### CURRENT

<table>
<thead>
<tr>
<th>COURSE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BIOL 221 Mechanisms of Evolution</strong></td>
<td>*3 (fi 6) (second term, 3-0-0). Discusses the major features of the evolutionary process, including the fossil record, basic population genetics, variation, natural selection, adaptation, and speciation. Prerequisites: BIOL 107, 108 or SCI 100.</td>
</tr>
<tr>
<td><strong>ENT 327 Terrestrial Arthropod Diversity</strong></td>
<td>*3 (fi 6) (first term, 3-0-3). Evolution, distribution, and classification of terrestrial arthropods, with emphasis on hexapods. Students practice identification using museum collections, keys and databases, and make a substantive collection of regional insects. Prerequisite: Any one of ENCS 201, ENT 220, 222, or ZOOL 250. Credit cannot be obtained for both ENT 327 and 527.</td>
</tr>
<tr>
<td><strong>ZOOL 350 Biology and Evolution of Invertebrates</strong></td>
<td>*3 (fi 6) (second term, 2-0-3). Invertebrate evolution and adaptations including topics on feeding and nutrition, motility, reproduction and development, and sensory systems. Emphasis will be on material from the primary literature. Laboratory exercises will involve advanced training in techniques of microscopy. Prerequisite: ZOOL 250. ZOOL 303 and ZOOL 351 recommended. Credit cannot be obtained for both ZOOL 350 and 550. Offered in alternate years.</td>
</tr>
</tbody>
</table>

### PROPOSED

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>BIOL 221 Mechanisms of Evolution</strong></td>
<td>*3 (fi 6) (second term, 3-0-0). Discusses the major features of the evolutionary process, including the fossil record, basic population genetics, variation, natural selection, adaptation, and speciation. Prerequisites: BIOL 107, 108 or SCI 100. Credit cannot be obtained for both BIOL 221 and 321.</td>
</tr>
<tr>
<td><strong>ENT 327 Terrestrial Arthropod Diversity</strong></td>
<td>*3 (fi 6) (first term, 3-0-3). Evolution, distribution, and classification of terrestrial arthropods, with emphasis on hexapods. Students practice identification using museum collections, keys and databases, and make a substantive collection of regional insects. Prerequisite: Any one of ENCS 201, ENT 220, 222, or ZOOL 250. Credit can only be obtained for one of ENT 327, 427 or 527.</td>
</tr>
<tr>
<td><strong>ZOOL 350 Biology and Evolution of Invertebrates</strong></td>
<td>*3 (fi 6) (second term, 2-0-3). Invertebrate evolution and adaptations including topics on feeding and nutrition, motility, reproduction and development, and sensory systems. Emphasis will be on material from the primary literature. Laboratory exercises will involve advanced training in techniques of microscopy. Prerequisite: ZOOL 250. ZOOL 303 and ZOOL 351 recommended. Credit can only be obtained for one of ZOOL 350, 450 or 550. Offered in alternate years.</td>
</tr>
<tr>
<td>Current</td>
<td>Proposed</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
</tr>
<tr>
<td>(new course)</td>
<td>231.158 Interdisciplinary Undergraduate and Graduate Courses, INT D</td>
</tr>
</tbody>
</table>

**Undergraduate Courses**

**231.158.11 Faculty of Science Courses**

INT D 400 Internship Capstone *3 (fi 6) (either term, 3-0-0). Required by all students who have just completed the on-site work experience portion of the Science Internship Program. Must be completed during the first fall or winter academic term following return to full-time studies. The course focuses on professional development, including skills in written and verbal communication and the ability to make contributions in a team environment. Students will be assigned both individual and team-based projects. Grades will be determined by performance on written assignments and oral presentations given in class. Taught in conjunction with INT D 401. This class may not be taken for credit if credit has already been obtained in a Science Internship Practicum course. Prerequisites: WKEXP 956 or WKEXP 932. [Faculty of Science]

Rationale: INT D 400 is to be listed under the Faculty of Science INT D offerings and will thus be counted as science credits in students' programs. The prerequisites are such that students coming out of Science Work Experience courses will take this course to receive Science Internship Program designation on their parchment.
Admissions Chart 6
Psychology
Entrance to Honors in Psychology can take place only after completion of a minimum of 48. Students must complete PSYCO 104 or SCI 100; PSYCO 105; two of PSYCO 223, 239, 241, two of PSYCO 258, 275, 282, and STAT 151 (STAT 141 may be substituted) prior to admission. Acceptance is dependent upon obtaining written approval from a potential research supervisor by August 31. Students planning to apply for admission should consult the Department Honors advisor.

Admissions Chart 7
Psychology
High School – No Year 1 entry
Transfer – a minimum 3.0 GPA on *24 in each preceding Fall/Winter and a minimum 3.3 GPA on attempted or completed Psychology and required Statistics courses. Admission may take place only after completion of a minimum of 48. Students must complete PSYCO 104 or SCI 100, PSYCO 105, 212; STAT 151; two of PSYCO 223, 239, 241, and two of PSYCO 258, 275, 282; prior to application for admission. Acceptance is dependent upon obtaining approval from a potential research supervisor by August 31. Students planning to apply for admission should consult the Departmental Honors advisor.
192.6 Courses

(1) Selection of Courses

Students are responsible for familiarizing themselves with program requirements and limitations as specified in the Calendar, for ensuring their programs are properly planned in accordance with degree specifications, and for the completeness and accuracy of their registration. Please read the Calendar carefully before registering in courses, and if you are in doubt about any regulations pertaining to your program, consult the Faculty of Science Office (1-001 CCIS) for clarification.

Students registered in the Faculty of Science must select courses offered by the Faculty of Arts or by the Faculty of Science. In some instances, courses from other Faculties may be permitted by permission of the Dean or designee. Written approval from the Faculty of Science is required if more than *30 are taken in a Fall/Winter, except in those Honors and Specialization programs requiring more than *30 in a given year.

193.3 BSc General Program

 […]

Admission

 […]

Selection of Courses

Note: For success in your chosen program, ensure you have satisfied the pre/corequisite requirements for all courses. Departments have the right to remove students from courses for failing to present a passing
grade (or higher, where stipulated) in the prerequisite course(s) and/or for failing to be enrolled in the corequisite course(s). Please see www.uofa.ualberta.ca/science/programs/undergraduate/admission-to-science for more information.

The following regulations govern the General program:

(1) To obtain a BSc General Degree, a student must receive credit in *120. At least *72 and not more than *102 must be in courses offered by the Faculty of Science. At least *18 and not more than *48 must be in courses offered by the Faculty of Arts.

(2) The General program includes a core of courses which must include the following:
   a. *6 junior ENGL or *3 junior ENGL and *3 junior WRS
   b. *6 from among junior courses offered by the Departments of Computing Science, and Mathematical and Statistical Sciences (CMPUT 101, 174, 175; MATH 113 or 114 or 117; MATH 115 or 118; MATH 125 or 127; STAT 141 or 151)
   c. *6 from among junior courses in the Departments of Chemistry and Physics (ASTRO 120, 122; CHEM 101, 102, 164; PHYS 114, 124, 126, 144, 146)
   d. *6 from among junior Science courses titled Biology, Earth and Atmospheric Sciences, or Science Psychology (BIOL 107, 108; EAS 100, 105; PSYCO 104)
(3) Not more than *42 may be taken at the junior level.

(4) Each student must complete a Science major. See below for specific course requirements in each major subject area of concentration. With the exception of the Physical Science major, which requires *42, all Science majors require a minimum of *36 with at least *12 in 300-level or higher courses taken while registered in the Faculty of Science at the University of Alberta.

(5) Each student must also either:
   a. complete a second Science major. Students who complete a second Science major will not have a minor. The Double Majors will be recorded on the student transcript; or
   b. complete a minor. With exception of the Physical Sciences minor, which requires *27, all minors must have at least *24 with at least *6 in 300-level or higher courses taken while registered in the Faculty of Science at the University of Alberta. The minor may be in Science (see below), in an Arts
subject area of concentration (see §44), in one of a select number of Agricultural, Life and Environmental Sciences subject areas of concentration (see §193.3.1), or in Business (see §193.3.2). For non-Science minors, students are responsible for meeting both the Faculty of Science minor requirements and any outside Faculty or department-specified course requirements. For information about admission to the Business minor, see §16.15.2.

(6) A maximum of *18 may be taken from faculties other than Arts or Science. For applicants to the BSc General who have already taken courses from faculties other than Arts or Science, potential transfer credit for such courses will be assessed at the time of admission to the program. Such subjects are not included as part of the major or minor (with the exception of those courses meeting the requirements for a Business minor or one of the allowable minors from Agricultural, Life and Environmental Sciences), nor toward the minimum requirement of *18 in Arts, nor toward the minimum requirement of *72 in Science.

Majors

A Science major consists of Science courses taken from one of the following nine subject areas of concentration:

<table>
<thead>
<tr>
<th>Subject Area of Concentration</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences</td>
<td>[...]</td>
</tr>
<tr>
<td>Chemistry</td>
<td>[...]</td>
</tr>
<tr>
<td>Computing Science</td>
<td>[...]</td>
</tr>
<tr>
<td>Earth and Atmospheric Sciences</td>
<td>[...]</td>
</tr>
<tr>
<td>Mathematical Sciences</td>
<td>[...]</td>
</tr>
<tr>
<td>Mathematics</td>
<td>[...]</td>
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Majors

A Science major consists of Science courses taken from one of the following nine subject areas of concentration:

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<tr>
<td>Mathematical Sciences</td>
<td>[...]</td>
</tr>
<tr>
<td>Mathematics</td>
<td>[...]</td>
</tr>
</tbody>
</table>
### Physical Sciences

[...]  

### Physics

[...]

### Science Psychology

A major in Psychology consists of at least *36 with at least *12 at the 300-level or higher. The major must include the following:

1. PSYCO 104 and 105  
2. At least *6 chosen from PSYCO 258, 275, 282  
3. At least *6 chosen from PSYCO 233, 239, 241  
4. At least *6 in PSYCO at the 300-level or higher (minimum of *3 from Science and *3 from Arts).  
5. At least *6 in PSYCO at the 400-level or higher (minimum of *3 from Science and *3 from Arts).  

Although it does not count toward the major, students completing a Psychology major must also take STAT 141 or 151. Many senior PSYCO courses require STAT 141 or 151 as a prerequisite so students must plan accordingly.

### Statistics

[...]

### Notes

1. Biological Sciences [...]  
2. [...]  
3. [...]  
4. BIOCH [...]  
5. MA PH [...]  
6. EAS [...]  
7. Courses in the major and minor [...]  
8. Science options may only be taken from the course subjects listed in §195, including SCI and Faculty of Science INT D courses, provided students meet the pre-requisite and eligibility requirements, if any.

### Minors

A Science minor consists of Science courses taken from one of the subject areas listed below.

---

**Bioinformatics**

[...]
Biological Sciences

Chemistry

Computing Science

Earth and Atmospheric Sciences

Earth and Atmospheric Sciences

A minor in Earth and Atmospheric Sciences consists of at least 24 with at least 6 at the 300-level or higher. The minor must include the following:

1. EAS 100
2. At least 12 at the 300-level or higher.

Courses may be chosen from Science EAS, GEOPH or PALEO (see Note 4).

Mathematical Sciences

Mathematics

Physical Sciences (see Note 6)

Physics

Psychology

Statistics

Notes

(1) Biological Sciences courses include […]
(2) BIOIN […]
(3) PALEO […]
(4) BIOCH […]
(5) MA PH […]

Biological Sciences

Chemistry

Computing Science

Earth and Atmospheric Sciences

Earth and Atmospheric Sciences

A minor in Earth and Atmospheric Sciences consists of at least 24 with at least 6 at the 300-level or higher. The minor must include the following:

1. EAS 100
2. At least 6 at the 300-level or higher.

Courses may be chosen from Science EAS, GEOPH or PALEO (see Note 4).

Mathematical Sciences

Mathematics

Physical Sciences (see Note 6)

Physics

Psychology

Statistics

Notes

(1) Biological Sciences courses include […]
(2) BIOIN […]
(3) PALEO […]
(4) BIOCH […]
(5) MA PH […]

Notes

(1) Biological Sciences courses include […]
(2) BIOIN […]
(3) PALEO […]
(4) BIOCH […]
(5) MA PH […]

Dependent on: 
Department Contact: ____________________________
Academic Standing and Graduation

The following regulations govern General Programs:

(1) To obtain a BSc General degree, a minimum 2.0 GPA must be attained on the last 60 credited to the degree. Moreover, a minimum 2.3 GPA must be attained in all courses in the major. Students must be in Satisfactory Standing in the General program in order to graduate (a minimum 2.0 GPA in the final Fall/Winter).

(2) BSc General degrees with Distinction are awarded when students achieve a GPA of 3.5 or higher over the last 60 if the students have satisfactorily completed at least a normal academic load of a minimum of 24 during the Fall/Winter periods of the last two years at the University of Alberta. Normally, only UofA courses will be used in the calculation of the GPA for the last 60 of the program.

193.3.2 BSc General—Minor in Business

Note: For requirements, see §193.3. Students admitted to the program lacking one or more prerequisites will be required to make up the deficiency during the first Fall/Winter in the Business minor program.

BSc General program students admitted to the minor in Business quota must complete the following:

(1) ECON 101, 102
(2) *18 to *30 in courses offered by the Faculty of Business including ACCTG 311; SMO 301; two of FIN 301, MARK 301, OM 352, SMO 321

Notes

(1) Several of the above courses have one or more Arts or Science courses as prerequisites. These prerequisites must be met.
prerequisites must be met.

(2) Students completing a minor in Business must still choose a major in Science and must satisfy the requirement that at least *72 of the *120 credited to the degree be in Science.

(3) Students minoring in Business must still complete at least *18 in Arts. ECON 101 and ECON 102 constitute six of those required Arts units.

Once admitted to the minor in Business, students in the BSc General program will be allowed to continue in the Business minor as long as they remain in good standing in the BSc General program. BSc General program students who have been admitted to the minor in Business and who subsequently apply to transfer to a Specialization or Honors program which has a Business component controlled by quota will have to apply and compete for admission to that quota.

193.4 BSc (Specialization in Science and Education)/BEd (Secondary) Combined Degrees Program

 [...] Admission

 [...] Selection of Courses

Note: For success in your chosen program, ensure you have satisfied the pre/corequisite requirements for all courses. Departments have the right to remove students from courses for failing to present a passing grade (or higher, where stipulated) in the prerequisite course(s) and/or for failing to be enrolled in the corequisite course(s). Please see www.uofa.ualberta.ca/science/programs/undergraduate/admission-to-science for more information.

The following regulations govern the BSc (Specialization in Science and Education)/BEd (Secondary) program:

(1) A student’s program must be approved by an advisor in the appropriate Faculty prior to the start of each Fall/Winter.

(2) Within the *150 program, a student must complete a minimum of *72 in Science, *48 in Education and *18 in Arts.

(3) In the major, at least *12 must be in 300-level or higher courses taken while registered in the BSc (Specialization in Science and Education)/BEd (Secondary) program at the University of Alberta.
(Secondary) program at the University of Alberta.

(4) In the minor, at least *6 must be in 300-level or higher courses taken while registered in the BSc (Specialization in Science and Education)/BEd (Secondary) program at the University of Alberta.

(5) No more than *42 at the 100-level are permitted in the BSc (Specialization in Science and Education)/BEd (Secondary) program.

[...]

194 Programs by Department

194.1 Biochemistry

194.1.1 Honors in Biochemistry

[...]

Year 1

[...]

Year 2

[...]

Year 3

BIOCH 310 (Fall), and BIOCH 401
*6 in senior-level BIOCH courses
*6 in Group A options
*3 in an approved Science option
*6 in approved Arts options

Year 4

*9 in senior-level BIOCH courses
BIOCH 499
*6 in Group A or Group B options
*6 in approved options
*3 in an approved Arts option

Notes

(1) Students must receive a grade of not less than B- in all Biochemistry courses credited toward the minimum number required for the degree.

