-year courses taken in the department. A student whose third-year work is not of Honours caliber may be required to withdraw from the program.

Mathematics Program Requirements

Honours in Mathematics

First and Second Years

<table>
<thead>
<tr>
<th>Course Code</th>
<th>4.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 100 or 109, 101, 122</td>
<td>4.5</td>
</tr>
<tr>
<td>CSC 110</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 200, 204, 211, 212, 236, 248</td>
<td>9.0</td>
</tr>
<tr>
<td>STAT 260</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Third and Fourth Years

<table>
<thead>
<tr>
<th>Course Code</th>
<th>7.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 222, 301, 311, 312, 335</td>
<td>7.5</td>
</tr>
<tr>
<td>STAT 350</td>
<td>1.5</td>
</tr>
</tbody>
</table>

15 units of MATH or STAT courses numbered 300 or higher including:

• at least 7.5 units of MATH courses;
• at least 9 units numbered 400 or higher;
• at least 4.5 units of MATH courses numbered 400 or higher.

Note: MATH 498 is highly recommended.

Major in Mathematics

First and Second Years

<table>
<thead>
<tr>
<th>Course Code</th>
<th>4.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 100 or 109, 101, 122</td>
<td>4.5</td>
</tr>
</tbody>
</table>
**First and Second Years**

- CSC 110 ...................................................................................................................... 1.5
- MATH 200, 204, 211, 212, 236, 248 ........................................................................ 9.0
- STAT 260 .................................................................................................................... 1.5

**Third and Fourth Years**

- MATH 222, 311 ........................................................................................................... 3.0
- STAT 350 ..................................................................................................................... 1.5
- 12 units of MATH or STAT courses numbered 300 or higher ................................. 12.0
  - at least 7.5 units of MATH courses;
  - at least 3 units numbered 400 or higher;
  - at least 1.5 units of MATH courses numbered 400 or higher.

*Note: STAT 261 is recommended.*

**General in Mathematics**

- MATH 100 or 109, 101, 122 ....................................................................................... 4.5
- MATH 200, 204, 211 ................................................................................................... 4.5
- 9.0 additional units of MATH or STAT courses numbered 300 or higher ............... 9.0

**Minor in Mathematics**

A student may declare a Minor in Mathematics by completing the requirements for an Honours Program or a Major Program offered by another department or school (which need not be in the Faculty of Science) in conjunction with either the Mathematics course requirements for the General in Mathematics or the following set of courses:

- MATH 100 or 109, 101 ............................................................................................... 3.0
- One of MATH 200, 202 ............................................................................................ 1.5
- Two of MATH 204, 211, 212, 222, STAT 260 ....................................................... 3.0
- 4.5 additional units of MATH courses numbered 300 or higher ............................. 4.5

The selected courses must include at least 9.0 units numbered 200 or higher that do not form part of the requirements of the Honours or Major or General or Option Program. Any course disqualified from the Minor Program by overlap with the requirements of the Honours or Major or General or Option Program may be replaced by another MATH or STAT course at the same level or higher. See Faculty of Science “Minor Program” regulations (page 241). Only one Minor may be declared on any degree program.

**Statistics Program Requirements**

**Honours in Statistics**

- MATH 100 or 109, 101, 122 ....................................................................................... 4.5
- CSC 110 ..................................................................................................................... 1.5
- MATH 200, 204, 211, 212, 236, 248 ........................................................................ 7.5
- STAT 260, 261 .......................................................................................................... 3.0
- Two of MATH 322, 342, 377 ..................................................................................... 3.0
- MATH 301, 311 .......................................................................................................... 3.0
- STAT 350, 353, 450 ................................................................................................... 4.5
- Two of MATH 451, 452, STAT 354, 453, 454, 455, 456, 457, 458, 459 (454 can be taken more than once in different topics) ........................................................................... 3.0

9.0 additional units made up of MATH courses numbered 300 or higher, or STAT courses numbered 400 or higher.

1. Students must make course selections such that their program contains at least 6.0 units of MATH and/or STAT courses numbered 400 or higher.

**Major in Statistics**

- MATH 100 or 109, 101 ............................................................................................... 3.0
- CSC 110 ..................................................................................................................... 1.5
- MATH 200, 204, 211, 248 ....................................................................................... 6.0
- STAT 260, 261 .......................................................................................................... 3.0
- MATH 377 .................................................................................................................. 1.5
- STAT 350, 353, 354, 453 ....................................................................................... 6.0
- 7.5 additional units made up of MATH courses numbered 300 or higher, and/or STAT courses numbered 400 or higher. Recommended courses include STAT 450, 454, 455, 456, 457, 458, 459 (454 can be taken more than once in different topics), MATH 452 ....................................................................................... 7.5

**General in Statistics**

- MATH 100 or 109, 101 ............................................................................................... 3.0
- MATH 200 (or 205), 211 ........................................................................................... 3.0
- STAT 260 (or 255), 261 (or 256) ............................................................................. 3.0
- STAT 353, 354, 453 ............................................................................................... 4.5
- 4.5 additional units of MATH and/or STAT courses numbered 300 or higher. Recommended courses include STAT 350, 355, 357, 359, 450, 454, 455, 456, 457, 458, 459 (454 can be taken more than once in different topics), MATH 352, 377, 452 ....................................................................................... 4.5

**Minor in Statistics**

A student may declare a Minor in Statistics by completing the requirements for an Honours Program or a Major Program offered by another department or school (which need not be in the Faculty of Science) in conjunction with the following set of courses:

- MATH 100 (or 102 or 109), 101 (or 151) ................................................................ 3.0
- MATH 211 .................................................................................................................. 1.5
- STAT 260 (or 255), 261 (or 256) ............................................................................. 3.0
- STAT 353, 354 .......................................................................................................... 3.0
- One of STAT 350, 355, 357, 359, 450, 453, 454, 455, 456, 457, 458, 459 (454 can be taken more than once in different topics) ........................................................................... 1.5

The selected courses must include at least 9.0 units numbered 200 or higher that do not form part of the requirements of the Honours or Major or General or Option Program. Any course disqualified from the Minor Program by overlap with the requirements of the Honours or Major or General or Option Program may be replaced by another MATH or STAT course at the same level or higher. Only one Minor may be declared on any degree program.

**Combined Mathematics and Statistics Program Requirements**

**Honours: Mathematics and Statistics**

- MATH 100 or 109, 101, 122 ....................................................................................... 4.5
- CSC 110 ..................................................................................................................... 1.5
### FACULTY OF SCIENCE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 200, 204, 211, 212, 236, 248</td>
<td>9.0</td>
</tr>
<tr>
<td>STAT 260, 261</td>
<td>3.0</td>
</tr>
<tr>
<td>Two of MATH 322, 342, 377</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 301, 311, 312, 335</td>
<td>6.0</td>
</tr>
<tr>
<td>STAT 350, 353, 450</td>
<td>4.5</td>
</tr>
<tr>
<td>Three of MATH 451, 452, STAT 354, 453, 454, 455, 456, 457, 458, 459 (454 can be taken more than once in different topics)</td>
<td>4.5</td>
</tr>
<tr>
<td>3.0 additional units of MATH or STAT courses numbered 300 or higher</td>
<td>3.0</td>
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</tbody>
</table>

**Major: Mathematics and Statistics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 100 or 109, 101, 122</td>
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<tr>
<td>CSC 110</td>
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<tr>
<td>MATH 200, 204, 211, 212, 236, 248</td>
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<tr>
<td>STAT 260, 261</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 322 or 342</td>
<td>1.5</td>
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<tr>
<td>MATH 312, 377</td>
<td>1.5</td>
</tr>
<tr>
<td>STAT 350, 353, 354, 453</td>
<td>6.0</td>
</tr>
<tr>
<td>One of STAT 450, 454, 455, 456, 457, 458, 459</td>
<td>1.5</td>
</tr>
<tr>
<td>3.0 additional units of MATH or STAT courses numbered 300 or higher</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Combined Chemistry and Mathematics Program Requirements**

For a BSc degree in Combined Chemistry and Mathematics, students may take a Major or Honours program. These programs are not joint degrees in Chemistry and Mathematics, but a single degree program composed of a selected combination of courses from each of the departments. Students opting for either of these combined programs must contact the Chemistry and Mathematics and Statistics departments. Each student will be assigned an adviser from each of these departments. Students considering proceeding to graduate work in either Chemistry or Mathematics must consult with their advisers prior to making their final choice of courses.

**Honours: Chemistry and Mathematics**

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>CHEM 109 and 101</td>
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</tr>
<tr>
<td>CHEM 102, 212, 213, 222, 231, 232, 245</td>
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</tr>
<tr>
<td>CSC 110, 115</td>
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</tr>
<tr>
<td>MATH 100 or 109, 101, 122, 200, 204, 211, 212, 236</td>
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<tr>
<td>PHYS 110, 111</td>
<td>3.0</td>
</tr>
<tr>
<td>STAT 260</td>
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</tbody>
</table>

**Third and Fourth Years**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 299</td>
<td>1.5</td>
</tr>
<tr>
<td>CHEM 347, 452, 453</td>
<td>4.5</td>
</tr>
<tr>
<td>Two of CHEM 318, 324, 335, 361, 362, 363, 364</td>
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</tr>
<tr>
<td>MATH 301, 312</td>
<td>3.0</td>
</tr>
<tr>
<td>Two of MATH 322, 335, 342, 346, 352, 377, 379, STAT 355 or 359</td>
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</tr>
<tr>
<td>CHEM course numbered 300 or higher</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH course numbered 400 or higher</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>10.5</td>
</tr>
</tbody>
</table>

**Computer Science and Mathematics, and Computer Science and Statistics Program Requirements**

For a BSc degree in Combined Computer Science and Mathematics or Computer Science and Statistics, students may take a Major or Honours program. These programs are not joint degrees in Computer Science and Mathematics or Computer Science and Statistics, but a single degree program composed of selected courses from each of the departments. Students opting for any of these combined programs must consult the Computer Science and Mathematics and Statistics departments, and will be assigned an adviser from each of these departments. Students considering future graduate work in Computer Science, Mathematics or Statistics must consult with their advisers prior to making their final choice of courses.

Students who wish to be admitted to one of the Combined Honours programs should apply in writing to the Honours Advisers of the departments on completion of their second year. Normally a student will be admitted to the Combined Honours program only if the student meets the following conditions:

1. completion of CSC 106 (formerly 112, 212), 110, 115, 225, 230, and SENG 265
2. completion of at least 10.5 units of the Mathematics and Statistics courses required for the degree
3. a grade of at least B+ in all 200-level CSC courses

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### Third and Fourth Years

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
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<tbody>
<tr>
<td>PHYS 110, 111</td>
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<td>MATH 312, 377</td>
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**Honours: Chemistry and Mathematics**

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<th>Course Code</th>
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<td>CHEM 109 and 101</td>
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<td>CHEM 102, 212, 213, 222, 231, 232, 245</td>
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<tr>
<td>CSC 110, 115</td>
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<tr>
<td>MATH 100 or 109, 101, 122, 200, 204, 211, 212, 236</td>
<td>12.0</td>
</tr>
<tr>
<td>PHYS 110, 111</td>
<td>3.0</td>
</tr>
<tr>
<td>STAT 260</td>
<td>1.5</td>
</tr>
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**Third and Fourth Years**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 299</td>
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</tr>
<tr>
<td>CHEM 347, 452, 453</td>
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</tr>
<tr>
<td>Two of CHEM 318, 324, 335, 361, 362, 363, 364</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 301, 312</td>
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<tr>
<td>Two of MATH 322, 335, 342, 346, 352, 377, 379, STAT 355 or 359</td>
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<tr>
<td>CHEM course numbered 300 or higher</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH course numbered 400 or higher</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>10.5</td>
</tr>
</tbody>
</table>
4. A GPA of at least 6.5 in all 200-level Mathematics and Statistics courses.

Students may also enter one of the Combined Honours programs upon completion of their third year provided they have at least 4.5 units of 300- or 400-level credit from each department with a minimum GPA of 6.0. This minimum GPA of 6.0 is in all courses completed at the 300- or 400-level in the two departments.

Honours students are expected to maintain a GPA of at least 5.0 in their third year to remain in the program.

Honours: Computer Science and Mathematics

**First Year**

CSC 106, 110, 115 ................................................................. 4.5
MATH 100 or 109, 101, 122 ................................................. 4.5
MATH 211 or STAT 260 ......................................................... 1.5
Electives² ................................................................. 4.5
Total ........................................................................... 15.0

**Second Year**

CSC 225, 226, 230 ................................................................. 4.5
MATH 200, 204, 222 ......................................................... 4.5
MATH 212 or 236 ................................................................. 1.5
MATH 211 or STAT 260 ......................................................... 1.5
SENG 265 ................................................................. 1.5
Electives³ ................................................................. 1.5
Total ........................................................................... 15.0

**Third Year**

CSC 320 ................................................................. 1.5
Two of CSC 305, 322, 330, 350, 360, 361, 370 ......................... 3.0
MATH 212 or 236 ................................................................. 1.5
Two of MATH 301, 311, 322, 335, 342, 352 or STAT 350, MATH 377, STAT 359 ......................... 3.0
CSC 349A or MATH 348 .......................................................... 1.5
Electives⁴ ................................................................. 4.5
Total ........................................................................... 15.0

**Fourth Year**

Two of CSC 422, 423, 425, 426, 429, 445, 446, 449, 482A ................................................................. 3.0
CSC 499 or Math 498 ................................................................. 1.5
Two of MATH 422, 423, 442, 446, 447, 449, 451, 452, 482A ................................................................. 3.0
Electives⁴ ................................................................. 7.5
Total ........................................................................... 15.0

1. MATH 211 can be replaced by MATH 110.
2. Students who have not satisfied the Academic Writing Requirement must choose 1.5 units from ENGL 135, 146, 147.
3. Students planning to take STAT 350 in third year should register for STAT 261.
4. Electives should include at least 9 units of 300/400 level courses to be chosen with at least 1.5 units from each department.