(2) Students should consult the Department of Biochemistry for advice about course selection throughout the program. Several alternative course schedules are possible.

(3) Group A options are selected from BIOCH 4XX, CHEM, PHYS, MATH, STAT, CMPUT. Group B options are selected from Group A or BIOIN, CELL, GENET, IMIN, MICRB, PHYSL, PMCOL. Group A and B options may not be junior courses.

(4) Credit in SCI 100 will be considered equivalent

(4) In the minor, at least *6 must be in 300-level or higher courses taken while registered in the BSc (Specialization in Science and Education)/BEd (Secondary) program at the University of Alberta.

(5) No more than *42 at the 100-level are permitted in the BSc (Specialization in Science and Education)/BEd (Secondary) program.

[...]
194.1.2 Specialization in Biochemistry

### Year 1

[BIOCH 310 (Fall), and BIOCH 401

*6 in senior-level BIOCH courses
*3 in Group A options
*6 in approved Science options
*6 in approved Arts options

### Year 2

### Year 3

### Year 4

*6 in senior-level BIOCH courses
*6 in approved Science options
*3 in an approved Arts option
*12 in approved options
*3 in Group B options

**Notes**

(1) Students must receive a grade of not less than B- in BIOCH 200, 310, 320 and 330, and C in all other BIOCH courses credited toward the minimum number required for the degree.

(2) Students should consult the Department of Biochemistry for advice about course selection throughout the program. Several alternative course schedules are possible.

(3) Group A options are selected from BIOCH 4XX, CHEM, CMPUT, MATH, PHYS, STAT. Group B options are selected from Group A or BIOIN, CELL, GENET, IMIN, MICRB, PHYSL, PMCOL. Group A and B options may not be junior courses.

(4) Students in the specialization program are strongly encouraged to take BIOCH 498 or 499 as a fourth year Science option.

(5) Credit in SCI 100 will be considered equivalent to BIOL 107, CHEM 101, 102, 164, MATH 114, PHYS 124, 126, *3 junior-level MATH or STAT option and *3 Science option ($195).
194.2 Biological Sciences

The following courses are common to all programs:

- BIOL 107, 108; CHEM 101, 164 or 261; MATH 113 or 114 or 125; STAT 151; *6 in Arts options (junior level ENGL or WRS recommended); *6 in program-specific courses (see individual programs for requirements and recommendations). SCI 100 may be used in lieu of BIOL 107, 108, CHEM 101, 164 and MATH 114.

194.3 Cell Biology

194.3.1 Honors in Cell Biology

Notes
- Students are required to consult the Department of Cell Biology for selection and approval of all options.
- Students are encouraged to select approved options from the Cell Biology Group A or recommended options list, but may also follow a course of study tailored to their interests (must be approved by a Cell Biology advisor).
- Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 102, 164, MATH 114, 115, PHYS 124, 126.

194.3.2 Specialization in Cell Biology

Notes
- Students are required to consult the Department of Cell Biology for selection and approval of all options.
- Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.
(2) Students are encouraged to select approved options from the Cell Biology Group A or recommended options list, but may also follow a course of study tailored to their interests (must be approved by a Cell Biology advisor).

(3) Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 102, 164, MATH 114, 115, PHYS 124, 126.

194.4 Chemistry

194.4.1 Honors in Chemistry
Honors students in Chemistry must take a core of Chemistry and auxiliary courses. The core consists of ★45 in Chemistry courses, ★12 in Mathematics courses, ★6 in Physics courses, ★3 in BIOCH 200, ★3 in CHEM 401, ★6 in a junior ENGL or ★3 in ENGL and ★3 in Arts option, and ★12 in Arts options. In addition to the core courses, honors students must complete at least ★18 in senior courses in Chemistry from the courses listed below, with ★6 of these taken at the 400-level. Finally, the honors student must include ★15 in options in the third and fourth years of the program. These are normally chosen from offerings within the Faculty of Science. All options must be selected in consultation with the Department of Chemistry.

Continuation in the Honors in Chemistry program requires successful completion of at least ★24 with a minimum 3.0 GPA and a minimum 3.0 GPA on all CHEM courses completed in the previous Fall/Winter. In addition, graduation requires a minimum 3.0 GPA on the last ★90 credited to the degree.

The Honors Chemistry degree is accredited by the Canadian Society for Chemistry.

Year 1
CHEM 101, 102, 261 (or 164)
MATH 114 (or 134 or 144)
MATH 115 (or 146)
PHYS 144, 146 (recommended) or PHYS 124, 126
★6 in junior ENGL or ★3 in junior ENGL and ★3 in an Arts option
★3 in Science option

Year 2
[...]

(3) Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 102, 164, MATH 114, 115, PHYS 124, 126.

(4) Credit in SCI 151 will be considered equivalent to STAT 151 and ★3 Science option.
# Programs
Faculty of Science
Calendar Changes 2016-2017

Year 2

Years 3 and 4
CHEM 313, 361, 363, 371, 373, 398
BIOCH 200
CHEM 401
★18 in senior chemistry courses (with at least ★6 taken at the 400 level).
★12 in Science options
★6 in Arts options

Senior Courses in Chemistry
BIOCH 310, 320, 330
CHEM 303, 305, 333, 400 (if not taken as a requirement), 401 (if not taken as a requirement), 403, 405, 419, 424, 425, 434, 436, 437, 438, 439, 443, 444, 461, 462, 463, 464, 477, 479, 483, 489, 493, 495

Note: Credit in SCI 100 will be considered equivalent to CHEM 101, 102, 164; MATH 114, 115; PHYS 144, 146; BIOL 107 and ★3 Science option.

194.4.2 Specialization in Chemistry

Year 1
CHEM 101, 102, 261 (or 164)
MATH 114 (or 134 or 144)
MATH 115 (or 146)
PHYS 144, 146 (recommended) or PHYS 124, 126
★6 in junior ENGL or WRS or ★3 junior ENGL and ★3 in Arts option
★3 in Science option

Year 2

Years 3 and 4
CHEM 313, 361, 371, 373, 398
BIOCH 200
★9 in senior chemistry courses (with at least ★3 taken at the 400-level).
★12 in Science options (§195)
★6 in Arts options
*15 in approved options

Senior Courses in Chemistry
BIOCH 310, 320, 330
CHEM 303, 305, 333, 400 (if not taken as a requirement), 401 (if not taken as a requirement), 403, 405, 419, 424, 425, 434, 436, 437, 438, 439, 443, 444, 461, 462, 463, 464, 477, 479, 483, 489, 493, 495

Note: Credit in SCI 100 will be considered equivalent to CHEM 101, 102, 164; MATH 114, 115; PHYS 144, 146; BIOL 107 and ★3 Science option (§195). Credit in SCI 151 will be considered equivalent to STAT 151 and ★3 Science option.

194.4.2 Specialization in Chemistry

Year 1
CHEM 101, 102, 261 (or 164)
MATH 114 (or 134 or 144)
MATH 115 (or 146)
PHYS 144, 146 (recommended) or PHYS 124, 126
★6 in junior ENGL or WRS or ★3 junior ENGL and ★3 in Arts option
★3 in Science option (§195)

Year 2

Years 3 and 4
CHEM 313, 361, 371, 373, 398
BIOCH 200
★9 in senior chemistry courses (with at least ★3 taken at the 400-level).
★12 in Science options (§195)
★6 in Arts options
*15 in approved options

Senior Courses in Chemistry
BIOCH 310, 320, 330
Senior Courses in Chemistry

BIOCH 310, 320, 330

Notes
(1) Approved options are normally chosen from offerings within the Faculty of Science.
(2) All options must be selected in consultation with the Department of Chemistry.
(3) Credit in SCI 100 will be considered equivalent to BIOL 107, CHEM 101, 102, 164, MATH 114, 115, PHYS 144, 146 and *3 Science option.

194.5 Computing Science

194.5.1 Honors in Computing Science

Year 1
CMPUT 274 and 275
*6 in junior ENGL or *3 in junior ENGL and *3 junior WRS
*9 in Science options
*9 in approved options

Year 2
*9 in Science options
*6 in Arts options
*15 in approved options

Year 3
*15 in CMPUT at the 300-level or 400-level (see Note 3)
*9 in Science options
*3 in Arts options
*3 in approved options


Notes
(1) Approved options are normally chosen from offerings within the Faculty of Science. (§195)
(2) All options must be selected in consultation with the Department of Chemistry.
(3) Credit in SCI 100 will be considered equivalent to BIOL 107, CHEM 101, 102, 164, MATH 114, 115, PHYS 144, 146 and *3 Science option. Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.
194.5.2 Specialization in Computing Science

Year 1
[...]

Year 2
[...]

Year 3
[...]

Year 4
[...]

Notes
(1) Options consist of Science options, Arts options, and other approved options. The options must satisfy at least *21 from Science and at least *12 from Arts; *30 can be chosen from Science, Arts or another Faculty. At least *9 in options must be at the 300-level or higher.

(2) Higher level CMPUT courses may require specific CMPUT, MATH or STAT courses as prerequisites. Therefore, prerequisites for higher level CMPUT courses must be considered when choosing options.

(3) Students must have *6 in introductory statistics and probability. This can be satisfied by selecting (STAT 141, 151 or 235) and STAT 252, or the more advanced sequence of STAT 265 and 266.

(4) At least *6 in CMPUT must be at the 400-level.
### Programs
#### Faculty of Science
#### Calendar Changes 2016-2017

<table>
<thead>
<tr>
<th>194.5.3 Specialization in Computing Science—Minor in Business</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image.png" alt="Table" /></td>
</tr>
</tbody>
</table>

#### Year 1
- [Year 1 Notes](#)

#### Year 2
- [Year 2 Notes](#)

#### Year 3
- [Year 3 Notes](#)

#### Year 4
- [Year 4 Notes](#)

### Notes
1. Options consist of Science options, Arts options, Business options, and approved options from any Faculty. The options must satisfy at least *12 from Science and *6 from Arts, and an additional *12 that may be chosen from Science, Arts or another Faculty. Higher level CMPUT courses may require specific CMPUT, MATH or STAT courses as prerequisites. Therefore, prerequisites for higher level CMPUT courses must be considered when choosing options.
2. Students must have *6 in introductory statistics and probability. This can be satisfied by selecting (STAT 141, 151 or 235) and STAT 252, or the more advanced sequence of STAT 265 and 266.
3. Students must take *3 in Group A courses which include CMPUT 304, 325, 340 and 474. A complete list of Group A courses to be offered in a given year is available from the department.
4. Students must take *3 in Group B project courses which include CMPUT 400, 401, 410, 412, 414, 415, 422, and 466. The department may approve variations in the above requirement on application.
5. Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 Science options.
6. Credit cannot be obtained in approved options for MIS 311, 415, 419, 435 and MGTSC 312.

---

Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 Science options. (§195)

At least *6 in CMPUT must be at the 400-level. (4)

Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option (§195). (5) Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 Science options. (§195). (6) Credit cannot be obtained in approved options for MIS 311, 415, 419, 435 and MGTSC 312.
### 194.5.4 Computing Science Specialization in Software Practice

**Year 1**
- CMPUT 174, 175, 272 (see Note 1)
- MATH 114, 115
- *6 in junior ENGL or *3 in junior ENGL and *3 junior WRS
- *6 in Science options
- *3 in an approved option (see Note 6)

**Year 2**
- CMPUT 174, 175, 272 (see Note 1)
- MATH 114, 115
- *6 in junior ENGL or *3 in junior ENGL and *3 junior WRS
- *6 in Science options
- *3 in an approved option (see Note 6)

**Year 3**
- CMPUT 300, 301, 379
- *6 in CMPUT at the 300-level or higher (see Note 4)
- *6 in Business options (see Note 2)
- *3 in an Arts option
- *6 in Science options (see Note 6)

**Year 4**
- CMPUT 325, 400, 401, 402
- *3 in CMPUT at the 300-level or higher (see Note 4)
- *6 in Business electives (see Note 2 below)
- *3 in an approved option (see Note 6)
- *3 in a Science option
- *3 in an Arts option (see Note 6)

**Year 5**
- CMPUT 325, 400, 401, 402
- *3 in CMPUT at the 300-level or higher (see Note 4)
- *6 in Business electives (see Note 2 below)
- *3 in an approved option (see Note 6)
- *3 in a Science option
- *3 in an Arts option (see Note 6)

### Notes

- (5) Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 options.  
- (6) Credit cannot be obtained in approved options for MIS 311, 415, 419, 435 and MGTSC 312.

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### 194.6.1 Honors in Atmospheric Sciences

**Year 1**
- CMPUT 300, 301, 379
- *6 in CMPUT at the 300-level or higher (see Note 4)
- *6 in Business options (see Note 2)
- *3 in an Arts option
- *6 in Science options (see Note 6)

**Notes**

- (5) Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 options.  
- (6) Credit cannot be obtained in approved options for MIS 311, 415, 419, 435 and MGTSC 312.
- (7) Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.
<table>
<thead>
<tr>
<th>Year 2</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 212, 221 and 270 EAS 294 or HGP 250 MATH 214 and 215 PHYS 244 and 281 *3 Science option *3 Arts option</td>
<td>EAS 212, 221 and 270 EAS 294 or HGP 250 MATH 214 and 215 PHYS 244 and 281 *3 Science option (§195) *3 Arts option</td>
</tr>
<tr>
<td>Year 3</td>
<td>Year 3</td>
</tr>
<tr>
<td>EAS 327, 370, 371, 372 and 373 PHYS 234 *6 in Arts options *3 in Science options (see Note 1 below) *3 in Open option (see Note 2 below)</td>
<td>EAS 327, 370, 371, 372 and 373 PHYS 234 *6 in Arts options *3 in Science options (see Note 1 below) (§195) *3 in Open option (see Note 2 below)</td>
</tr>
<tr>
<td>Year 4</td>
<td>Year 4</td>
</tr>
<tr>
<td>EAS 426 EAS 470, 471 and 475 *12 in Science options (see Note 1 below) *3 in Open option (see Note 2 below)</td>
<td>EAS 426 EAS 470, 471 and 475 *12 in Science options (see Note 1 below) (§195) *3 in Open option (see Note 2 below)</td>
</tr>
</tbody>
</table>

Notes
(1) Students are recommended to consult Advisor for approved Science options.
(2) Open option – Chosen from any credit course offered by the University of Alberta
(3) For students in the Science Internship Program: EAS 401, WKEXP 955, 956.
(4) Recommended Arts options include any EAS X9X courses or any HGP courses.
(5) For students entering Atmospheric Science Honors, credit in SCI 100 will be considered equivalent to CMPUT 174, EAS 100, MATH 113, 115, PHYS 144, 146 and *9 Science options equivalent to CHEM 101, 102 and EAS 105.

Specialization in Atmospheric Sciences

Year 2
EAS 212, 221, and 270 EAS 294 or HGP 250 MATH 214 and 215 PHYS 244 and 281 *3 in an Arts option *3 in a Science option

Year 3
EAS 327, 370, 371, 372 and 373 PHYS 234 *6 in Arts options *3 in Science option (see Note 1 below) *3 in Open option (see Note 2 below)

Year 4

Specialization in Atmospheric Sciences

Year 2
EAS 212, 221, and 270 EAS 294 or HGP 250 MATH 214 and 215 PHYS 244 and 281 *3 in an Arts option *3 in a Science option (§195)

Year 3
EAS 327, 370, 371, 372 and 373 PHYS 234 *6 in Arts options *3 in Science option (see Note 1 below) (§195) *3 in Open option (see Note 2 below)

Year 4
### Programs
#### Faculty of Science
#### Calendar Changes 2016-2017

**EAS 470, 471 and 475**  
*18 in Science options (see Note 1 below)  
*3 in Open option (see Note 2 below)

**Notes**  
(1) Students are recommended to consult Advisor for approved Science options.  
(2) Open option – Chosen from any credit course offered by the University of Alberta  
(3) For students in the Industrial Internship Program: EAS 401, WKEXP 955, 956.  
(4) Recommended Arts options include any EAS X9X courses or any HGP courses.  
(5) For students entering Atmospheric Science Specialization, credit in SCI 100 will be considered equivalent to CMPUT 174, EAS 100, MATH 113, 115, PHYS 144, 146 and *9 Science options equivalent to CHEM 101, 102 and EAS 105.