Honours: Computer Science and Statistics

**First Year**

CSC 106, 110, 115 ................................................................. 4.5
MATH 100 or 109, 101, 122 ................................................. 4.5
Math 211 or Stat 260 ................................................................. 1.5
Electives¹ ................................................................. 3.0
Total ........................................................................... 15.0

**Second Year**

CSC 225, 226, 230 ................................................................. 4.5
**FACULTY OF SCIENCE**

### Second Year

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>MATH 200, 204, 222</td>
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<td>SENG 265</td>
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<tr>
<td>STAT 260, 261</td>
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<tr>
<td>Electives&lt;sup&gt;1&lt;/sup&gt;</td>
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**Total** ................................................................. 15.0

### Third Year

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>CSC 320</td>
</tr>
<tr>
<td>CSC 370</td>
</tr>
<tr>
<td>MATH 348 or CSC 349A</td>
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<tr>
<td>STAT 350, 353, 359</td>
</tr>
<tr>
<td>3.0 units of CSC, SENG or STAT courses numbered 300 or higher&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>Electives</td>
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**Total** ........................................................................ 15.0

### Fourth Year

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>SENG 474</td>
</tr>
<tr>
<td>STAT 450</td>
</tr>
<tr>
<td>CSC 499 or STAT 498</td>
</tr>
<tr>
<td>One of CSC 421, 425, 429, 445, 449, 462</td>
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<tr>
<td>One of SENG 401, 460</td>
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<tr>
<td>One of STAT 453, 454, 455, 456, 457, 458, 459</td>
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<tr>
<td>Electives</td>
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</table>

**Total** ........................................................................ 15.0

1. Students who have not satisfied the Academic Writing Requirement must choose 1.5 units from ENGL 135, 146, 147.
2. MATH 211 can be replaced by MATH 110.
4. Electives should include at least 3.0 units comprising 300/400 level courses from either CSC or MATH or SENG or STAT.

### Major: Computer Science and Statistics

#### First Year

<table>
<thead>
<tr>
<th>Course</th>
</tr>
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<tbody>
<tr>
<td>CSC 106, 110, 115</td>
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<tr>
<td>MATH 100 or 109, 101, 122, 211&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>STAT 123</td>
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<td>Electives&lt;sup&gt;1&lt;/sup&gt;</td>
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**Total** ........................................................................ 15.0

#### Second Year

<table>
<thead>
<tr>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 225, 226, 230</td>
</tr>
<tr>
<td>MATH 200, 204, 222</td>
</tr>
<tr>
<td>SENG 265</td>
</tr>
<tr>
<td>STAT 260, 261</td>
</tr>
<tr>
<td>Electives&lt;sup&gt;1&lt;/sup&gt;</td>
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**Total** ........................................................................ 15.0

#### Third Year

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>CSC 320</td>
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<tr>
<td>CSC 370</td>
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**Total** ........................................................................ 30.0

### Third and Fourth Years

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>MATH 301, 311, 312&lt;sup&gt;2&lt;/sup&gt;, 335, 342, 346</td>
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<tr>
<td>MATH 442 or 446</td>
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<td>PHYS 313 or 314</td>
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<td>PHYS 321A, 321B, 323, 325, 326</td>
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<tr>
<td>PHYS 410, 421, 422, 423</td>
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<tr>
<td>PHYS 460</td>
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<tr>
<td>Electives&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

1. Electives chosen from first-year Chemistry courses.

### Honours: Physics and Mathematics Program Requirements

#### First and Second Years

<table>
<thead>
<tr>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM electives&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>CSC 110 or 111</td>
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<tr>
<td>MATH 100 or 109, 101, 122</td>
</tr>
<tr>
<td>MATH 200, 204, 211, 212&lt;sup&gt;2&lt;/sup&gt;, 236</td>
</tr>
<tr>
<td>PHYS 120 and 130; or 110 and 111</td>
</tr>
<tr>
<td>PHYS 214, 215, 216, 217</td>
</tr>
<tr>
<td>Electives&lt;sup&gt;3&lt;/sup&gt;</td>
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</tbody>
</table>

**Total** ........................................................................ 30.0

---

<sup>1</sup> Students who have not satisfied the Academic Writing Requirement must choose 1.5 units from ENGL 135, 146, 147.
<sup>2</sup> MATH 211 can be replaced by MATH 110.
<sup>4</sup> Electives should include at least 3.0 units comprising 300/400 level courses from either CSC or MATH or SENG or STAT.
<sup>5</sup> Electives should include at least 3.0 units comprising 300/400 level courses from either CSC or MATH or SENG or STAT.
2. Some students may take MATH 211 and 212 in first year, and MATH 311 and 312 in second year.
3. PHYS 210, MATH 248, CSC 115, 225 and 230 are recommended.
4. Electives chosen from MATH courses numbered 300 or higher. These electives must be chosen in consultation with the Department of Mathematics and Statistics, and must include 3 units of courses numbered 400 or higher.
5. Elective chosen from Physics and Astronomy courses numbered 300 or higher. This elective must be chosen in consultation with the Department of Physics and Astronomy.

**Combined Major: Financial Mathematics and Economics**

This is a single degree program leading to a BSc in Financial Mathematics and Economics. Only a Major program is offered. Students are required to take a selected combination of courses from the Department of Mathematics and Statistics and the Department of Economics. Students may complete this program in either the Faculty of Science or the Faculty of Social Sciences. Those choosing a Science degree should consult the Faculty of Science “Requirements Common to All Bachelor’s Degrees”, page 239; those choosing a Social Science degree should consult the Faculty of Social Sciences degree requirements, (see “Requirements Common to All Bachelor’s Degrees”, page 284).

**First Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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</tr>
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<tbody>
<tr>
<td>CSC 110, 115</td>
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<tr>
<td>ECON 103 or 103C or 180, 104</td>
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<td>MATH 100 or 109, 101, 122</td>
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<tr>
<td>AWR1 and Electives3</td>
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**Second Year**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>COM 240 and COM 202 or 270</td>
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<tr>
<td>ECON 2032, 204, 2251</td>
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<tr>
<td>MATH 200, 204, 211</td>
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<td>4.5</td>
</tr>
<tr>
<td>STAT 260, 261</td>
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**Third Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>ECON 305, 3131, 3651, 366, 4352</td>
<td></td>
<td>7.5</td>
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<tr>
<td>MATH 348, 377</td>
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<td>STAT 350</td>
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<td>1.5</td>
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<tr>
<td>Elective3</td>
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**Fourth Year**

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<td>MATH 452, 477</td>
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<td>STAT 450, 457</td>
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</tr>
<tr>
<td>Electives3</td>
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</tbody>
</table>

1. Satisfaction of the AWR (“Academic Writing Requirement” page 40) is a prerequisite for ECON 225. ECON 225 is a prerequisite for ECON 313 and a co-requisite for ECON 365. Students satisfy the ECON 225 course requirement if they have: i) received a minimum grade of B+ in ENGL 135, 146 or 147, or ii) passed ENGR 240.
2. A minimum grade of C in ECON 203 is the prerequisite for ECON 313. A minimum grade of B in ECON 313 is the prerequisite for ECON 435 and 454.
3. At least 1.5 units of electives must be from ECON or MATH courses numbered 300 or above.

**Diploma in Secondary Teacher Education**

Students enrolled in a Bachelor of Science degree in Mathematics may apply to the Faculty of Education to take the Diploma in Secondary Teacher Education concurrently. Consult an academic adviser in Mathematics or Education for information about the admission requirements and application procedures.

**Mathematics and Statistics Co-operative Education Program**

See “Co-operative Education Programs” for the Faculty of Science (page 241).

**Co-op Program Requirements**

Students are normally admitted to the program in January, after their first term on campus, and application for admission should be made before the end of the first term. However, a student may be admitted to the program up to the end of his or her second year. A student will be admitted to a Co-op program only if there is a satisfactory schedule of academic terms and work terms that will enable the student to complete all Co-op requirements.

Students registered in the Co-op Program normally must be enrolled in at least 6 units of course work during each academic term. The performance of students will be reviewed after each academic term and each work term. Students who fail to achieve satisfactory standing on an academic term or satisfactory completion of a work term may be required to withdraw from the program.

Each work term is recorded on the student’s academic record and transcript. The granting of “Work Term Credit By Challenge” (page 61) is permitted and is governed by the Co-op regulations. Students must pass four work terms in order to complete their Co-op degree requirements, and satisfy the course requirements of their specific degree program.

Further information concerning the Co-operative Education Program may be obtained from the department.

**Computer Science/Mathematics Work Experience Program**

The Computer Science/Mathematics Work Experience program is intended for students who are enrolled in, or have completed, at least 3 units of 300- or 400-level courses in Computer Science, Software Engineering, Mathematics or Statistics in any Major, Honours or Option degree program in either the Department of Computer Science or the Department of Mathematics and Statistics, or in any combined degree program offered entirely within these two departments. Students participating in the Work Experience program must pass two Co-op work experience terms, that is, a total of eight months of full-time, discipline-related work under the supervision of the Engineering and Computer Science/Mathematics Co-op Program. These work experience terms are subject to the “General Regulations: Undergraduate Co-op”, page 61, with the exception that work term credit by challenge is not permitted. Students passing the required two work experience terms will receive a designation of Work Experience on their academic record and transcript.

Students should contact the Engineering and Computer Science/Mathematics Co-op Office to discuss entry into this program.

**Department of Physics and Astronomy**

Adam Ritz, BSc (Tasmania), MSc (Melbourne), PhD (Imperial College), Professor and Chair
Arif Babul, BASc (Toronto), PhD (Princeton), UVic Distinguished Professor
Byoung-Chul Choi, Diplom (Aachen), PhD (Freie Universität), Professor
Sara L. Ellison, MPhys (Kent), PhD (Cambridge), Professor
Falk H. Herwig, BSc (Kiel), MSc (Edinburgh), PhD (Potsdam & Kiel), Associate Professor
Dean Karlen, BSc (Alberta), PhD (Stanford), R. M. Pearce Professor of Physics
Richard K. Keeler, BSc (McGill), MSc, PhD (UBC), Professor
Robert V. Kowalewski, BS (Rochester), PhD (Cornell), Professor
Michel Lefebvre, BSc (Laval), PhD (Cambridge), Professor
Julio Navarro, BSc, PhD (Universidad Nacional de Cordoba), CIFAR Senior Fellow and Professor
Maxim Pospelov, MSc (Novosibirsk), PhD (Budker), Professor
J. Michael Roney, BSc (Carleton), MSc (McGill), PhD (Carleton), Professor
Kimberley A. Venn, BSc (Toronto), MSc, PhD (Texas, Austin), Professor
Justin Albert, AB (Harvard), MSc, PhD (Princeton), Associate Professor
Rogério de Sousa, BS, MS (Campinas, Brazil), PhD (Maryland), Associate Professor
Jody M. Klymnak, BSc (UVic), MSc, PhD (Washington), Associate Professor
Pavel Koutun, MSc (Kharkov Natl. University, Ukraine), PhD (Washington), Associate Professor
Jon P. Willis, BSc (Glasgow), PhD (Cambridge), Associate Professor
Magdalena Bazalova-Carter, MSc (Czech Technical University) PhD (McGill), Assistant Professor
Assistant Professor
Pavel Kovtun, MSc (Kharkov Natl. University, Ukraine), PhD (Washington), Professor
Professor
Robert E. Horita, BASc, MASc, PhD (UBC), Adjunct Professor and Emeritus Professor
Adjunct Professor
Isabelle Gagné, BSc (Royal Roads Military College), MSc, PhD (Alberta), Adjunct Professor
Adjunct Professor
Laura Ferrarese, Laurea Degree (Padova, Italy), MA, PhD (Johns Hopkins), Adjunct Professor
Adjunct Professor
Isabelle Gagné, BSc (Royal Roads Military College), MSc, PhD (Alberta), Adjunct Professor
Robert E. Honta, BASc, MASc, PhD (UBC), Adjunct Professor and Emeritus Professor
John Hutchings, BSc, MSc (Rand, South Africa), PhD (Cambridge), Adjunct Professor
Werner Israel, OC, BSc, MSc (Cape Town), Scholar (Dublin), PhD (Trinity), FRSC, FRSC, CIFAR Fellow and Adjunct Professor
Oliver Kester, BSc (Goethe-Universität Frankfurt), PhD (IAP, TU Wien), Adjunct Professor
Akira Konaka, MSc, PhD (Kyoto), Adjunct Professor
Bob Laxdal, MSc, (Saskatchewan), Adjunct Professor
Nikolisa (Lia) Merminga, BS (Athens), MS (Michigan), PhD (Michigan), Adjunct Professor
Arthur Olin, BSc (McGill), PhD (Harvard), Adjunct Professor
Lyle P. Robertson, BA, MA PhD (UBC), Adjunct Professor and Emeritus Professor
Thomas J. Ruth, BS (St. Francis College), MA (College of William & Mary), MA, PhD (Clark), Adjunct Professor
David Schade, BSc, MSc, PhD (UVic), Adjunct Professor
Peter B. Stetson, BA, MA (Wesleyan), MSc, PhD (Yale), Adjunct Professor
Edward L. Tomusiak, BSc, MSc (Alberta), PhD (McGill), Adjunct Professor
Jean-Pierre Véran, MSc, PhD (École Nat. Sup. des Télécomm. - Paris), Adjunct Professor
Gordon A.H. Walker, BSc (Edinburgh), PhD (Cambridge), Adjunct Professor
Seergei, F. Zavgorodnii, BSc, MSc, PhD (Kazakh State University, USSR), PhD (Institute for Nuclear Physics, Tomsk, USSR), Adjunct Professor
David Andersen, BA (Wisconsin, Madison), PhD (Pennsylvania State), Adjunct Associate Professor
Cynthia Araujo, PhD (UBC), Adjunct Associate Professor
John P. Blakeslee, BA (Chicago), PhD (MIT), Adjunct Associate Professor
James Di Francesco, BSc (Toronto), PhD (Texas, Austin), Adjunct Associate Professor
Cornelia Hoehr, BSc, MSc, PhD (Albert-Ludwigs-Universität), PhD (Ruprecht-Karls-Universität), Adjunct Associate Professor
Andrew I. Jirasek, BSc, MSc, PhD (Guelph), Adjunct Associate Professor
Doug Johnstone, BA (Toronto), MSc, PhD (UC Berkeley), Adjunct Associate Professor
J. L. Kavelaars, BSc (Guelph), MSc, PhD (Queen’s), Adjunct Associate Professor
Shane M. Koscielniak, BA (Cambridge), PhD (Oxford), Adjunct Associate Professor
Christian Marois, BSc, MSc, PhD (Montreal) Adjunct Associate Professor
Brenda C. Matthews, BASc (McMaster), MSc (Calgary), PhD (McMaster), Adjunct Associate Professor
Alan W. McConnachie, MSc (St. Andrews), PhD (Cambridge), Adjunct Associate Professor
Ante  Mestrovic, BSc (Simon Fraser), PhD (UBC), Adjunct Associate Professor
David Morrissey, MSc (McGill), PhD (Chicago), Adjunct Associate Professor
Christopher Ruiz, BSc, PhD (Edinburgh), Adjunct Associate Professor
Luc Simard, BSc, MSc, PhD (UVic), Adjunct Associate Professor
Erika Chin, BSc (UBC), MSc (McGill), PhD (UBC), Adjunct Assistant Professor
Iris Dillmann, Diploma (Johannes Gutenberg-Universität), PhD (Basel), Adjunct Assistant Professor
Alexander Gottberg, BSc, MSc, PhD (Freie Universität), Adjunct Assistant Professor
Michelle Hilts, BA, BSc (McMaster), MSc, PhD (UBC), Adjunct Assistant Professor
Ania Kwiatkowski, BA (UC Berkeley), MS, PhD (Michigan State), Adjunct Assistant Professor
Antoniu I. Popescu, Diploma (Bucharest), PhD (Kentucky), Adjunct Assistant Professor