---

| **EAS 470, 471 and 475** | **EAS 470, 471 and 475**  
*18 in Science options (see Note 1 below)  
*3 in Open option (see Note 2 below) |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Notes</strong></td>
<td><strong>Notes</strong></td>
</tr>
<tr>
<td>(1) Students are recommended to consult Advisor for approved Science options.</td>
<td>(1) Students are recommended to consult Advisor for approved Science options.</td>
</tr>
<tr>
<td>(2) Open option – Chosen from any credit course offered by the University of Alberta</td>
<td>(2) Open option – Chosen from any credit course offered by the University of Alberta</td>
</tr>
<tr>
<td>(3) For students in the Industrial Internship Program: EAS 401, WKEXP 955, 956.</td>
<td>(3) For students in the Industrial Internship Program: EAS 401, WKEXP 955, 956.</td>
</tr>
<tr>
<td>(4) Recommended Arts options include any EAS X9X courses or any HGP courses.</td>
<td>(4) Recommended Arts options include any EAS X9X courses or any HGP courses.</td>
</tr>
<tr>
<td>(5) For students entering Atmospheric Science Specialization, credit in SCI 100 will be considered equivalent to CMPUT 174, EAS 100, MATH 113, 115, PHYS 144, 146 and *9 Science options equivalent to CHEM 101, 102 and EAS 105.</td>
<td>(5) For students entering Atmospheric Science Specialization, credit in SCI 100 will be considered equivalent to CMPUT 174, EAS 100, MATH 113, 115, PHYS 144, 146 and *9 Science options equivalent to CHEM 101, 102 and EAS 105. Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.</td>
</tr>
</tbody>
</table>

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#### Honors in Environmental Earth Sciences

<table>
<thead>
<tr>
<th>Year 4</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 425 or 468</td>
<td>EAS 425 or 468</td>
</tr>
<tr>
<td>EAS 426</td>
<td>EAS 426</td>
</tr>
<tr>
<td>*6 of EAS 457 or 458</td>
<td>*6 of EAS 457 or 458</td>
</tr>
<tr>
<td>*6 Arts options</td>
<td>*6 Arts options</td>
</tr>
<tr>
<td>*9 Science and related options</td>
<td>*9 Science and related options</td>
</tr>
</tbody>
</table>

**Notes**  
(1) EAS 458 may be taken more than once for credit.  
Science and related options require the approval of the Environmental Earth Sciences advisor.  
(2) For students in the Science Internship Program: EAS 401, WKEXP 955, 956.  
(3) For students entering Environmental Earth Science Honors, credit in SCI 100 will be considered equivalent to BIOL 108, CHEM 101, 102, EAS 100, 105, MATH 113, 115, PHYS 144 and 146.

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#### Specialization in Environmental Earth Sciences

<table>
<thead>
<tr>
<th>Year 4</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 425 or 468</td>
<td>EAS 425 or 468</td>
</tr>
<tr>
<td>*6 of EAS 457 or 458</td>
<td>*6 of EAS 457 or 458</td>
</tr>
<tr>
<td>*6 in Arts options</td>
<td>*6 in Arts options</td>
</tr>
<tr>
<td>*15 Science and related options</td>
<td>*15 Science and related options</td>
</tr>
</tbody>
</table>

**Notes**  
(1) EAS 458 may be taken more than once for credit.  
Science and related options require the approval of the Environmental Earth Sciences advisor.  
(2) For students in the Science Internship Program: EAS 401, WKEXP 955, 956.  
(3) For students entering Environmental Earth Science Honors, credit in SCI 100 will be considered equivalent to BIOL 108, CHEM 101, 102, EAS 100, 105, MATH 113, 115, PHYS 144 and 146. Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.  
(4) Recommended Arts options include any EAS X9X courses or any HGP courses.  
(5) For students entering Atmospheric Science Specialization, credit in SCI 100 will be considered equivalent to CMPUT 174, EAS 100, MATH 113, 115, PHYS 144, 146 and *9 Science options equivalent to CHEM 101, 102 and EAS 105. Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.
## Programs
### Faculty of Science
### Calendar Changes 2016-2017

<table>
<thead>
<tr>
<th>Notes</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) EAS 458 may be taken more than once for credit. Science and related options require the approval of the Environmental Earth Sciences advisor.</td>
<td>(1) EAS 458 may be taken more than once for credit. Science and related options require the approval of the Environmental Earth Sciences advisor.</td>
</tr>
<tr>
<td>(2) For students in the Science Internship Program: EAS 401, WKEXP 955, 956.</td>
<td>(2) For students in the Science Internship Program: EAS 401, WKEXP 955, 956.</td>
</tr>
<tr>
<td>(3) For students entering Environmental Earth Science Specialization, credit in SCI 100 will be considered equivalent to BIOL 108, CHEM 101, 102, EAS 100, 105, MATH 113, 115, PHYS 144 and 146.</td>
<td>(3) For students entering Environmental Earth Science Specialization, credit in SCI 100 will be considered equivalent to BIOL 108, CHEM 101, 102, EAS 100, 105, MATH 113, 115, PHYS 144 and 146. Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.</td>
</tr>
</tbody>
</table>

### Honors in Geology

#### Year 3
- EAS 320, 323, 331, 332, 333 and 336 EAS 364 or 368
- GEOPH 210 or 223 or 224
  *3 Arts option
  *3 Science option

#### Year 4
- EAS 426
- GEOPH 210 or 223 or 224
  *6 Arts option
  *12 EAS Science courses numbered 300 or higher
  *3 Science option

<table>
<thead>
<tr>
<th>Notes</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Recommended Arts options include any EAS X9X courses or any HGP courses.</td>
<td>(1) Recommended Arts options include any EAS X9X courses or any HGP courses.</td>
</tr>
<tr>
<td>(2) For students in the Science Internship Program: EAS 401, WKEXP 955, 956.</td>
<td>(2) For students in the Science Internship Program: EAS 401, WKEXP 955, 956.</td>
</tr>
<tr>
<td>(3) For students entering Geology Honors, credit in SCI 100 will be considered equivalent to BIOL 108, CHEM 101, 102, EAS 100, 105, MATH 113, 115, PHYS 144 and 146.</td>
<td>(3) For students entering Geology Honors, credit in SCI 100 will be considered equivalent to BIOL 108, CHEM 101, 102, EAS 100, 105, MATH 113, 115, PHYS 144 and 146. Credit in SCI 151 will be considered equivalent to *6 Science options.</td>
</tr>
</tbody>
</table>

### Specialization in Geology

#### Year 1
[...]

#### Year 2
[...]

#### Year 3
- EAS 320, 323, 331, 332, 333 and 336 EAS 364 or 368
- GEOPH 210 or 223 or 224
  *3 Arts option

<table>
<thead>
<tr>
<th>Notes</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Recommended Arts options include any EAS X9X courses or any HGP courses.</td>
<td>(1) Recommended Arts options include any EAS X9X courses or any HGP courses.</td>
</tr>
<tr>
<td>(2) For students in the Science Internship Program: EAS 401, WKEXP 955, 956.</td>
<td>(2) For students in the Science Internship Program: EAS 401, WKEXP 955, 956.</td>
</tr>
<tr>
<td>(3) For students entering Geology Honors, credit in SCI 100 will be considered equivalent to BIOL 108, CHEM 101, 102, EAS 100, 105, MATH 113, 115, PHYS 144 and 146.</td>
<td>(3) For students entering Geology Honors, credit in SCI 100 will be considered equivalent to BIOL 108, CHEM 101, 102, EAS 100, 105, MATH 113, 115, PHYS 144 and 146. Credit in SCI 151 will be considered equivalent to *6 Science options.</td>
</tr>
</tbody>
</table>
**Specialization in Planning**

<table>
<thead>
<tr>
<th>Year</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>BIOL 108, EAS 100 and 105, HGP 100, MATH 113 or 114 or 117 or 144 or 120 STAT 141 or 151, *3 option</td>
</tr>
<tr>
<td>Year 2</td>
<td>BIOL 208, EAS 221, 225 and 250 HGP 210, 211, 240, 250, *6 Science options</td>
</tr>
<tr>
<td>Year 3</td>
<td>EAS 351, HGP 310, 315, 316, 317, 355, EAS 399, MATH 113 or 114 or 117 or 144 or 120 STAT 141 or 151, *3 option, *3 Science options</td>
</tr>
<tr>
<td>Year 4</td>
<td>HGP 410, 412, 470, HGP 495, MATH 113 or 114 or 117 or 144 or 120 STAT 141 or 151, *3 option, *3 Science options</td>
</tr>
</tbody>
</table>

Notes:
1. List A courses include: BIOL 299, 330, 331, 332, 333, 364, 365, 366, 381, 464 and 470; EAS 323, ...
| Programs  
Faculty of Science  
Calendar Changes 2016-2017 |
|-----------------------------|
(2) For students entering the Science Internship Program: EAS 401, WKEXP 955, 956 are required.  
(3) HGP 355, 381, 470 and 485 may be used as a Science courses by students in the BSc Specialization in Planning program. |
(2) For students entering the Science Internship Program: EAS 401, WKEXP 955, 956 are required.  
(3) HGP 355, 381, 470 and 485 may be used as a Science courses by students in the BSc Specialization in Planning program. |

### 194.8.1 Honors in Immunology and Infection

[...]

Notes
(1) GENET 270 is the prerequisite for GENET 304 and MICRB 316, while BIOCH 320 and 330 are prerequisites for BIOCH 430.
(2) At least *3 must be in a course with a laboratory component.
(3) Normally only *12 are allowed outside the Faculties of Science and Arts in the entire program. See §194 for courses outside the Faculty of Science that will be considered as Science options.
(4) Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 102, 164, MATH 114 and *9 approved options.

### 194.8.2 Specialization in Immunology and Infection

[...]

Notes
(1) GENET 270 is the prerequisite for GENET 304, MICRB 316; while BIOCH 320 and 330 are prerequisites for BIOCH 430.
(2) At least *3 must be in a course with a laboratory component.
(3) Normally only *12 are allowed outside the Faculties of Science and Arts in the entire program. See §194 for courses outside the Faculty of Science that will be considered as Science options.
(4) Credit in SCI 100 is considered equivalent to BIOL 107, 108, CHEM 101, 102, 164, MATH 114 and *9 approved options.

### 194.10.1 Honors in Mathematics

[...]

Notes
(1) GENET 270 is the prerequisite for GENET 304, MICRB 316; while BIOCH 320 and 330 are prerequisites for BIOCH 430.
(2) At least *3 must be in a course with a laboratory component.
(3) Normally only *12 are allowed outside the Faculties of Science and Arts in the entire program. See §195 for courses outside the Faculty of Science that will be considered as Science options.
(4) Credit in SCI 100 is considered equivalent to BIOL 107, 108, CHEM 101, 102, 164, MATH 114 and *9 approved options.
(5) Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.
Programs
Faculty of Science
Calendar Changes 2016-2017

<table>
<thead>
<tr>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 117, 118, 127, 227 [see Note (2)]</td>
</tr>
<tr>
<td>*6 in an approved Science option</td>
</tr>
<tr>
<td>*6 in approved Arts options</td>
</tr>
<tr>
<td>*6 in approved options</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 217, 317, 328, either 326 or 334</td>
</tr>
<tr>
<td>*6 in approved Science options</td>
</tr>
<tr>
<td>*6 in approved Arts options</td>
</tr>
<tr>
<td>*6 in approved options</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years 3 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 326, 334, 411, 417, 418, 424, 447, 448 and 499</td>
</tr>
<tr>
<td>*12 in approved Science options including *3 in CMPUT or STAT</td>
</tr>
<tr>
<td>*6 in approved Arts options</td>
</tr>
<tr>
<td>*18 in approved options</td>
</tr>
</tbody>
</table>

Notes
(1) Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences.
(2) With consent of the Department, students may substitute MATH 100, 113, 114, 134, or 144 for MATH 117; MATH 101, 115, or 146 for MATH 118; MATH 102 or 125 for MATH 127; MATH 225 for MATH 227.
(3) Several of the required courses, including MATH 411, 424, 447, and 448, may only be offered in alternate years.
(4) ECON 299, 386 or 387 may not be used for credit in any Honors degree offered by the Department of Mathematical and Statistical Sciences.
(5) SCI 100 will be considered equivalent to MATH 114, 115, CMPUT 174 and *18 Science options.
(6) Credit in SCI 151 will be considered equivalent to *6 Science options.
194.10.4 Specialization in Mathematics

[...]

Year 1
MATH 114 (or 117 or 134 or 144)
MATH 115 (or 118 or 146)
MATH 125 (or 127)
CMPUT 174 and 175
*6 in junior ENGL, or *3 junior ENGL and *3 junior WRS
*3 in an approved Science option
*6 in approved options

Year 2
MATH 214 (or 217), 215 (or 317)
MATH 225 (or 227)
MATH 228
*3 in an approved MATH option
*3 in an approved Science option
*6 in approved Arts options
*6 in approved options

Year 3
MATH 314, 414 [see Note (3)]
*6 in approved MATH options
*6 in approved Science options
*6 in approved Arts options
*6 in approved options

Year 4
*12 in approved MATH options at the 300-level or higher
*6 in approved Science options
*12 in approved options

Notes
(1) Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences.
(2) Students are encouraged to take at least 6 in MATH in each Fall/Winter of the program.
(3) A student presenting the Honors Calculus sequence MATH 117/118/217/317 must substitute MATH options for MATH 314 and 414
(4) Credit will not be given for ECON 299, 386 or
<table>
<thead>
<tr>
<th>387.</th>
<th>Credit for SCI 100 will be considered equivalent to MATH 114, 115, CMPUT 174 and *18 Science options</th>
</tr>
</thead>
<tbody>
<tr>
<td>387.</td>
<td>Credit for SCI 100 will be considered equivalent to MATH 114, 115, CMPUT 174 and *18 Science options ($195).</td>
</tr>
<tr>
<td>387.</td>
<td>Credit in SCI 151 will be considered equivalent to *6 Science options</td>
</tr>
</tbody>
</table>
194.10.5 Specialization in Mathematics - Computational Science

Notes

1. Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences.
2. The program must contain at least *72 in Science and *18 in Arts.
3. Recommended MATH options include MATH 314, 322, 324, 325, 334, 337, 373, 414, 421, 422, 481.
4. Recommended CMPUT options include CMPUT 301, 304, 313, 325, 379, 391, 401, 411.
5. Recommended STAT options include STAT 368, 371, 378, 471, 479.
6. Credit will not be given for ECON 299, 386 or 387.
7. Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 options.

194.10.5 Specialization in Mathematics - Computational Science

Notes

1. Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences.
2. The program must contain at least *72 in Science and *18 in Arts.
3. Recommended MATH options include MATH 314, 322, 324, 325, 334, 337, 373, 414, 421, 422, 481.
4. Recommended CMPUT options include CMPUT 301, 304, 313, 325, 379, 391, 401, 411.
5. Recommended STAT options include STAT 368, 371, 378, 471, 479.
6. Credit will not be given for ECON 299, 386 or 387.
7. Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 options.
8. Credit in SCI 151 will be considered equivalent to *6 Science options.