Research Faculty
Robert A. McPherson, BA (UBC), MA, PhD (Princeton), IPP Scientist and Honorary Research Professor
Randall J. Sobie, BSc, MSc, PhD (Toronto), IPP Scientist and Honorary Research Professor

Administrative and Academic Professionals
Susan Gnucci, BEd (UVic), Administrative Officer
Andrew MacRae, BSc (UVic), MSc, PhD (Calgary), Senior Laboratory Instructor
Douglas McKenzie, BSc (UVic), Senior Laboratory Instructor
Robin D. Rempel, BSc (UVic), Laboratory Instructor
Daniela Rosa, BSc (Concordia), Senior Laboratory Instructor
Alexander Schmid, BSc (UVic), Laboratory Instructor
Karun Thanyavut, BE, ME (TamilNadu, India), MSc (Concordia), PhD (UVic), Senior Laboratory Instructor
Alexander van Netten, BSc, MSc, PhD (UVic), A. Eng. dip at von Karman Institute for Fluid Dynamics, Laboratory Supervisor
Alexander Y. Wong, BSc (UVic), Senior Laboratory Instructor
Nikiforos Zaptakis, BSc (UBC), Senior Programmer Analyst

Visiting, Adjunct and Cross-listed Appointments
William Ansabacher, BSc, PhD (Otago), Adjunct Professor
Richard Baartman, MSc, PhD (SFU), Adjunct Professor
Parvin Basran, BSc, MSc (Alberta), PhD (Calgary), Adjunct Professor
Wayne A. Beckham, BSc, MSc (Otago), PhD (Adelaide), Adjunct Professor
Harvey A. Buckmaster, BSc (Alberta), MA, PhD (UBC), Adjunct Professor
Patrick Côté, BSc (Western Ontario), MSc, PhD (McMaster), Adjunct Professor
David Crampton, BSc, PhD (Toronto), Adjunct Professor
Laurent Drissen, PhD (Montreal), Adjunct Professor
Laura Ferrarese, Laurea Degree (Padova, Italy), MA, PhD (Johns Hopkins), Adjunct Professor
Isabelle Gagné, BSc (Royal Roads Military College), MSc, PhD (Alberta), Adjunct Professor
Robert E. Honta, BASc, MASc, PhD (UBC), Adjunct Professor and Emeritus Professor
John Hutchings, BSc, MSc (Rand, South Africa), PhD (Cambridge), Adjunct Professor

FACULTY OF SCIENCE
Physics and Astronomy

Undergraduate Degree Programs

The department offers the following BSc degree programs:

- General, Minor, Major and Honours in Physics
- Minor, Major and Honours in Astronomy
- Combined Major and Honours in Physics and Astronomy
- Combined Honours in Physics and Mathematics
- Combined Major and Honours in Physics and Earth Sciences (Geophysics)
- Combined Major and Honours in Physics and Ocean Sciences (Physical Oceanography)
- Combined Major and Honours in Physics and Computer Science
- Combined Major and Honours in Physics and Biochemistry

A student may complete a Minor in Physics by completing the requirements for the General Program in Physics in conjunction with the requirements for an Honours or Major Program offered by another department (which need not be in the Faculty of Science).

A BSc degree in Physics provides a sound basis for entry to graduate programs of study in fields such as Atmospheric Science, Geophysics and Oceanography.

Courses of General Interest

The courses ASTR 101, 102, 201 and PHYS 303 are intended for students who wish to increase their understanding of science and the physical world as part of their cultural development.

See "Physics and Astronomy Co-operative Education Program" (page 280).

Program Requirements

Notes on Course Requirements

1. The course sequences below are designed for a four-year program. Students who anticipate taking longer than four years should consult the undergraduate adviser. Students in the Co-op program will take longer than four years and should consult the Co-op coordinator.

2. Physics 12 and Mathematics 12 are required for entry into the Physics and Astronomy undergraduate programs. For all sequences, PHYS 120 is intended for students planning a career in Physics or Astronomy and who have attained at least a B standing in each of Physics 12 and Mathematics 12.

3. Those with less than a B standing and planning a career in Physics or Astronomy, or those planning a career in some other Physical Science (such as Chemistry or Earth and Ocean Sciences), should take PHYS 110 and 111.

4. Students planning to take Honours programs should normally also have completed Chemistry 11 and 12. Advanced placement is available for students with high standing in both Mathematics 12 and Physics 12.