194.10.6 Honors in Applied Mathematics

 [...] Year 1

MATH 117, 118, 127, 227 [see Note (2)]
*6 in approved Science options
*6 in approved Arts options
*6 in approved options

Year 2

MATH 217, 317, 326 or 328, 334
*6 in approved Science options
*6 in approved Arts options
*6 in approved options

Years 3 and 4

*21 in Mathematics including MATH 337, 381, 411, 417, 436, 499
*6 in approved options at the 300-level or higher in the field of application
*3 in an approved 300- or 400-level MATH or MA PH

194.10.6 Honors in Applied Mathematics

 [...] Year 1

MATH 117, 118, 127, 227 [see Note (2)]
*6 in approved Science options
*6 in approved Arts options
*6 in approved options

Year 2

MATH 217, 317, 326 or 328, 334
*6 in approved Science options
*6 in approved Arts options
*6 in approved options

Years 3 and 4

*21 in Mathematics including MATH 337, 381, 411, 417, 436, 499
*6 in approved options at the 300-level or higher in the field of application
*3 in an approved 300- or 400-level MATH or MA PH
**Programs**  
**Faculty of Science**  
**Calendar Changes 2016-2017**

<table>
<thead>
<tr>
<th>*3 in CMPUT or STAT option</th>
<th>*3 in CMPUT or STAT option</th>
</tr>
</thead>
<tbody>
<tr>
<td>*9 in approved Science options</td>
<td>*9 in approved Science options (§195)</td>
</tr>
<tr>
<td>*6 in approved Arts options</td>
<td>*6 in approved Arts options</td>
</tr>
<tr>
<td>*12 in approved options</td>
<td>*12 in approved options</td>
</tr>
</tbody>
</table>

**Notes**

1. Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences.
2. With consent of the Department, students may substitute MATH 100, 113, 114, 134, or 144 for MATH 117; MATH 101, 115, or 146 for MATH 118; MATH 102 or 125 for MATH 127; MATH 225 for MATH 227.
3. Several of the required courses, including MATH 411, may only be offered in alternate years.
4. ECON 299, 386 or 387 may not be used for credit in any Honors degree offered by the Department of Mathematical and Statistical Sciences.
5. SCI 100 will be considered equivalent to MATH 114, 115, CMPUT 174 and *18 Science options.
6. Credit in SCI 151 will be considered equivalent to *6 Science options.
<table>
<thead>
<tr>
<th>194.10.9 Honors in Mathematics and Economics</th>
<th>194.10.9 Honors in Mathematics and Economics</th>
</tr>
</thead>
<tbody>
<tr>
<td>[...]</td>
<td>[...]</td>
</tr>
<tr>
<td><strong>Year 1</strong></td>
<td><strong>Year 1</strong></td>
</tr>
<tr>
<td>ECON 101, 102</td>
<td>ECON 101, 102</td>
</tr>
<tr>
<td>MATH 117, 118, 127, 227 [see Note (2)]</td>
<td>MATH 117, 118, 127, 227 [see Note (2)]</td>
</tr>
<tr>
<td>*6 junior ENGL or *3 junior ENGL and *3 junior WRS</td>
<td>*6 junior ENGL or *3 junior ENGL and *3 junior WRS</td>
</tr>
<tr>
<td>*6 in approved Science options</td>
<td>*6 in approved Science options</td>
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<tr>
<td><strong>Year 2</strong></td>
<td><strong>Year 2</strong></td>
</tr>
<tr>
<td>ECON 281, 282</td>
<td>ECON 281, 282</td>
</tr>
<tr>
<td>MATH 217, 317, 325 or 326 or 328 STAT 265, 266</td>
<td>MATH 217, 317, 325 or 326 or 328 STAT 265, 266</td>
</tr>
<tr>
<td>*3 in approved Science options</td>
<td>*3 in approved Science options</td>
</tr>
<tr>
<td>*6 in approved options</td>
<td>*6 in approved options</td>
</tr>
<tr>
<td><strong>Years 3 and 4</strong></td>
<td><strong>Years 3 and 4</strong></td>
</tr>
<tr>
<td>ECON 384, 385, 399, 481, 482, 497</td>
<td>ECON 384, 385, 399, 481, 482, 497</td>
</tr>
<tr>
<td>*6 in Economics options</td>
<td>*6 in Economics options</td>
</tr>
<tr>
<td>*12 from MATH 334, 373, 381, 411, 417, 421, 422, 481</td>
<td>*12 from MATH 334, 373, 381, 411, 417, 421, 422, 481</td>
</tr>
<tr>
<td>*12 in MATH or STAT courses</td>
<td>*12 in MATH or STAT courses</td>
</tr>
<tr>
<td>*6 in approved Science options</td>
<td>*6 in approved Science options</td>
</tr>
<tr>
<td>*6 in approved options</td>
<td>*6 in approved options</td>
</tr>
</tbody>
</table>

**Notes**

1. Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences.

2. With consent of the Department, students may substitute MATH 100, 113, 114, 134, or 144 for MATH 117; MATH 101, 115, or 146 for MATH 118; MATH 102 or 125 for MATH 127; MATH 225 for MATH 227.

3. Credit is not granted for ECON 299, 386 or 387.

4. Credit in SCI 100 will be considered equivalent to MATH 114, 115, *15 Science options and *6 approved options.

5. Credit in SCI 151 will be considered equivalent to *6 Science options.

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<table>
<thead>
<tr>
<th>194.10.10 Specialization in Mathematics and Economics</th>
<th>194.10.10 Specialization in Mathematics and Economics</th>
</tr>
</thead>
<tbody>
<tr>
<td>[...]</td>
<td>[...]</td>
</tr>
</tbody>
</table>

**Notes**

1. Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences.

2. With consent of the Department, students may substitute MATH 100, 113, 114, 134, or 144 for MATH 117; MATH 101, 115, or 146 for MATH 118; MATH 102 or 125 for MATH 127; MATH 225 for MATH 227.

3. Credit is not granted for ECON 299, 386 or 387.

4. Credit in SCI 100 will be considered equivalent to MATH 114, 115, *15 Science options and *6 approved options.

5. Credit in SCI 151 will be considered equivalent to *6 Science options.
## Programs

### Faculty of Science

#### Calendar Changes 2016-2017

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 1</th>
</tr>
</thead>
</table>
| **ECON 101, 102**  
**MATH 114 (or 117 or 134 or 144)**  
**MATH 115 (or 118 or 146)**  
**MATH 125 (or 127)**  
**STAT 151**  
*6 junior ENGL, or *3 junior ENGL and *3 junior WRS* |
| **ECON 101, 102**  
**MATH 114 (or 117 or 134 or 144)**  
**MATH 115 (or 118 or 146)**  
**MATH 125 (or 127)**  
**STAT 151**  
*6 junior ENGL, or *3 junior ENGL and *3 junior WRS* |
| **Year 2** | **Year 2** |
| **CMPUT 174, 175**  
**ECON 281, 282**  
**MATH 214 (or 217), 215 (or 317)**  
**MATH 225 (or 227)**  
**STAT 265, 266**  
*3 in an approved option** |
| **CMPUT 174, 175**  
**ECON 281, 282**  
**MATH 214 (or 217), 215 (or 317)**  
**MATH 225 (or 227)**  
**STAT 265, 266**  
*3 in an approved option** |
| **Years 3 and 4** | **Years 3 and 4** |
| **ECON 384 (or an approved ECON option at the 400-level or higher), 385 (or an approved ECON option at the 400-level or higher), 399**  
*15 in approved ECON options, of which at least *3 must be at the 400-level or higher*  
*18 in approved MATH or STAT options, of which at least *12 must be at the 300-level or higher*  
*3 in an approved Science option*  
*15 in approved options** |
| **ECON 384 (or an approved ECON option at the 400-level or higher), 385 (or an approved ECON option at the 400-level or higher), 399**  
*15 in approved ECON options, of which at least *3 must be at the 400-level or higher*  
*18 in approved MATH or STAT options, of which at least *12 must be at the 300-level or higher*  
*3 in an approved Science option*  
*15 in approved options** |

### Notes

1. Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences.
2. Credit will not be given for ECON 299, 386 or 387.
3. Students who are considering graduate work in Economics should take ECON 497.
4. Students are encouraged to take at least *6 in ECON, MATH, or STAT in each Fall/Winter of the program.
5. Credit in SCI 100 will be considered equivalent to MATH 114, 115, CMPUT 174, *12 Science options and *6 options.
6. Credit in SCI 151 will be considered equivalent to *6 Science options.
194.10.11 Honors in Mathematics and Finance

Notes
(1) Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences and must include:
  a. *18 in Arts courses
  b. *33 in ACCTG, ECON, FIN, MGTSC or OM, including *9 in 400-level FIN
(2) Approved ACCTG, ECON, FIN and MGTSC options include ACCTG 322, 412, 432, 443; ECON 282, 384, 385, 399, 408, 481, 482; FIN 412, 413, 414, 416, 422, 434, 442; MGTSC 404, 405. Credit will not be given for ECON 299, 386 or 387.
(3) Recommended Science options include: MATH 381, 418, 432, 436, 481, 499; STAT 353, 472, 479; CMPUT 201.
(4) A student not presenting the Honors Calculus sequence MATH 117/118/217/317 must take MATH 314 and 414.
(5) Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 options.

194.10.12 Specialization in Mathematics and Finance

Notes
(1) Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences and must include:
  a. *18 in Arts courses
  b. *63 in Science courses
  c. *33 in ACCTG, ECON, FIN, MGTSC or OM, including *9 in 400-level FIN
(2) Approved ACCTG, ECON, FIN and MGTSC options include ACCTG 322, 412, 432, 443; ECON 282, 384, 385, 399, 408, 481, 482; FIN 412, 413, 414, 416, 422, 434, 442; MGTSC 404, 405. Credit will not be given for ECON 299, 386 or 387.
(3) Recommended Science options include: MATH 334, 337, 381, 432, 481; STAT 353, 472, 479.
(4) A student presenting the Honors Calculus sequence MATH 117/118/217/317 must substitute a MATH option for MATH 314.
(5) Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 options.
(6) Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.
### 194.10.14 Honors in Statistics

#### Year 1
- CMPUT 174 and 175
- *6 junior ENGL, or *3 junior ENGL and *3 junior WRS
- MATH 117 (or 114 or 134 or 144)
- MATH 118 (or 115 or 146)
- MATH 127 (or 125)
- STAT 151
- *6 in approved options

#### Year 2
- MATH 217 (or 214), 317 (or 215), 227 (or 225)
- STAT 252, 265, 266
- *6 in approved Arts options
- *3 in approved Science options
- *3 in an approved option

#### Years 3 and 4
- MATH 314 or 417
- MATH 414 or 418
- STAT 361, 368, 371, 372, 378, 471, 499
- *12 in STAT options at the 400-level
- *6 in approved Arts options
- *15 in approved Science options

#### Notes
1. Each student's program must have the approval of the Department of Mathematical and Statistical Sciences.
2. Credit will not be granted for ECON 299, 386 or 387.
3. Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 approved Science options.
4. Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.

### 194.10.15 Specialization in Statistics

#### Year 1
- CMPUT 174 and 175
- MATH 114 (or 117 or 134 or 144)
- MATH 115 (or 118 or 146)

### Notes
1. Each student's program must have the approval of the Department of Mathematical and Statistical Sciences.
2. Credit will not be granted for ECON 299, 386 or 387.
3. Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 approved Science options.
4. Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.
### Programs
#### Faculty of Science
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<table>
<thead>
<tr>
<th>MATH 125 (or 127)</th>
<th>STAT 151</th>
</tr>
</thead>
<tbody>
<tr>
<td>*6 junior ENGL, or *3 junior ENGL and *3 junior WRS</td>
<td></td>
</tr>
<tr>
<td>*6 in approved options</td>
<td></td>
</tr>
</tbody>
</table>

**Year 2**

| MATH 214 (or 217), 215 (or 317) |
| MATH 225 (or 227) |
| STAT 252, 265, 266 |
| *6 in approved Arts options |
| *6 in approved Science options |
| *3 in approved options |

**Years 3 and 4**

| STAT 361, 368, 371, 372, 378 |
| *12 in STAT options at 300- and 400-level |
| *6 in approved Arts options |
| *6 in approved Science options |
| *18 in approved options |

**Notes**
1. Each student’s program must have the approval of the Department of Mathematical and Statistical Sciences.
2. Credit will not be granted for ECON 299, 386 or 387.
3. Credit in SCI 100 will be considered equivalent to CMPUT 174, MATH 114, 115 and *18 approved Science options.

#### 194.11.1 Honors in Neuroscience

**Year 1**

| BIOL 107 |
| CHEM 101, 261 |
| *6 junior ENGL or WRS |
| MATH 113 or 114 |
| MATH 115 or STAT 141 or 151 |
| PHYS 124, 126 |
| PSYCO 104 |

**Year 2**

| BIOCH 200 |
| BIOL 207 |
| CHEM 263 |
| NEURO 210 |

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Submitted on: _______________________________  GFC Circulated on: ________________
Department Contact: __________________________________________________________

**(4) Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.**
Programs
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PHYSL 212, 214 (Students must be manually enrolled in both courses by the Department of Physiology. Registration via Bear Tracks is not possible.)

PSYCO 275

*6 in Science options
*3 in Arts options

Year 3

NEURO 375
PMCOL 371 or ZOOL 342 but not both.

PHYSL 372
One of PSYCO 371, 375, 377; GENET 270, 390; ZOOL 344

*12 in approved options
*6 in Arts options

Year 4

Honors neuroscience students may choose from two research streams during their fourth year of study.

Research Stream A (Independent Study and Laboratory Research) allows for *6 or *9 of independent study and research in one or more labs in the Neuroscience and Mental Health Institute. This stream provides flexibility and allows for exposure to multiple research areas. Research Stream B (Undergraduate Honors Thesis in Neuroscience) involves *12 in independent study and research to be performed in the lab of a single faculty member in the Neuroscience and Mental Health Institute, with the development of an undergraduate honors research thesis. This option is therefore a more intensive research experience allowing for more time and independent study in a neuroscience lab, and will culminate with a written research thesis and oral thesis defense.

Research Stream A (Independent Study and Laboratory Research):

NEURO 450
NEURO 451 and/or 452

*6 chosen from the following courses covering topics in Cellular and Molecular Neuroscience: NEURO 410; PHYSL 444; PMCOL 412; 512; PSYCO 478.

*6 chosen from the following courses covering topics in Systems and Cognitive Neuroscience: NEURO 443, 472, 496; PHYSL 403, 405; PSYCI 511; PSYCO 471, 475.

*6 (if NEURO 450, 451 and 452 are taken) or *9 (if NEURO 450 and one of NEURO 451 or 452 are taken) of Science options approved by the program coordinator.

PHYSL 212, 214 (Students must be manually enrolled in both courses by the Department of Physiology. Registration via Bear Tracks is not possible.)

PSYCO 275

*6 in Science options
*3 in Arts options

Year 3

NEURO 375
PMCOL 371 or ZOOL 342 but not both.

PHYSL 372
One of PSYCO 371, 375, 377; GENET 270, 390; ZOOL 344

*12 in approved options
*6 in Arts options

Year 4

Honors neuroscience students may choose from two research streams during their fourth year of study.

Research Stream A (Independent Study and Laboratory Research) allows for *6 or *9 of independent study and research in one or more labs in the Neuroscience and Mental Health Institute. This stream provides flexibility and allows for exposure to multiple research areas. Research Stream B (Undergraduate Honors Thesis in Neuroscience) involves *12 in independent study and research to be performed in the lab of a single faculty member in the Neuroscience and Mental Health Institute, with the development of an undergraduate honors research thesis. This option is therefore a more intensive research experience allowing for more time and independent study in a neuroscience lab, and will culminate with a written research thesis and oral thesis defense.

Research Stream A (Independent Study and Laboratory Research):

NEURO 450
NEURO 451 and/or 452

*6 chosen from the following courses covering topics in Cellular and Molecular Neuroscience: NEURO 410; PHYSL 444; PMCOL 412; 512; PSYCO 478.

*6 chosen from the following courses covering topics in Systems and Cognitive Neuroscience: NEURO 443, 472, 496; PHYSL 403, 405; PSYCI 511; PSYCO 471, 475.