5. Students should consult the timetable or the department to confirm which courses are offered in any particular term.

6. Where consent of the department is specified as a course prerequisite, this consent must be obtained from the department Chair or the Chair’s nominee.

7. “MATH breadth electives” may be chosen from MATH 301, 311, 348, 352, 369, 377, 379, 436, 442, 447, 449, 492, STAT 254, 260, 350. MATH 301 is strongly recommended for students considering graduate school.

Honours Programs: General Regulations

1. Admission to the third and fourth years of the Honours programs requires the permission of the department.

2. Admission to the Combined Honours Physics and Mathematics program requires the permission of both the Department of Physics and Astronomy and the Department of Mathematics and Statistics.

3. Admission to the Combined Honours Physics and Earth Sciences (Geophysics) Program, and the Combined Honours Physics and Ocean Sciences (Physical Oceanography) Program requires the permission of the Department of Physics and Astronomy and the School of Earth and Ocean Sciences (SEOS).

4. Admission to the Combined Honours Physics and Computer Science Program requires the permission of both the Department of Physics and Astronomy and the Department of Computer Science.

5. Admission to the Combined Honours Physics and Biochemistry Program requires the permission of both the Department of Physics and Astronomy and the Department of Biology and Microbiology.

6. Students in the Honours programs will be required to maintain a GPA of at least 3.5.

Major Programs: General Regulations

For any Major program in the department, the course grades used in calculating the GPA on which the type of degree is based must include those for all courses (including departmental electives) numbered 300 and above that are specified by the department.

Physics Programs: Course Requirements

Honours Program in Physics

Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
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<tbody>
<tr>
<td>CHEM 101, 102</td>
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<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 120 and 130; or 110 and 111</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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Year 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 200, 204, 211</td>
<td>4.5</td>
</tr>
<tr>
<td>PHYS 215, 216, 229, 248</td>
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<tr>
<td>Electives</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15.0</strong></td>
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Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>MATH 301, 342, 346</td>
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<tr>
<td>MATH breadth electives</td>
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</tr>
<tr>
<td>PHYS 317; 321A, 321B, 323, 325, 326</td>
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</tr>
</tbody>
</table>
### Major Program in Physics

**Year 1**
- CSC 110 or 111 ............................................. 1.5
- MATH 100 or 109, 101 ...................................... 3.0
- PHYS 120 and 130; or 110 and 111 .................. 3.0
- Electives $^1$ .................................................. 7.5
- **Total** ...................................................... 15.0

**Year 2**
- MATH 200, 204, 211 ....................................... 4.5
- PHYS 215, 216, 229, 248 ................................. 6.0
- Electives $^1$ .................................................. 4.5
- **Total** ...................................................... 15.0

**Year 3**
- MATH 342, 346 ............................................. 3.0
- PHYS 317, 321A, 323, 325, 326 ......................... 7.5
- Electives ...................................................... 4.5
- **Total** ...................................................... 15.0

**Year 4**
- MATH breadth electives $^2$ ................................ 3.0
- PHYS electives $^3$ ........................................... 7.5
- Electives ...................................................... 4.5
- **Total** ...................................................... 15.0

---

1. Three units of Chemistry are strongly recommended in this program. ASTR 150, 250, PHYS 210, CSC 349A, MATH 122 are also recommended.
2. Chosen from Physics and Astronomy courses numbered 300 or higher.

### General Program in Physics

**Year 1**
- CSC 110 or 111 ............................................. 1.5
- MATH 100 or 109, 101 ...................................... 3.0
- PHYS 120 and 130; or 110 and 111 .................. 3.0
- Electives $^1$ .................................................. 7.5
- **Total** ...................................................... 15.0

### Minor Program in Physics

A student may complete a Minor in Physics by fulfilling the requirements of an Honours, Major, or General degree in another discipline together with either the requirements of the General Program in Physics or the following:

- PHYS 120 and 130; or 110 and 111 .................. 3.0
- PHYS 200-level or higher ................................. 4.5
- PHYS 300-level or higher ................................. 4.5

The 9.0 units numbered 200 or higher cannot also be used to fulfill the requirements of a student’s Honours, Major or General program, or Option. Any course disqualified from the Minor program by such overlap may be replaced by another PHYS course at the same level or higher. Students should note that most PHYS courses have MATH prerequisites. Students who believe they are appropriately prepared for a PHYS course without having completed the listed prerequisites, such as 3rd or 4th year BEng students who have completed MATH 204, may apply to the department for permission to take it. The combination PHYS 215, 317, 321A, 323, 325, 326 is recommended for students in Electrical Engineering. The combination PHYS 215, 321A, 323, 325, 326, 328 is recommended for students in Mechanical Engineering.

### Astronomy Programs: Course Requirements

#### Honours Program in Astronomy

**Year 1**
- ASTR 150 .................................................. 1.5
- CHEM 101, 102 ............................................. 3.0
- CSC 110 or 111 ............................................. 1.5
- MATH 100 or 109, 101 ................................... 3.0
- PHYS 120 and 130; or 110 and 111 .................. 3.0
- Electives $^1$ .................................................. 3.0
- **Total** ...................................................... 15.0
### Major Program in Astronomy

#### Year 1

<table>
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<tr>
<th>Course</th>
<th>Units</th>
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<tr>
<td>ASTR 150</td>
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<td><strong>Total</strong></td>
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#### Year 2

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ASTR 250, 255</td>
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<td>MATH 200, 204, 211</td>
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<tr>
<td>PHYS 215, 216, 229, 248</td>
<td>6.0</td>
</tr>
<tr>
<td>Electives</td>
<td>1.5</td>
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<tr>
<td><strong>Total</strong></td>
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#### Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>PHYS 317, 321A, 323, 325, 326</td>
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<td>Electives</td>
<td>3.0</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>15.0</strong></td>
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### Year 4

<table>
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<tbody>
<tr>
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<tr>
<td>MATH breadth electives</td>
<td>3.0</td>
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<tr>
<td>Electives</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15.0</strong></td>
</tr>
</tbody>
</table>

1. Three units of Chemistry are strongly recommended in this program. PHYS 210, CSC 349A, MATH 122 are also recommended.
2. Electives chosen from Astronomy courses numbered 300 or higher.
3. Chosen from courses listed in Note 7 in the Notes on Course Requirements in Physics and Astronomy’s Program Requirements.
4. PHYS 460A and 460B are recommended for third- and fourth-year students.

### Minor Program in Astronomy

A student may complete a Minor in Astronomy by fulfilling the requirements of an Honours, Major, or General degree in another discipline together with the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>ASTR 150</td>
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<tr>
<td>ASTR 250</td>
<td>1.5</td>
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<tr>
<td>ASTR or PHYS 200-level or higher</td>
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<tr>
<td>ASTR 300-level or higher</td>
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</table>

The 9.0 units numbered 200 or higher cannot also be used to fulfill the requirements of a student’s Honours, Major, or General program, or Option. Any course disqualified from the Minor program by such overlap may be replaced by another PHYS or ASTR course at the same level or higher. Students should note that most ASTR courses have PHYS and MATH pre- and corequisites. Students who believe they are appropriately prepared for an ASTR course without having completed the listed prerequisites may apply to the department for permission to take it.

### Combined Physics and Astronomy Program Requirements

#### Combined Honours in Physics and Astronomy

#### Year 1

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ASTR 150</td>
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<tr>
<td>CHEM 101, 102</td>
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<tr>
<td>CSC 110 or 111</td>
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<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 120 and 130; or 110 and 111</td>
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</tr>
<tr>
<td>Electives</td>
<td>3.0</td>
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<tr>
<td><strong>Total</strong></td>
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#### Year 2

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ASTR 250, 255</td>
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<tr>
<td>MATH 200, 204, 211</td>
<td>4.5</td>
</tr>
<tr>
<td>PHYS 215, 216, 229, 248</td>
<td>6.0</td>
</tr>
<tr>
<td>Electives</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15.0</strong></td>
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#### Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>ASTR 329</td>
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</tr>
<tr>
<td>MATH 342, 346</td>
<td>4.5</td>
</tr>
<tr>
<td>Electives</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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FACULTY OF SCIENCE

UVIC UNDERGRADUATE CALENDAR JANUARY 2018
### Combined Physics and Astronomy Program Requirements

#### Combined Major in Physics and Astronomy

<table>
<thead>
<tr>
<th>Year</th>
<th>Courses</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>ASTR 150</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>CSC 110 or 111</td>
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</tr>
<tr>
<td></td>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>PHYS 120 and 130; or 110 and 111</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>Electives$^1$</td>
<td>1.5</td>
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<table>
<thead>
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<th>Year 2</th>
<th>Courses</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>ASTR 250, 255</td>
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<tr>
<td></td>
<td>MATH 200, 204, 211</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>PHYS 215, 216, 229</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>Electives$^1$</td>
<td>1.5</td>
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<table>
<thead>
<tr>
<th>Year 3</th>
<th>Courses</th>
<th>Units</th>
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<tr>
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<tr>
<td></td>
<td>ASTR electives$^2$</td>
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<tr>
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<td>MATH 342, 346</td>
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<td></td>
<td>PHYS 317, 321A, 323, 325, 326</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>Electives$^1$</td>
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<table>
<thead>
<tr>
<th>Year 4</th>
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<tr>
<td></td>
<td>Total</td>
<td>15.0</td>
</tr>
</tbody>
</table>

1. Electives chosen from Chemistry courses.
2. Some students may take MATH 211 and 212 in first year, and MATH 311 and 312 in second year.
3. PHYS 210, CSC 349A are recommended.
4. Electives chosen from MATH courses numbered 300 or higher. These electives must be chosen in consultation with the Department of Mathematics and Statistics.
5. The courses chosen for this degree must include at least 4.5 units of MATH numbered 400 or higher.
6. Electives chosen from MATH or PHYS courses numbered 300 or higher.

### Combined Physics and Mathematics Program Requirements

#### Combined Honours in Physics and Mathematics

<table>
<thead>
<tr>
<th>Year</th>
<th>Courses</th>
<th>Units</th>
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<td>Year 1</td>
<td>CHEM electives$^1$</td>
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<tr>
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<td>CSC 110 or 111</td>
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<td>Electives$^1$</td>
<td>3.0</td>
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<td></td>
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<table>
<thead>
<tr>
<th>Year 2</th>
<th>Courses</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>MATH 200, 204, 211, 212, 236$^2$</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>PHYS 215, 216, 229</td>
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<td>PHYS 248 or MATH 248</td>
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<td>Electives$^3$</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>Year 3</th>
<th>Courses</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
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<tr>
<td></td>
<td>MATH electives$^4, 5$</td>
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<tr>
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<td>PHYS 317, 321A, 323, 325, 326</td>
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<tr>
<td></td>
<td>Total</td>
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<table>
<thead>
<tr>
<th>Year 4</th>
<th>Courses</th>
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<tr>
<td></td>
<td>MATH 311, 312, 442 or 446$^2$</td>
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<td></td>
<td>PHYS 421, 422, 423</td>
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</table>

1. Electives chosen from Chemistry courses.
2. Some students may take MATH 211 and 212 in first year, and MATH 311 and 312 in second year.
3. PHYS 210, CSC 349A are recommended.
4. Electives chosen from MATH courses numbered 300 or higher. These electives must be chosen in consultation with the Department of Mathematics and Statistics.
5. The courses chosen for this degree must include at least 4.5 units of MATH numbered 400 or higher.
6. Electives chosen from MATH or PHYS courses numbered 300 or higher.

### Combined Physics and Earth Sciences (Geophysics) Program Requirements

#### Combined Honours in Physics and Earth Sciences (Geophysics)

<table>
<thead>
<tr>
<th>Year</th>
<th>Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>CHEM 101$^1$, 102</td>
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</tr>
</tbody>
</table>
Combined Physics and Ocean Sciences (Ocean-Atmosphere Dynamics) Program Requirements

Combined Honours in Physics and Ocean Sciences (Ocean-Atmosphere Dynamics)

Year 1

CHEM 101, 102 ................................................................. 3.0
CSC 110 or 111 ............................................................... 1.5
EOS 110, 120 ................................................................. 3.0
MATH 100 or 109, 101 ................................................... 3.0
PHYS 120 and 130; or 110 and 111 ................................. 3.0
Electives ........................................................................... 1.5
Total .................................................................................. 15.0

Year 2

EOS 300 ............................................................................ 1.5
EOS 427 or PHYS 427 or electives2,3 ................................ 1.5
MATH 342, 346 ............................................................... 3.0
PHYS 427, 460, 469 ....................................................... 7.5
Electives2 ......................................................................... 1.5
Total .................................................................................. 15.0

Year 3

EOS 410, 480 ................................................................. 3.0
EOS 427 or PHYS 427 or electives2,3 ................................ 1.5
PHYS 460, 469 ............................................................... 3.0
Electives2,3 ...................................................................... 4.5
Total .................................................................................. 15.0

Year 4

EOS 410, 480 ................................................................. 3.0
EOS 427 or PHYS 427 or electives2,3 ................................ 1.5
PHYS 460, 469 ............................................................... 3.0
Electives2,3 ...................................................................... 4.5
Total .................................................................................. 15.0

1. CHEM 150 may be taken instead of CHEM 101.
2. In choosing these electives, it is recommended that students consider the prerequisite requirements for PHYS or EOS electives in Year 4.
3. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered. One of EOS 427 or PHYS 427 is required in the program, and may be taken in either third or fourth year.
4. Chosen from courses listed in Note 7 in the Notes on Course Requirements in Physics and Astronomy’s Program Requirements.
5. Chosen from EOS and PHYS courses numbered 300 and above. PHYS 460A and 460B are recommended for third- and fourth-year students.