*6 (if NEURO 450, 451 and 452 are taken) or *9 (if NEURO 450 and one of NEURO 451 or 452 are taken) of Science options approved by the program coordinator.

Submitted on: _______________________________  GFC Circulated on: _______________________________
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<table>
<thead>
<tr>
<th>*3 in Arts options</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Stream B (Undergraduate Honors Thesis in Neuroscience):</td>
<td></td>
</tr>
<tr>
<td>*6 NEURO 498 and *6 NEURO 499</td>
<td></td>
</tr>
<tr>
<td>*6 chosen from the following courses covering topics in Cellular and Molecular Neuroscience: NEURO 410; PHYSL 444; PMCOL 412, 512; PSYCO 478</td>
<td></td>
</tr>
<tr>
<td>*6 chosen from the following courses covering topics in Systems and Cognitive Neuroscience: PSYCO 471; PHYSL 403, 405; NEURO 443, 472, 496; PSYCI 511.</td>
<td></td>
</tr>
<tr>
<td>*3 of Science options approved by the program coordinator</td>
<td></td>
</tr>
<tr>
<td>*3 in Arts options</td>
<td></td>
</tr>
</tbody>
</table>

Notes

(1) Each student’s program must include:
   a. a minimum of *18 in Arts courses;
   b. a minimum of *90 in Science courses;
   c. no more than *12 in Outside (non-Science, non-Arts) courses;
   d. no more than *42 at the junior level.

(2) Each student’s program must have the approval of the Neuroscience and Mental Health Institute.

(3) Approved Science options in Years 1-3 may be chosen from Science departments including BIOCH, BIOL, CELL, CHEM, CMPUT, EAS, ENT, GENET, IMIN, MATH, MICRB, PMCOL, PHYS, PHYSL, PSYCO, STAT. 300- and 400-level options are preferable in Years 3 and 4. Science options must be approved by the program coordinator for the Neuroscience and Mental Health Institute Undergraduate Honors Program.

(4) Courses in Faculties outside of the Faculty of Science and Arts that may be used as approved Outside (non-Science, non-Arts) options include: ANAT 200, 400; LABMP 400; OTHER 567, and BME 520. All other Outside options require prior approval by the Neuroscience and Mental Health Institute.

(5) In the fourth year, all students must successfully complete an individual study program with members of the Neuroscience and Mental Health Institute. This program can be chosen from either Research Stream A (Independent Study and...|
### Programs
#### Faculty of Science
#### Calendar Changes 2016-2017

<table>
<thead>
<tr>
<th>Laboratory Research (Undergraduate Honors Thesis in Neuroscience)</th>
<th>Laboratory Research (Undergraduate Honors Thesis in Neuroscience)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(6) Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 164, MATH 114, 115, PHYS 144, 146 and PSYCO 104.</td>
<td>(6) Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 164, MATH 114, 115, PHYS 144, 146 and PSYCO 104.</td>
</tr>
<tr>
<td>(7) Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.</td>
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</tbody>
</table>

### Honors in Paleontology

<table>
<thead>
<tr>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 107 and 108</td>
</tr>
<tr>
<td>CHEM 101 or 164</td>
</tr>
<tr>
<td>EAS 100 and 105</td>
</tr>
<tr>
<td>*6 junior ENGL or *3 junior ENGL and *3 junior WRS</td>
</tr>
<tr>
<td>MATH 113 or 114 or 117 or 144 or 125</td>
</tr>
<tr>
<td>STAT 141 or 151 *3 Science option</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years 2, 3, and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 207, 208, 321 and 335 BIOL 499 or EAS 426</td>
</tr>
<tr>
<td>EAS 222, 230, 233 and 234 EAS 336 or ZOOL 325</td>
</tr>
<tr>
<td>*6 PALEO 4XX and/or EAS 4XX</td>
</tr>
<tr>
<td>ZOOL 224 or 250</td>
</tr>
<tr>
<td>*21 in Science from approved courses below (see note)</td>
</tr>
<tr>
<td>*12 in approved Arts options</td>
</tr>
<tr>
<td>*15 Open options (including Science courses below)</td>
</tr>
</tbody>
</table>

#### Recommended option courses for Vertebrate Paleontology:

| BIOL 315, 361, 364, 398, 399, 421, 498 MA SC 412 |
| PALEO 400, 412, 414, 418, 419 |
| ZOOL 224, 325, 405, 406, 407, 408 |

#### Recommended option courses for Invertebrate Paleontology:

| BIOL 315, 361, 364, 398, 399, 421, 498 |
| BOT 205, 308, 321 |
| EAS 110, 208, 225, 270, 320, 336, 364, 373, 421, 457, 460, 462, 465 ENT 220, 427 |
| MA SC 410 |
| PALEO 412, 414 |
| ZOOL 250 |

### Notes

1. Some courses are offered in alternate years only, so plan your schedule appropriately.
### Specialization in Paleontology

Continuation in the Specialization in Paleontology program requires successful completion of at least *18 with a minimum 2.3 GPA in the previous Fall/Winter. In addition, graduation requires a minimum 2.3 GPA on all courses credited to the degree.

#### Year 1

- **BIOL 107 and 108**
- **CHEM 101 or 164**
- **EAS 100 and 105**
- 6 junior ENGL or 3 junior ENGL and 3 junior WRS
- **MATH 113 or 114 or 117 or 144 or 125**
- **STAT 141 or 151** *3 Science option

#### Years 2, 3, and 4

- **BIOL 207 and 208, 321 and 335**
- **EAS 222, 230, 233 and 234**; **EAS 336 or ZOOL 325**
- 6 PALEO 4XX and/or EAS 4XX
- **ZOOL 224 or 250**
- 21 in Science from approved courses below (see note) *12 in approved Arts options

**Recommended option courses for Vertebrate Paleontology:**

- **BIOL 315, 361, 364, 421, 398, 399, 498 MA SC 412**
- **PALEO 400, 412, 414, 418, 419**
- **ZOOL 224, 325, 405, 406, 407, 408**

**Recommended option courses for Invertebrate Paleontology:**

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### Specialization in Paleontology

Continuation in the Specialization in Paleontology program requires successful completion of at least *18 with a minimum 2.3 GPA in the previous Fall/Winter. In addition, graduation requires a minimum 2.3 GPA on all courses credited to the degree.

#### Year 1

- **BIOL 107 and 108**
- **CHEM 101 or 164**
- **EAS 100 and 105**
- 6 junior ENGL or 3 junior ENGL and 3 junior WRS
- **MATH 113 or 114 or 117 or 144 or 125**
- **STAT 141 or 151** *3 Science option

#### Years 2, 3, and 4

- **BIOL 207 and 208, 321 and 335**
- **EAS 222, 230, 233 and 234**; **EAS 336 or ZOOL 325**
- 6 PALEO 4XX and/or EAS 4XX
- **ZOOL 224 or 250**
- 21 in Science from approved courses below (see note) *12 in approved Arts options

**Recommended option courses for Vertebrate Paleontology:**

- **BIOL 315, 361, 364, 421, 398, 399, 498 MA SC 412**
- **PALEO 400, 412, 414, 418, 419**
- **ZOOL 224, 325, 405, 406, 407, 408**

**Recommended option courses for Invertebrate Paleontology:**

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BIOL 315, 361, 364, 421, 398, 399, 498  
BOT 205, 308, 321  
EAS 110, 208, 225, 270, 320, 336, 364, 373, 421, 457, 460, 462, 465 ENT 220, 427, MA SC 410, PALEO 412, 414, ZOOL 250

Notes
(1) Some courses are offered in alternate years only, so plan your schedule appropriately.  
(2) Approved Arts options: ANTHR 209, 390, 391; CHRTC 350, 451; PHIL 265, 317.  

Paleontology:
BIOL 315, 361, 364, 421, 398, 399, 498  
BOT 205, 308, 321  
EAS 110, 208, 225, 270, 320, 336, 364, 373, 421, 457, 460, 462, 465 ENT 220, 427, MA SC 410, PALEO 412, 414, ZOOL 250

Notes
(1) Some courses are offered in alternate years only, so plan your schedule appropriately.  
(2) Approved Arts options: ANTHR 209, 390, 391; CHRTC 350, 451; PHIL 265, 317.  

194.14.1 Honors in Pharmacology

[...]

Notes
. (1) Students must consult the Chair of the Department or designee for approval of the selection of options. Students will not be permitted to take 400-level pharmacology courses unless all prerequisites have been met.
. (2) Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 105, MATH 113, 115, PHYS 144 and 146. Credit in SCI 151 will be considered equivalent to STAT 151 and ★3 Science option.

194.14.1 Honors in Pharmacology

[...]

Notes
. (1) Students must consult the Chair of the Department or designee for approval of the selection of options. Students will not be permitted to take 400-level pharmacology courses unless all prerequisites have been met.
. (2) Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 102, 164; MATH 114, 115 and ★6 Science options.
Students who take PMCOL 498 may not take PMCOL 401 or PMCOL 402

Recommended Science options: BIOCH 310, 401, 410, 420, 430, 441, 450, CHEM 211, 213, 313, 419, GENET 270, 301, 304, 390, 408, MATH 113, or 114 and 115, PHYSL 372, 401, 402, 403, 404, PMCOL 371, STAT 252.

194.14.2 Specialization in Pharmacology

Notes

1. Students must consult the Chair of the Department or designee for approval of the selection of options. Students will not be permitted to take 400-level pharmacology courses unless all prerequisites have been met.

2. Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 102, 164; MATH 114, 115 and ★6 Science options.

Recommended Science options: BIOCH 310, 401, 410, 420, 430, 441, 450, CHEM 211, 213, 313, 419, GENET 270, 301, 304, 390, 408, MATH 113, or 114 and 115, PHYSL 372, 401, 402, 403, 404, PMCOL 371, STAT 252.

194.14.2 Specialization in Pharmacology

Notes

1. Students must consult the Chair of the Department or designee for approval of the selection of options. Students will not be permitted to take 400-level pharmacology courses unless all prerequisites have been met.

2. Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 102, 164; MATH 114, 115 and ★6 Science options ($195).

3. Credit in SCI 151 will be considered equivalent to STAT 151 and ★3 Science option.

Recommended Science options: BIOCH 310, 401, 410, 420, 430, 441, 450, CHEM 211, 213, 313, 419, GENET 270, 301, 304, 390, 408, MATH 113, or 114 and 115, PHYSL 372, 401, 402, 403, 404, PMCOL 371, STAT 252.
### 194.15.1 Honors in Physics

Continuation in the Honors in Physics program requires successful completion of at least *24 with a minimum 3.0 GPA in the previous Fall/Winter. In addition, graduation requires a minimum 3.0 GPA on the last *90 credited to the degree.

**Notes**

1. By the end of their programs, students must have taken *18 of Arts options.
2. PH Pool A options: All 400-level ASTRO; PHYS 415, 485, 495.
3. PH Pool B options: MA PH 451; all 400-level MATH; PHYS 458, 467.
4. PH Pool options: ASTRO 320, 322; EAS 370, 371, 373; all 300- and 400-level GEOPH; all 400-level PHYS; all courses in Pool A and Pool B. Other courses may be taken by prior consent of the Department of Physics.
5. Credit in SCI 100 will be considered equivalent to MATH 114, 115, PHYS 144, 146 and *6 Science options.

**Year 1**

- MATH 144 (or 117), 146 (or 118)
- MATH 125 (or 127), 225 (or 227)
- PHYS 144, 146

*6 in Science options (CMPUT 174 recommended if a student has no computing background)

*6 in an Arts options (see Note 1 above)

No further change to Honors Physics program

### 194.15.2 Specialization in Physics

**Notes**

1. By the end of their programs, students must have taken *18 of Arts options.
2. PS Senior Science options: Any 200- or higher level course offered by the Faculty of Science.
3. PS Pool A: PHYS 301, 362, 364, all 300- and 400-level ASTRO, GEOPH, MA PH, and MATH courses; all 400-level PHYS courses. Other courses may be taken with prior consent of Department.
4. PS Pool B: all 400-level ASTRO, GEOPH, MA PH, and PHYS. Other courses may be taken with prior consent of Department.
5. Credit in SCI 100 is considered equivalent to MATH 114, 115, PHYS 144, 146 and *6 Science options.

**Year 1**

- MATH 144 (or 117), 146 (or 118)
- MATH 125 (or 127), 225 (or 227)
- PHYS 144, 146

*6 in Science options [$195]

*6 in an Arts options (see Note 1 above)
<table>
<thead>
<tr>
<th>Year 1</th>
<th>6) Credit in SCI 151 will be considered equivalent to *6 Science options.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 144 (or 117), 146 (or 118), 125 (or 127), 225 (or 227)</td>
<td>Year 1</td>
</tr>
<tr>
<td>PHYS 144, 146</td>
<td></td>
</tr>
<tr>
<td>*6 in Science options (CMPUT 174 recommended if a student has no computing background)</td>
<td>*6 in Science options (§195) (CMPUT 174 recommended if a student has no computing background)</td>
</tr>
<tr>
<td>*6 in Arts options (see Note 1 above)</td>
<td>*6 in Arts options (see Note 1 above)</td>
</tr>
</tbody>
</table>
194.15.3 Honors in Astrophysics

Continuation in the Honors in Astrophysics program requires successful completion of at least *24 with a minimum 3.0 GPA in the previous Fall/Winter. In addition, graduation requires a minimum 3.0 GPA on the last *90 credited to the degree.

Notes
1. Students must take a total of *18 in Arts options.
2. AH Pool: EAS 370, 371, 373; all 300-level GEOPH courses; PHYS 397; MA PH 451; all 400-level ASTRO, GEOPH, PHYS, and MATH courses. Other courses may be taken with prior consent of Department.
3. Credit in SCI 100 will be considered equivalent to MATH 114, 115, PHYS 144 and 146 and *6 Science options.

Year 1
MATH 144 (or 117), 146 (or 118), 125 (or 127), 225 (or 227)
PHYS 144, 146
*6 in Science options (recommended options are ASTRO 120, 122, or CMPUT 174 if a student has no computing background)
*6 in Arts options

No further change to Honors Astrophysics program

194.15.4 Specialization in Astrophysics

[...]

Notes
1. Students must take a total of *18 in Arts options.
2. AS Senior Science options: Any 200-, 300-, or 400-level course offered by the Faculty of Science.
3. AS Pool options: PHYS 301, 362, 364, 397; all 300- and 400-level GEOPH, MA PH, MATH, and PHYS courses; all 400-level ASTRO courses. Other courses may be taken with prior consent of Department.
4. Credit in SCI 100 is considered equivalent to MATH 114, 115, PHYS 144, 146 and *6 Science options.

No further change to Honors Astrophysics program
### Programs
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<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 144 (or 117), 146 (or 118), 125 (or 127), 225 (or 227)</td>
<td>MATH 144 (or 117), 146 (or 118), 125 (or 127), 225 (or 227)</td>
</tr>
<tr>
<td>PHYS 144, 146</td>
<td>PHYS 144, 146</td>
</tr>
<tr>
<td>*6 in Science options (recommended options are ASTRO 120, 122, or CMPUT 174 if a student has no computing background)</td>
<td>*6 in Science options (recommended options are ASTRO 120, 122, or CMPUT 174 if a student has no computing background) <strong>(§195)</strong></td>
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<td>*6 in Arts options</td>
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**No further change to Specialization Astrophysics program**

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<td>MATH 144 (or 117), 146 (or 118), 125 (or 127), 225 (or 227)</td>
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<tr>
<td>PHYS 144, 146</td>
<td>PHYS 144, 146</td>
</tr>
<tr>
<td>*6 in Science options (recommended options are ASTRO 120, 122, or CMPUT 174 if a student has no computing background)</td>
<td>*6 in Science options (recommended options are ASTRO 120, 122, or CMPUT 174 if a student has no computing background) <strong>(§195)</strong></td>
</tr>
<tr>
<td>*6 in Arts options</td>
<td>*6 in Arts options</td>
</tr>
</tbody>
</table>

**194.15.5 Honors in Geophysics**

**No changes until …..**

**Notes**

1. In addition to the specific courses listed in the program, students must take *15 in approved Science options and *12 in Arts options.

2. **(§195)**

3. **(6)** Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 144 (or 117), 146 (or 118), 125 (or 127), 225 (or 227)</td>
<td>MATH 144 (or 117), 146 (or 118), 125 (or 127), 225 (or 227)</td>
</tr>
<tr>
<td>PHYS 144, 146</td>
<td>PHYS 144, 146</td>
</tr>
<tr>
<td>*6 in Science options (recommended options are ASTRO 120, 122, or CMPUT 174 if a student has no computing background)</td>
<td>*6 in Science options (recommended options are ASTRO 120, 122, or CMPUT 174 if a student has no computing background) <strong>(§195)</strong></td>
</tr>
<tr>
<td>*6 in Arts options</td>
<td>*6 in Arts options</td>
</tr>
</tbody>
</table>

**194.15.6 Specialization in Geophysics**

**[…]**

**Notes**

1. In addition to the specific courses listed in the program, students must take a minimum of *3 from specialization Pool B, *6 from specialization Pools A or B, *15 in approved Science options and *12 in Arts options.

2. Specialization Pool A courses: ASTRO 429; EAS 221, 320, 323, 324, 425; GEOPH 332, 421, 431, 440; MIN E 323; PET E 365, 473, 477; PHYS 308, 499. Students in Geophysics will not have the formal prerequisites for many of the EAS, MIN E, and PET E courses, and must request permission to register in those courses from the department offering the particular course. GEOPH courses are recommended.

3. Specialization Pool B courses: EAS 224, PHYS 261, 310 (recommended), 362, 420, 467, STAT 141 (or 151).

4. Not all 300-level and 400-level courses are offered every year. Students must consult the Department

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<table>
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<tr>
<th>Program</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>194.15.7 Honors in Mathematical Physics</td>
<td>...</td>
</tr>
</tbody>
</table>

**Notes**
1. MPH Senior Science options: any 300- or 400-level course offered by the Faculty of Science.
2. MPH Pool courses: PHYS 362, 397; all 300- and 400-level ASTRO and GEOPH courses; all 400-level MA PH, MATH and PHYS courses. Other courses may be taken with prior consent of Department.
3. Credit in SCI 100 will be considered equivalent to MATH 114, 115, PHYS 144, 146 and *6 Science options (§195).

<table>
<thead>
<tr>
<th>Year 1</th>
<th>MATH 117, 118, 125 or 127, 225 or 227</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PHYS 144, 146</td>
</tr>
<tr>
<td></td>
<td>*6 in Science options (CMPUT 174 recommended if a student has no computing background)</td>
</tr>
<tr>
<td></td>
<td>*6 in Arts options</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Year 4</th>
<th>PHYSYL 467 and</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>★9 from PHYSYL 400; 402; 404; 405; 444; 501; 513; PHYSYL 545 or NEURO 443</td>
</tr>
<tr>
<td></td>
<td>★9 from BIOL 545; NEURO 410 or other 400- or 500-</td>
</tr>
</tbody>
</table>

...
level-Science or Non-Science or Non-Arts courses, with consent of the Department.

★6 in other approved options or

PHYSL 468 and 469 and

★12 from PHYSL 400; 402; 404; 405; 444; 501; 513;

PHYSL 545 or BIOL 545; NEURO 410; 433; or other

400- or 500-level Science or Non-Science-Non-Arts
courses, with consent of the Department

★6 in other approved options

Notes

(1) The program must consist of a minimum of ★90

in Science, a minimum of ★18 in Arts, and no

more than ★18 in non-Arts/non-Science options

and no more than ★42 in junior (100-level)
courses.

(2) Honors students in the first year of the program

who are unable to take CHEM 263 may take

CHEM 263 in second year.

(3) All options must be approved by the

Departmental Advisor.

(4) Credit in Science 100 will be considered
equivalent to BIOL 107, 108; CHEM 101, 102, 164;

PHYS 144, 146 and ★6 approved Science options.

level-Science ($195) or Non-Science or Non-Arts
courses, with consent of the Department.

★6 in other approved options or

PHYSL 468 and 469 and

★12 from PHYSL 400; 402; 404; 405; 444; 501; 513;

PHYSL 545 or BIOL 545; NEURO 410; 433; or other

400- or 500-level Science or Non-Science-Non-Arts
courses, with consent of the Department

★6 in other approved options

Notes

(1) The program must consist of a minimum of ★90

in Science ($195), a minimum of ★18 in Arts, and no

more than ★18 in non-Arts/non-Science options

and no more than ★42 in junior (100-level)
courses.

(2) Honors students in the first year of the program

who are unable to take CHEM 263 may take

CHEM 263 in second year.

(3) All options must be approved by the

Departmental Advisor.

(4) Credit in Science 100 will be considered
equivalent to BIOL 107, 108; CHEM 101, 102, 164;

PHYS 144, 146 and ★6 approved Science options ($195).

(5) Credit in SCI 151 will be considered
equivalent to STAT 151 and ★3 Science option.
### Programs
#### Faculty of Science
#### Calendar Changes 2016-2017

#### 194.17.1 Honors in Psychology

<table>
<thead>
<tr>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) In addition to the courses specifically listed above, the program must include, among the student’s optional courses, a minimum of *12 in one or more disciplines relevant to Psychology, e.g., ANTHR, BIOL, CHEM, CMPUT, ECON, GENET, LING, MATH, NEURO, PHIL, PHYS, PHYSL, PMCOL, POL S, SOC, STAT, ZOOL. These courses may not overlap those used to fulfill the Computing/Mathematics/Statistics, Natural Science and Social Science requirements listed above.</td>
</tr>
<tr>
<td>(2) Under the supervision of a faculty member in the Department of Psychology, students undertake a year-long research apprenticeship (PSYCO 390) during the third year and conduct and write an empirical thesis (PSYCO 490) during the fourth year. Third-year students present their thesis research proposals, and fourth-year students present the results of their thesis research at the annual Honors Psychology Conference in April.</td>
</tr>
<tr>
<td>(3) Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CMPUT 174, PSYCO 104, MATH 114, 115 and *9 approved Science options.</td>
</tr>
<tr>
<td>(4) Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYCO 309, 390 and PSYCO 303 or 304 <em>(PSYCO 212 must be completed by the end of the first term after admittance into the program)</em></td>
</tr>
<tr>
<td>*3 (one of) PSYCO 356, 410, 411, 413, 431, 475, 476, 482 or other advanced research methods course approved by the Honors Advisor</td>
</tr>
<tr>
<td>*9-12 in approved Science options</td>
</tr>
<tr>
<td>*6-9 in approved options</td>
</tr>
</tbody>
</table>

#### 194.17.2 Specialization in Psychology

<table>
<thead>
<tr>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) In addition to the courses specifically listed above, the program must include, among the student’s optional courses, a minimum of *12 in one or more disciplines relevant to Psychology, e.g., ANTHR, BIOL, CHEM, CMPUT, ECON, GENET, LING, MATH, NEURO, PHIL, PHYS, PHYSL, PMCOL, POL S, SOC, STAT, ZOOL. These courses may not overlap those used to fulfill the Computing/Mathematics/Statistics, Natural Science and Social Science requirements listed above.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYCO 309, 390 and PSYCO 303 or 304</td>
</tr>
<tr>
<td>*3 (one of) PSYCO 356, 402, 410, 411, 413, 414, 415, 431, 471, 476, 482, or other advanced research methods course approved by the Honors Advisor</td>
</tr>
<tr>
<td>*9-12 in approved Science options</td>
</tr>
<tr>
<td>*6-9 in approved options</td>
</tr>
</tbody>
</table>
Programs
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(1) To fulfill the degree requirements, students must complete a minimum of *36 in Psychology courses.
At least *6 must be at the 400-level. A minimum of *72 in Science is required (see §193.2).

(2) Credit in SCI 100 will be considered equivalent to BIOL 107, 108, CHEM 101, CMPUT 174, MATH 114, PHYS 144, PSYCO 104 and *6 Approved options.

(3) Credit in SCI 151 will be considered equivalent to STAT 151 and *3 Science option.

CHART 2
Animal Biology

<table>
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<tr>
<th>CURRENT</th>
<th>PROPOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 1</strong></td>
<td><strong>Year 1</strong></td>
</tr>
<tr>
<td>BIOL 107, 108; CHEM 101, 164 or 261; MATH 113 or 114 or 125; STAT 151</td>
<td>BIOL 107, 108; CHEM 101, 164 or 261; MATH 113 or 114 or 125; STAT 151</td>
</tr>
<tr>
<td>★6 Arts options (junior level ENGL or junior WRS recommended)</td>
<td>★6 Arts options (junior level ENGL or junior WRS recommended)</td>
</tr>
<tr>
<td>★6 Science options</td>
<td>★6 Science options (§195)</td>
</tr>
<tr>
<td><strong>Year 2</strong></td>
<td><strong>Year 2</strong></td>
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<tr>
<td>(...)</td>
<td></td>
</tr>
<tr>
<td><strong>Years 3 and 4</strong></td>
<td><strong>Years 3 and 4</strong></td>
</tr>
<tr>
<td>BIOL 321; BIOL 331 or 332; BIOL 380 or GENET 270; ENT 220 or ZOOL 250 or 352; ZOOL 303; ZOOL 325; ZOOL 370 or 371 ★9 Arts options ★15 from List A ★3 from List B (discussion courses) ★12 approved options (including additional courses from List A or B)</td>
<td>BIOL 321; BIOL 331 or 332; BIOL 380 or GENET 270; ENT 220 or ZOOL 250 or 352; ZOOL 303; ZOOL 325; ZOOL 370 or 371 ★9 Arts options ★15 from List A ★3 from List B (discussion courses) ★12 approved options (including additional courses from List A or B)</td>
</tr>
</tbody>
</table>

Submitted on: _______________________________  GFC Circulated on: ________________  
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List B: BIOL 409, 433, 434, 445, 468, 495 (if appropriate topic); ENT 401; GENET 422; MARC 480; ZOOL 402, 405, 406, 441, 442, 450, 452, 472.

Available streams include: entomology, marine biology, parasitology and vertebrate biology.

**Notes**
(1) MA SC courses on this list are offered at Bamfield Marine Sciences Centre.
(2) Honors students are required to take BIOL 499 and reduce approved options by 6.
(3) Credit in SCI 100 will be considered equivalent to BIOL 107, 108; CHEM 101, 261; MATH 114; 6 Science options and 6 Approved options.
Bio informatics

Year 1
BIOL 107, 108; CHEM 101, 102, 164 or 261; ★6 Arts options (junior level ENGL or junior WRS recommended)
CMPUT 174, 175 and ★3 in a Science option

Year 2
BIOCH 200; BIOL 207, 208; CHEM 263; CMPUT 201, 291; GENET 270; MATH 113 or 114 or 117; MATH 125; STAT 151
Note: GENET 270 may be taken in Year 3

Year 3 and 4
One of BIOCH 310, 320, 330
BIOIN 301, 401; CMPUT 204, 272, 301
★6 in GENET 301, 302, 304, 305, or 390
★12 Arts options
★3 CMPUT from recommended options below
★21 Science options
Recommended options include, but are not restricted to additional courses from above and the following:
BIOCH 310, 320, 330, 420; BIOL 321, 380, 391, 398, 399, 400, 421, 490, 495, 498, 499; CMPUT 229, 304, 325, 340, 366, 379, 391, 466, 474, 495; GENET 301, 302, 304, 305, 390; IMIN 200; MICRB 265, 316; STAT 221, 222, 337.

Notes
First-year core Math and Stats courses are taken in Year 2. Honors students are required to take BIOL 499 and reduce Science options by ★6.
Credit in SCI 100 will be considered equivalent to BIOL 107, 108; CHEM 101, 102, 261; CMPUT 174; MATH 114 and ★6 Science options.

Bio informatics

Year 1
BIOL 107, 108; CHEM 101, 102, 164 or 261; ★6 Arts options (junior level ENGL or junior WRS recommended)
CMPUT 174, 175 and ★3 in a Science option

Year 2
BIOCH 200; BIOL 207, 208; CHEM 263; CMPUT 201, 291; GENET 270; MATH 113 or 114 or 117; MATH 125; STAT 151
Note: GENET 270 may be taken in Year 3

Year 3 and 4
One of BIOCH 310, 320, 330
BIOIN 301, 401; CMPUT 204, 272, 301
★6 in GENET 301, 302, 304, 305, or 390
★12 Arts options
★3 CMPUT from recommended options below
★21 Science options
Recommended options include, but are not restricted to additional courses from above and the following:
BIOCH 310, 320, 330, 420; BIOL 321, 380, 391, 398, 399, 400, 421, 490, 495, 498, 499; CMPUT 229, 304, 325, 340, 366, 379, 391, 466, 474, 495; GENET 301, 302, 304, 305, 390; IMIN 200; MICRB 265, 316; STAT 221, 222, 337.

Notes
First-year core Math and Stats courses are taken in Year 2. Honors students are required to take BIOL 499 and reduce Science options by ★6.
Credit in SCI 100 will be considered equivalent to BIOL 107, 108; CHEM 101, 102, 261; CMPUT 174; MATH 114 and ★6 Science options.
### Ecology

**Year 1**
- **Biol 107, 108; Chem 101, 164 or 261; Math 113 or 114 or 125; Stat 151**
- **6 Arts options (junior level ENGL or junior WRS recommended)**
- **6 Science options (EAS 100 recommended)**

**Year 2**
- **Bioch 200; Biol 207, 208; Bot 205; Micrib 265; Zool 224 or 325 or Paleo 201; Zool 250 or Ent 220**
- **9 in an Arts option**

**Year 3 and 4**
- **Biol 321, 330**
  - **12 from Biol 331, 332, 340; Bot 332; Zool 371**
  - **3 from Biol 333, 361, 364, 366, 367, 381, 384, 398, 399, 430, 433, 434, 464, 468, 471, 490, 498, 499; Micrib 491; Zool 340, 354, 370, 472**
  - **3 Arts option**
  - **18 approved options**
  - **3 from Biol 365, 432; Ma Sc 4xx, Zool 434**

Available streams include: conservation/wildlife biology, freshwater biology, and plant ecology.

**Notes**
- MA SC courses on this list are offered at Bamfield Marine Sciences Centre.
- Honors students are required to take Biol 430 and 499 and reduce approved options by **9**.
- Credit in SCI 100 will be considered equivalent to Biol 107, 108; Chem 101, 164; EAS 100; Math 114; **3 Science options and 6 Approved options**

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### Evolutionary Biology

<table>
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Department Contact: __________________________________________________________
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<th>Programs</th>
<th>Faculty of Science</th>
<th>Calendar Changes 2016-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 107, 108; CHEM 101, 164 or 261; MATH 113 or 114 or 125; STAT 151</td>
<td>BIOL 107, 108; CHEM 101, 164 or 261; MATH 113 or 114 or 125; STAT 151</td>
<td>*6 Arts options (junior level ENGL or WRS recommended) *6 Science options</td>
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<tr>
<th><strong>Year 2</strong></th>
<th><strong>Year 2</strong></th>
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</thead>
<tbody>
<tr>
<td>BIOCH 200; BIOL 207, 208, 321</td>
<td>[…]</td>
</tr>
<tr>
<td>*6 from BOT 205; ENT 207, 220, 380; MICRB 265; PALEO 201; ZOOL 224, 250</td>
<td>*3 from BOT 340; ENT 321; ZOOL 241, 242</td>
</tr>
<tr>
<td>*3 from BOT 340; ENT 321; ZOOL 241, 242</td>
<td>*3 Arts option *6 approved options</td>
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</tbody>
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<th><strong>Years 3 and 4</strong></th>
<th><strong>Years 3 and 4</strong></th>
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<tbody>
<tr>
<td>BIOL 335, 380, 392</td>
<td>BIOL 335, 380, 392</td>
</tr>
<tr>
<td>*3 from BOT 411; PALEO 400, 414, 418, 419</td>
<td>*3 from BOT 411; PALEO 400, 414, 418, 419</td>
</tr>
<tr>
<td>*3 from BIOL 331, 332; BOT 332</td>
<td>*3 from BIOL 331, 332; BOT 332</td>
</tr>
<tr>
<td>*3 from GENET 270, 390</td>
<td>*3 from GENET 270, 390</td>
</tr>
<tr>
<td>*6 from BIOL 322, BOT 314, 321; ENT 427; MICRB 423, ZOOL 325, 405, 406, 407, 408, 450</td>
<td>*9 Arts options *12 approved options *15 from list below</td>
</tr>
</tbody>
</table>

Recommended options include, but are not restricted to additional courses from above, and the list below:


**Notes:**
1) Marine Science courses on this list are offered at Bamfield Marine Sciences Centre.
2) Honors students are required to take BIOL 499 and reduce approved options by *6.
3) Credit in Science 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 164, MATH 114, *6 Science options and *6 Approved options.