Combined Major in Physics and Earth Sciences (Geophysics)

Year 1

CHEM 111, 102 ................................................................. 3.0
CSC 110 or 111 ............................................................... 1.5
EOS 110, 120 ................................................................. 3.0
MATH 100 or 109, 101 ................................................... 3.0
PHYS 120 and 130; or 110 and 111 ................................. 3.0
Electives ........................................................................... 1.5
Total .................................................................................. 15.0

Year 2

EOS 340 ................................................................. 1.5
MATH 200, 204, 211 ....................................................... 4.5
PHYS 215, 216, 229, 248 ............................................. 6.0
### Year 2

<table>
<thead>
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### Year 3

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<td>PHYS 317, 321A, 321B, 323, 325, 326</td>
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### Year 4

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<td>PHYS 323, 411, 426</td>
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<tr>
<td>Electives</td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
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---

1. CHEM 150 may be taken instead of CHEM 101.
2. EOS 210 or PHYS 210, and CSC 115, 225 and 230 are recommended.
3. Chosen from courses listed in Note 7 in the Notes on Course Requirements in Physics and Astronomy’s Program Requirements.
4. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.
5. Chosen from PHYS or EOS courses numbered 300 and above. PHYS 460A and 460B are recommended for third- and fourth-year students.

### Combined Major in Physics and Ocean Sciences (Ocean-Atmosphere Dynamics)

#### Year 1

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<td>EOS 110, 120</td>
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<tr>
<td>MATH 100 or 109, 101</td>
<td>3.0</td>
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<tr>
<td>PHYS 120 or 130; or 110 and 111</td>
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<td>Elective</td>
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<td><strong>Total</strong></td>
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#### Year 2

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>EOS 340</td>
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<tr>
<td>MATH 200, 204, 211</td>
<td>4.5</td>
</tr>
<tr>
<td>PHYS 215, 216, 229, 248</td>
<td>6.0</td>
</tr>
<tr>
<td>Electives²</td>
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<td><strong>Total</strong></td>
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#### Year 3

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<tr>
<th>Course Code</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>MATH breadth electives³</td>
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<tr>
<td>PHYS 317, 321A, 325, 326</td>
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### Year 5

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<tr>
<td><strong>Total</strong></td>
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</tbody>
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---

1. CHEM 150 may be taken instead of CHEM 101.
2. EOS 210 or PHYS 210, and CSC 115, 225 and 230 are recommended.
3. Chosen from courses listed in Note 7 in the Notes on Course Requirements in Physics and Astronomy’s Program Requirements.
4. EOS 403, 408, 416, 420, 422, 425, 427, and 433 are normally offered in alternate years. Students are advised to consult with the department to determine when these courses are offered.
5. Chosen from PHYS or EOS courses numbered 300 and above. PHYS 460A and 460B are recommended for third- and fourth-year students.

### Combined Honours in Physics and Computer Science Program Requirements

#### Combined Physics and Computer Science Program Requirements

#### Year 1

<table>
<thead>
<tr>
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<tbody>
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<td>MATH 100 or 109, 101, 122</td>
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<td><strong>Total</strong></td>
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#### Year 2

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CSC 225, 226, 230</td>
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<td>MATH 200; 201 or 204; 211</td>
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<td>PHYS 215, 216, 229, 248</td>
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#### Year 3

<table>
<thead>
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<tr>
<td>PHYS 317, 321A, 323, 325, 326</td>
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<td>SENG 265</td>
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#### Year 4

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<td>MATH 301</td>
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<td>PHYS 460A, 460B</td>
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<td>PHYS electives³</td>
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### Combined Major in Physics and Computer Science

#### Year 1

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<tr>
<td>CSC 106; 110 or 111; 115</td>
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<tr>
<td>PHYS 120 and 130 or 110 and 111</td>
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Total: 15.0

#### Year 2

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<tr>
<td>PHYS 215, 216, 229, 248</td>
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Total: 15.0

#### Year 3

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<td>ENGR 240</td>
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<tr>
<td>MATH 342, 346</td>
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#### Year 4

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Total: 15.0

1. It is recommended that students consider the upper-level PHYS courses they wish to take when choosing the order in which to take PHYS 317, 321A, 323, 325, 326.
2. Electives chosen from Physics and Astronomy courses numbered 300 or higher.
3. PHYS 432 is strongly recommended.

### Combined Major in Physics and Biochemistry

#### Year 1

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<td>MATH 100 or 109, 111</td>
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<td>3.0</td>
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<td>PHYS 120 and 130 or 110 and 111</td>
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Total: 15.0

#### Year 2

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<th>Units</th>
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<tbody>
<tr>
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<td>CHEM 231, 232</td>
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<td>MATH 200, 204, 211</td>
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<tr>
<td>MICR 200A</td>
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Total: 15.0

1. It is recommended that students consider the upper-level PHYS courses they wish to take when choosing the order in which to take PHYS 317, 321A, 323, 325, 326.
2. Electives chosen from Physics and Astronomy courses numbered 300 or higher.
3. PHYS 432 is strongly recommended.

### Combined Physics and Biochemistry Program Requirements

#### Combined Honours in Physics and Biochemistry

#### Year 1

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<th>Course Code</th>
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#### Year 2

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PHYSICS AND ASTRONOMY CO-OPERATIVE EDUCATION PROGRAM

The Physics and Astronomy Co-operative Education Program is a year-round program which includes, in addition to the normal Major or Honours academic program for the BSc, employment in jobs related to Physics or Astronomy in industry or government for at least four scheduled Work Terms interspersed between academic terms. This employment is related as closely as possible to the student’s course of studies and individual interest. See “Co-operative Education Programs” for the Faculty of Science (page 241). See also the general regulations pertaining to “Undergraduate Co-operative Education” Programs of the University of Victoria governing all co-operative education students (page 59).

Co-op Program Requirements

To qualify for entry to the Physics and Astronomy Co-op Program, a student must have satisfied the Academic Writing Requirement, be enrolled full time, be proceeding to an Honours or Major degree in the department of Physics and Astronomy, have at least a 4.5 GPA and have at least a B- in each Physics or Astronomy course taken. To remain in the program, a student must be enrolled full time and maintain an average of at least 3.5. A minimum of four Work Terms is required to graduate with Co-op designation. Successfully completed Work Terms will be recorded on the student’s record and transcript. “Work Term Credit By Challenge” (page 61), is permitted in the Physics and Astronomy Co-op Program.

Honours students in the Co-operative Education Program are normally required to obtain credit for at least 7.5 units in each academic term, or 15 units in two successive academic terms which may be separated by a Work Term. The ninth academic term is not subject to this requirement.

Students who are taking double or combined Major degrees programs, who wish to participate in a combined Co-op program, should refer to the regulations for the Faculty of Science “Co-operative Education Programs” found on page 241.

A student may, at any time during an academic term, transfer from the Physics and Astronomy Co-operative Education Program to a regular Physics and Astronomy program.

Applications and further information concerning the Co-operative Education Program in Physics and Astronomy may be obtained from the department or at <www.uvic.ca/physcoop>.