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**Microbiology**

<table>
<thead>
<tr>
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### Programs
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<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 107, 108; CHEM 101, 102, 164 or 261; MATH 113 or 114 or 125; STAT 151 *6 Arts options (junior level ENGL or WRS recommended) *3 Science options</td>
<td>BIOL 107, 108; CHEM 101, 102, 164 or 261; MATH 113 or 114 or 125; STAT 151 *6 Arts options (junior level ENGL or WRS recommended) *3 Science options ($195)</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Year 2</th>
<th>Year 2</th>
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</thead>
<tbody>
<tr>
<td>BIOCH 200; BIOL 207, 208; CHEM 263; GENET 270; IMIN 200; MICRB 265 *3 in Science options *6 in Arts options</td>
<td>BIOCH 200; BIOL 207, 208; CHEM 263; GENET 270; IMIN 200; MICRB 265 *3 in Science options ($195) *6 in Arts options</td>
</tr>
</tbody>
</table>

**Notes:**
1. A minimum grade of B- is required in MICRB 265 and 311 to stay in Microbiology Honors program.
2. BIOL 201 highly recommended in Year 2.

<table>
<thead>
<tr>
<th>Years 3 and 4</th>
<th>Years 3 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 201, 391; GENET 390; MICRB 311, 316 *6 in Arts options *12 in Microbiology options (List A) *15 in Science options (List A or B) *12 in Approved options (List A, B or C)</td>
<td>BIOL 201, 391; GENET 390; MICRB 311, 316 *6 in Arts options *12 in Microbiology options (List A) *15 in Science options (List A or B) ($195) *12 in Approved options (List A, B or C)</td>
</tr>
</tbody>
</table>

Recommended options include, but are not restricted to the following:
**List A)** Microbiology options:
Programs
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BIOL 322; GENET 415; IMIN 324, 371, 372, 452; MICRB 315, 320, 343, 345, 392, 410, 423, 491; NU FS 361, 363, 402, 480; MMI 351, 352, 405, 415, 520.

List B) Science options:
BIOCH 310, 320, 330, 401, 410, 420, 430, 441, 450, 455, 460; BIOIN 301; BIOL 398, 399, 400, 490, 495, 498, 499; CHEM 211, 213, 303, 361, 363, 371, 373; CMPUT 101, 114, 115; 174, 175; ENT 378; GENET 301, 302, 304, 305, 375, 408, 420; IMIN 401; PHYS 124, 126; ZOOL 352, 452.

List C) Approved options:
BIOL 380; BOT 205, 380, 382; CELL 300, 301; EAS 201; PHYSL 210; PSYCO 104; REN R 210, 442.

Notes:
(1) Honors students are required to take BIOL 499, MICRB 343 and 345 and reduce the number of Science and Microbiology options each by *6.
(2) Credit in Science 100 will be considered equivalent to BIOL 107, 108, CHEM 101, 102, 261, CMPUT 174, MATH 114, PHYS 144 and 146.
(3) CHEM 211 and 213 highly recommended.

Molecular Genetics

<table>
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<tr>
<th>CURRENT</th>
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<tbody>
<tr>
<td><strong>Year 1</strong></td>
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</tr>
<tr>
<td>BIOL 107, 108, 207</td>
<td>No changes.</td>
</tr>
<tr>
<td>CHEM 101, 102, 164 or 261</td>
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</tr>
<tr>
<td>MATH 113 or 114 or 125</td>
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</tr>
<tr>
<td>STAT 151</td>
<td></td>
</tr>
<tr>
<td>*6 Arts options (junior level ENGL or junior WRS recommended)</td>
<td></td>
</tr>
<tr>
<td>Note: Although BIOL 207 is recommended in Year 1, alternatively, BIOL 201 (or CELL 201) may be taken in Year 1. BIOL 207 must be completed before Winter term of Year 2.</td>
<td></td>
</tr>
<tr>
<td><strong>Year 2</strong></td>
<td><strong>Year 2</strong></td>
</tr>
<tr>
<td>BIOCH 200</td>
<td>BIOCH 200</td>
</tr>
<tr>
<td>BIOL 201 or CELL 201</td>
<td>BIOL 201 or CELL 201</td>
</tr>
<tr>
<td>BIOL 208</td>
<td>BIOL 208</td>
</tr>
<tr>
<td>CHEM 263</td>
<td>CHEM 263</td>
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<tr>
<td>GENET 270</td>
<td>GENET 270</td>
</tr>
<tr>
<td>MICRB 265</td>
<td>MICRB 265</td>
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</tbody>
</table>
### Programs
**Faculty of Science**
**Calendar Changes 2016-2017**

<table>
<thead>
<tr>
<th>Programs</th>
<th>Faculty of Science</th>
</tr>
</thead>
</table>

**Years 3 and 4**

One of BIOCH 310, 320, 330 or CELL 300 (BIOCH 320 strongly recommended)

Students required to take at least

*6 from GENET 301, 302, 304 and *6 from BIOL 380, GENET 305, 390.

*9 from List A

*3 from List B

*15 from List C

*6 in Arts options

*12 in approved options

List A: GENET 364, 408, 412, 415, 418 and either GENET 422 or 424.

List B: BIOL 391; GENET 375, 420.

List C: Including, but not restricted to the following: ANAT 400; BIOCH 310, 320, 330, 401, 410, 420, 430, 450; BIOL 315, 321, 391, 398, 399, 400, 490, 495, 498, 499; BOT 303, 382, 445, 464; CELL 300, 301, 402, 415, 445; CHEM 371, 373; ENT 321; GENET 301, 302, 304, 305, 364, 375, 390, 408, 412, 418, 420, 422, 424; IMIN 200, 324, 371, 401; MICRB 311, 316, 320, 343, 345, 392, 415; ONCOL 320, 425; PHYSYL 210, 401; ZOOL 241, 242, 303, 340, 342, 402, 441, 442.

**Notes**

(1) Honors students are required to take BIOL 499 and reduce approved options by *6.

(2) Credit in SCI 100 will be considered equivalent to BIOL 107, 108; CHEM 101, 102, 261; MATH 114, *3 Science options and *6 Approved options.

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**Physiology and Developmental Biology**

<table>
<thead>
<tr>
<th>CURRENT</th>
<th>PROPOSED</th>
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</thead>
<tbody>
<tr>
<td>BIOL 107, 108</td>
<td>BIOL 107, 108</td>
</tr>
</tbody>
</table>

**Notes**

(1) Honors students are required to take BIOL 499 and reduce approved options by *6.

(2) Credit in SCI 100 will be considered equivalent to BIOL 107, 108; CHEM 101, 102, 261; MATH 114, *3 Science options and *6 Approved options.
### Programs

**Faculty of Science**

**Calendar Changes 2016-2017**

<table>
<thead>
<tr>
<th>CHEM 101, 164 or 261</th>
<th>CHEM 101, 164 or 261</th>
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<tr>
<td>MATH 113 or 114 or 125</td>
<td>MATH 113 or 114 or 125</td>
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<tr>
<td>STAT 151</td>
<td>STAT 151</td>
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<td>*6 Arts options (junior level ENGL or junior WRS recommended)</td>
<td>*6 Arts options (junior level ENGL or junior WRS recommended)</td>
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</table>
| * 6 Science options | * 6 Science options | ($195)

**Year 2**

<table>
<thead>
<tr>
<th>BIOCH 200</th>
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<tr>
<td>BIOL 201 or CELL 201</td>
<td>BIO 201 or CELL 201</td>
</tr>
<tr>
<td>BIOL 207, 208</td>
<td>BIO 207, 208</td>
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<tr>
<td>ZOOL 241, 242, 250</td>
<td>ZOOL 241, 242, 250</td>
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<tr>
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<td>*3 Arts option</td>
</tr>
<tr>
<td>*6 approved options</td>
<td>*6 approved options</td>
</tr>
<tr>
<td>Note: students intending to take BIOCH 310, 320 or 330 are required to take CHEM 263</td>
<td>Note: students intending to take BIOCH 310, 320 or 330 are required to take CHEM 263</td>
</tr>
</tbody>
</table>

**Years 3 and 4**

<table>
<thead>
<tr>
<th>ZOOL 303, 325, 344</th>
<th>ZOOL 303, 325, 344</th>
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<tr>
<td>*3 from ZOOL 402, 441, 442, 450</td>
<td>*3 from ZOOL 402, 441, 442, 450</td>
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<tr>
<td>or BIOL 445</td>
<td>or BIOL 445</td>
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<tr>
<td>*3 from BIOCH 310, 320, 330 or CELL 300</td>
<td>*3 from BIOCH 310, 320, 330 or CELL 300</td>
</tr>
<tr>
<td>*9 from ZOOL 340, 342, 343, 352</td>
<td>*9 from ZOOL 340, 342, 343, 352</td>
</tr>
<tr>
<td>or BIOL 341 or 391</td>
<td>or BIOL 341 or 391</td>
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<tr>
<td>*9 Arts options</td>
<td>*9 Arts options</td>
</tr>
<tr>
<td>*12 approved options</td>
<td>*12 approved options</td>
</tr>
<tr>
<td>*15 from list below</td>
<td>*15 from list below</td>
</tr>
</tbody>
</table>

Recommended options include, but are not restricted to additional courses from above and the following:

| BIOCH 310, 320, 330; BIOL 341, 391, 398, 399, 400, 490, 495, 498, 499, 545; BOT 303, 340, 445; CELL 300, 301, 402, 415; ENT 321, 378; GENET 270, 301, 302, 304, 375, 390, 412, 418, 420; IMIN 200, 371, 372, 401, 452; MA SC 403, 415; MICRB 265, 311; NEURO 443, 472; PHYSL 372, 401, 402, 403, 404, 544, 545; PMCOL 371; ZOOL 340, 342, 343, 352, 370, 402, 441, 442, 450, 452. |

**Notes**

(1) MA SC courses on this list are offered at Bamfield Marine Sciences Centre.

(2) Honors students are required to take BIOL 499 and reduce approved options by *6.

(3) The above program is distinct from the Honors Physiology Program offered by the Department of Physiology, Faculty of Medicine and Dentistry. Applicants should contact the current Advisor in the Department of Biological Sciences to ensure that this is the Program for which they wish to register.

(4) Credit in SCI 100 will be considered

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Submitted on: _______________________________
Department Contact: __________________________________________________________
GFC Circulated on: ____________________________
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### Plant Biology

<table>
<thead>
<tr>
<th>CURRENT</th>
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<tbody>
<tr>
<td><strong>Year 1</strong></td>
<td><strong>Year 1</strong></td>
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<td>BIOL 107, 108; CHEM 101, 164 or 261; MATH 113 or 114 or 125; STAT 151; *6 Arts options (junior level ENGL or junior WRS recommended) *6 Science options</td>
<td>BIOL 107, 108; CHEM 101, 164 or 261; MATH 113 or 114 or 125; STAT 151; *6 Arts options (junior level ENGL or junior WRS recommended) *6 Science options ($195)</td>
</tr>
<tr>
<td><strong>Year 2</strong></td>
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<tr>
<td>BIOCH 200; BIOL 201, 207, 208, 321; BOT 205; CHEM 102; *3 Arts option *3 approved option</td>
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</tr>
<tr>
<td><strong>Years 3 and 4</strong></td>
<td><strong>Years 3 and 4</strong></td>
</tr>
</tbody>
</table>
Details of Courses

195.1 Course Listings

Science courses can be found in §231, Course Listings, under the following subject headings:

- Immunology and Infection (IMIN)
- Laboratory Animal Management (LB AN)
- Marine Science (MA SC)
- Mathematical Physics (MA PH)
- Mathematics (MATH)

<table>
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<tbody>
<tr>
<td>195.1 Details of Courses</td>
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</tbody>
</table>

Science courses can be found in §231, Course Listings, under the following subject headings:

- Immunology and Infection (IMIN)
- Interdisciplinary Courses offered by the Faculty of Science (INT D)
- Laboratory Animal Management (LB AN)
- Marine Science (MA SC)
- Mathematical Physics (MA PH)
- Mathematics (MATH)

[...]
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Term</th>
<th>Prerequisites</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BIOL 330 Introduction to Biological Data</strong></td>
<td>*3 (fi 6)</td>
<td>(second term, 3-0-3)</td>
<td>Expands on prior introductions to the scientific method and examines the steps involved in the planning, collection, organization, analysis and presentation of biological data. Classes will explore the types of data used to answer a variety of biological questions and will review several different sampling designs, assess the benefits and limitations of various data types for scientific inference, and integrate the statistical methods that are common to other introductory courses. Labs will teach students how spreadsheets and relational databases can be used to manipulate, analyze, and present the results of scientific research. Prerequisites: BIOL 208 and STAT 151.</td>
<td></td>
</tr>
<tr>
<td><strong>BIOL 331 Population Ecology</strong></td>
<td>*3 (fi 6)</td>
<td>(second term, 3-0-3)</td>
<td>Principles of population ecology as they apply to plants and animals; population consequences of variation among individuals; habitat structure and population structure; habitat selection and foraging theory; life tables, demography, and the evolution of life history patterns; population dynamics; interactions among organisms (predation, competition, mutualism); and population regulation. Prerequisites: BIOL 208; any one of MATH 113, 115, 120, 125 or SCI 100; STAT 151.</td>
<td></td>
</tr>
<tr>
<td><strong>BIOL 332 Community Ecology</strong></td>
<td>*3 (fi 6)</td>
<td>(either term, 3-3s-0)</td>
<td>Principles of community ecology, applied to plants and animals. The nature of communities, functional groups and rarity; niche theory and competition; disturbance and other alternatives to competition; food webs (predation, herbivory and disease); diversity (determinants, functional consequences and gradients); island communities. Prerequisites: BIOL 208; STAT 151; and any one of MATH 113, 115, 120, 125 or SCI 100. May not be taken for credit if credit already obtained in ZOOL 332.</td>
<td></td>
</tr>
<tr>
<td><strong>BIOL 430 Experimental Biology</strong></td>
<td>*3 (fi 6)</td>
<td>(either term, 3-0-3)</td>
<td>Emphasis is on the design of experiments and analysis of data collected from field and laboratory studies in Biology. Prerequisites: STAT 141 or 151 and a 300-level Biological Sciences course. Credit cannot be obtained for both BIOL 430 and REN R 480.</td>
<td></td>
</tr>
</tbody>
</table>

**BIOL 330 Introduction to Biological Data**

*3 (fi 6) (second term, 3-0-3). Expands on prior introductions to the scientific method and examines the steps involved in the planning, collection, organization, analysis and presentation of biological data. Classes will explore the types of data used to answer a variety of biological questions and will review several different sampling designs, assess the benefits and limitations of various data types for scientific inference, and integrate the statistical methods that are common to other introductory courses. Labs will teach students how spreadsheets and relational databases can be used to manipulate, analyze, and present the results of scientific research. Prerequisites: BIOL 208 and STAT 151 or SCI 151.

**BIOL 331 Population Ecology**

*3 (fi 6) (second term, 3-0-3). Principles of population ecology as they apply to plants and animals; population consequences of variation among individuals; habitat structure and population structure; habitat selection and foraging theory; life tables, demography, and the evolution of life history patterns; population dynamics; interactions among organisms (predation, competition, mutualism); and population regulation. Prerequisites: BIOL 208; any one of MATH 113, 115, 120, 125 or SCI 100; STAT 151 or SCI 151.

**BIOL 332 Community Ecology**

*3 (fi 6) (either term, 3-3s-0). Principles of community ecology, applied to plants and animals. The nature of communities, functional groups and rarity; niche theory and competition; disturbance and other alternatives to competition; food webs (predation, herbivory and disease); diversity (determinants, functional consequences and gradients); island communities. Prerequisites: BIOL 208; STAT 151 or SCI 151; and any one of MATH 113, 115, 120, 125 or SCI 100. May not be taken for credit if credit already obtained in ZOOL 332.

**BIOL 430 Experimental Biology**

*3 (fi 6) (either term, 3-0-3). Emphasis is on the design of experiments and analysis of data collected from field and laboratory studies in Biology. Prerequisites: STAT 141 or 151 and a 300-level Biological Sciences course. Credit cannot be obtained for both BIOL 430 and REN R 480.
BIOL 432 Field Methods in Ecology
*3 (fi 6) (first term, 0-0-6). Design, execution, analysis, and presentation of problems in behavioral, population, and community ecology in a field environment. Field exercises, demonstration of techniques, and data collection for independent projects will take place during the two weeks preceding the Fall term at a field station off the main campus. Final reports are due in the last week of September. Prerequisites: BIOL 331 or 332 or ZOOL 371 or BOT 332; a statistics course such as STAT 151, BIOL 330 or 430. This course requires payment of additional miscellaneous fees. Refer to the Fees Payment Guide in the University Regulations and Information for Students section of the Calendar.

BIOL 471 Landscape Ecology
*3 (fi 6) (second term, 3-0-3). Landscapes are holistic entities whose patterns influence ecological processes. Topics highlighted in this course include landscape components, morphology and dynamics; detecting spatial/temporal change in landscapes; issues of scales; movements of organisms, disturbances, and nutrients across landscape mosaics; and restoration, planning and management in a landscape context. Labs emphasize GIS applications to characterizing landscape patterns and heterogeneity in space and time, distributing and moving organisms across landscapes, and restoring or planning landscapes for conservation objectives. Prerequisites: MATH 115 or SCI 100; STAT 151; one of BIOL 331, 332 or BOT 332. Previous GIS course is useful. Credit cannot be obtained for both BIOL 471 and 571.

BOT 332 Plant Ecology
*3 (fi 6) (first term, 3-0-3). Study of the local factors, which limit plant growth, reproduction, and diversity. Particular emphasis on the mechanisms by which plants interact with their local environment and the effects of these interactions on diversity and community functioning. Specific topics include plant foraging, germination ecology, mechanisms of competition and facilitation, patterns of diversity, and community stability. Prerequisites: BIOL 208 and STAT 151. BOT 205 recommended. This course requires payment of additional miscellaneous fees. Refer to the Fees Payment Guide in the University Regulations and Information for Students section of the Calendar.

BIOL 432 Field Methods in Ecology
*3 (fi 6) (first term, 0-0-6). Design, execution, analysis, and presentation of problems in behavioral, population, and community ecology in a field environment. Field exercises, demonstration of techniques, and data collection for independent projects will take place during the two weeks preceding the Fall term at a field station off the main campus. Final reports are due in the last week of September. Prerequisites: BIOL 331 or 332 or ZOOL 371 or BOT 332; a statistics course such as STAT 151 or SCI 151, BIOL 330 or 430. This course requires payment of additional miscellaneous fees. Refer to the Fees Payment Guide in the University Regulations and Information for Students section of the Calendar.

BIOL 471 Landscape Ecology
*3 (fi 6) (second term, 3-0-3). Landscapes are holistic entities whose patterns influence ecological processes. Topics highlighted in this course include landscape components, morphology and dynamics; detecting spatial/temporal change in landscapes; issues of scales; movements of organisms, disturbances, and nutrients across landscape mosaics; and restoration, planning and management in a landscape context. Labs emphasize GIS applications to characterizing landscape patterns and heterogeneity in space and time, distributing and moving organisms across landscapes, and restoring or planning landscapes for conservation objectives. Prerequisites: MATH 115 or SCI 100; STAT 151 or SCI 151; one of BIOL 331, 332 or BOT 332. Previous GIS course is useful. Credit cannot be obtained for both BIOL 471 and 571.

BOT 332 Plant Ecology
*3 (fi 6) (first term, 3-0-3). Study of the local factors, which limit plant growth, reproduction, and diversity. Particular emphasis on the mechanisms by which plants interact with their local environment and the effects of these interactions on diversity and community functioning. Specific topics include plant foraging, germination ecology, mechanisms of competition and facilitation, patterns of diversity, and community stability. Prerequisites: BIOL 208 and STAT 151 or SCI 151. BOT 205 recommended. This course requires payment of additional miscellaneous fees. Refer to the Fees Payment Guide in the University Regulations and Information for Students section of the Calendar.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Hours</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>CMPUT 304</td>
<td>Algorithms II</td>
<td>3</td>
<td>6</td>
<td>CMPUT 204 or 275; one of STAT 141, 151, 235 or 265; one of MATH 225, 227, 228 or consent of Instructor.</td>
</tr>
<tr>
<td>CMPUT 340</td>
<td>Introduction to Numerical Methods</td>
<td>3</td>
<td>6</td>
<td>CMPUT 204 or 275; MATH 125, 214; one of STAT 141, 151, 235 or 265.</td>
</tr>
<tr>
<td>CMPUT 366</td>
<td>Intelligent Systems</td>
<td>3</td>
<td>6</td>
<td>CMPUT 204 or 275; one of STAT 141, 151, 235 or 265.</td>
</tr>
</tbody>
</table>
**CMPUT 466 Machine Learning**

*3 (fi 6) (either term, 3-0-3). Learning is essential for many real-world tasks, including adaptive control, recognition, diagnosis, forecasting and data-mining. This course covers a variety of learning scenarios (supervised, unsupervised and partially supervised), as well as foundational methods for regression, classification, dimensionality reduction and clustering. Modeling techniques such as kernels, Gaussian processes and probabilistic graphical models will typically be introduced. It will also provide the formal foundations for understanding when learning is possible and practical. Prerequisite: one of CMPUT 340, 418 or equivalent knowledge; one of STAT 141, 151, 235 or 265; or consent of Instructor.

**EAS 351 Environmental Applications of Geographical Information Systems**

*3 (fi 6) (either term, 3-0-3). This course emphasizes the applications of Geographic Information Systems (GIS) to the environmental sciences. Examples from resource management and the earth and biological sciences are discussed. Labs impart technical experience with ARCINFO. Prerequisites: EAS 221 and one of MATH 113, 114, STAT 141, 151, or permission of the instructor. [Faculty of Science]

**MATH 100 Calculus I**

Œ3.5 (fi 6) (either term, 3-0-1). Review of numbers, inequalities, functions, analytic geometry; limits, continuity; derivatives and applications, Taylor polynomials; log, exp, and inverse trig functions. Integration, fundamental theorem of calculus substitution, trapezoidal and Simpson’s rules. Prerequisites: Pure Mathematics 30 or Mathematics 30-1 or equivalent, and Mathematics 31. Notes: (1) Credit can be obtained in at most one MATH 100, 113, 114, 117, 144, or SCI 100. (2) Students in all sections of this course will write a common final examination. (3) Restricted to Engineering students. Non-Engineering students who take this course will receive Ö3.0.

**MATH 113 Elementary Calculus I**

Œ3 (fi 6) (either term, 3-0-0). Review of analytic geometry. Differentiation of elementary, trigonometric, exponential, and logarithmic functions. Applications of the derivative. Integration. Fundamental Theorem of Calculus. Prerequisite: Pure Mathematics 30 or Mathematics 30-1 or equivalent. Students who have taken Mathematics 31 are advised to
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 114</td>
<td>Elementary Calculus I</td>
<td>3</td>
<td>Review of analytic geometry. Differentiation of elementary, trigonometric, exponential, and logarithmic functions. Applications of the derivative. Fundamental Theorem of Calculus. Prerequisite: Pure Mathematics 30 or Mathematics 30-1 or equivalent. Note: Credit can be obtained in at most one of MATH 100, 113, 114, 117, 134, 144, or SCI 100.</td>
</tr>
<tr>
<td>MATH 115</td>
<td>Elementary Calculus II</td>
<td>3</td>
<td>Inverse trigonometric functions. Techniques of integration. Improper integrals. Applications of the definite integral. Introduction to differential equations. Prerequisite: MATH 113, 114, or 144, or equivalent. Note: Credit can be obtained in at most one of MATH 101, 115, 118, 146, or SCI 100.</td>
</tr>
<tr>
<td>MATH 117</td>
<td>Honors Calculus I</td>
<td>3</td>
<td>Functions, continuity, and the derivative. Extended limits and L'Hospital's rule. Prerequisite: Pure Mathematics 30 and 31 or their equivalents. Notes: This course is designed for students with at least 80 percent grade in Pure Mathematics 30 or Mathematics 30-1 and Mathematics 31. Other students may be admitted with the consent of the Department. Credit can be obtained in at most one of MATH 100, 113, 114, 117, 144, or SCI 100. Engineering students will receive a weight of 4.0 units for this course.</td>
</tr>
<tr>
<td>MATH 118</td>
<td>Honors Calculus II</td>
<td>3</td>
<td>Integration and the Fundamental Theorem. Techniques and applications of integration. Derivatives and integrals of the exponential, trigonometric functions. Introduction to infinite series. Introduction to partial derivatives. Prerequisite: MATH 117 or its equivalent. Students with MATH 113 or 114 will be admitted with the consent of Department. Note: Credit can be obtained in at most one of MATH 101, 115, 118, 146, or SCI 100. Engineering students will receive a weight of 4.0 units for this course.</td>
</tr>
<tr>
<td>MATH 144</td>
<td>Calculus for the Physical Sciences I</td>
<td>3</td>
<td>Integration and the Fundamental Theorem. Techniques and applications of integration. Derivatives and integrals of the exponential, trigonometric functions. Introduction to infinite series. Introduction to partial derivatives. Prerequisite: MATH 117 or its equivalent. Students with MATH 100, 113, 114, 134, or 144 will be admitted with consent of Department. Note: Credit can be obtained in at most one of MATH 101, 115, 118, 146, or SCI 100. Engineering students will receive a weight of 4.0 units for this course.</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
<td>Term(s)</td>
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</tr>
<tr>
<td>MATH 100</td>
<td>Calculus for the Physical Sciences I</td>
<td>3</td>
<td>fi 6</td>
</tr>
<tr>
<td>MATH 146</td>
<td>Calculus for the Physical Sciences II</td>
<td>3</td>
<td>fi 6</td>
</tr>
<tr>
<td>MATH 227</td>
<td>Honors Linear Algebra II</td>
<td>3</td>
<td>second term, 3-0-0</td>
</tr>
<tr>
<td>MM 813</td>
<td>Hot Topics in Multimedia I</td>
<td>3</td>
<td>(either term, variable)</td>
</tr>
</tbody>
</table>
brought revolution in multimedia research and development. This course intends to introduce some latest hot topics in multimedia so that students understand industrial requirements and applications, and prepare for their careers.

**NEW COURSE**

**MM 814 Hot Topics in Multimedia II**  
*3 (fi 6) (either term, variable)*. The multimedia pipeline includes data acquisition, processing, transmission and visualization, as well as quality assessment. Over the years, state-of-the-art techniques have been developed in these areas. Nevertheless, emerging technologies in hardware, systems and tools necessitate continuous evolution of multimedia algorithms and inventions. Driven by industrial demands and consumer preferences, recent advances, e.g. Internet-of-Things, Cloud Computing, High Dynamic Display, visual recognition, multimedia mining and so on, have brought revolution in multimedia research and development. This course intends to introduce some latest hot topics in multimedia so that students understand industrial requirements and applications, and prepare for their careers.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Course</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYCO 258 Cognitive Psychology</td>
<td><em>3 (fi 6) (either term, 3-0-0)</em>. A survey of findings of theoretical issues in the study of cognition, such as perception, attention, knowledge representation, memory, learning, language, reasoning, and problem solving. Prerequisites: PSYCO 104 or SCI 100, and STAT 141 or 151.</td>
<td>Faculty of Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSYCO 254 Foundations of Cognitive Science</td>
<td><em>3 (fi 6) (either term, 3-0-0)</em>. An introduction to the theories and research practices of cognitive science by examining contributions of cognitive psychology, artificial intelligence, linguistics, and neuroscience to a variety of research areas. Prerequisites: STAT 141 or 151 and PSYCO 258.</td>
<td>Faculty of Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSYCO 372 Behavior in Relation to Genetics</td>
<td><em>3 (fi 6) (either term, 3-0-0)</em>. An examination of the influence of genetic variations on behavioral differences in infra-human and human populations. Prerequisites: PSYCO 104 or SCI 100 and PSYCO 105 and STAT 141 or 151 and BIOL 207.</td>
<td>Faculty of Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSYCO 372 Behavior in Relation to Genetics</td>
<td><em>3 (fi 6) (either term, 3-0-0)</em>. An examination of the influence of genetic variations on behavioral differences in infra-human and human populations. Prerequisites: PSYCO 104 or SCI 100 and PSYCO 105 and STAT 141 or 151 and BIOL 207.</td>
<td>Faculty of Science</td>
<td></td>
<td></td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
<td>Term(s)</td>
<td>Prerequisites</td>
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<tr>
<td>PSYCO 381</td>
<td>Principles of Learning</td>
<td>*3</td>
<td>(fi 6)</td>
<td>(either term, 3-0-0). Principles and processes of learning including a consideration of classical conditioning, instrumental learning, and memory. Research involving non-human animals will be emphasized. Prerequisites: STAT 141 or 151 and PSYCO 281 or 282. [Faculty of Science]</td>
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<tr>
<td>PSYCO 396</td>
<td>Individual Research</td>
<td>*3</td>
<td>(fi 6)</td>
<td>(either term, 3-0-0). A course designed to allow the greater depth than the classroom structure senior undergraduate student the opportunity to pursue a supervised research project in permits. Directed research done under the supervision of an academic member of the Psychology Department. Successful completion of this course requires a formal research proposal or report, lab notes, and/or essay. Normally for students in their third year of study. Cannot be taken more than twice. Prerequisites: a 200-level PSYCO course and consent of the Department. Specific projects may require additional prerequisites. [Faculty of Science]</td>
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<tr>
<td>PSYCO 402</td>
<td>Recent Advances in Experimental Psychology: Methods and Phenomena</td>
<td>*3</td>
<td>(fi 6)</td>
<td>(either term, 3-0-2). Discussion and demonstration of the techniques and discoveries of selected fields within experimental psychology. The course will provide laboratory experience with the empirical findings of these fields. Prerequisites: STAT 141 or 151 and a 300-level PSYCO course. Students must check with the Department for the topics for the year and any additional prerequisites. [Faculty of Science]</td>
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<tr>
<td>PSYCO 403</td>
<td>Recent Advances in Experimental Psychology: Models and Theories</td>
<td>*3</td>
<td>(fi 6)</td>
<td>(either term, 3-0-0). Discussion of advanced concepts and theories developed by selected fields within experimental psychology. The course will examine the relation between theory and data in these fields. Prerequisites: STAT 141 or 151 and a 300-level PSYCO course. Students must check with the Department for the topics for the year and any additional prerequisites. [Faculty of Science]</td>
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<tr>
<td>PSYCO 402</td>
<td>Recent Advances in Experimental Psychology: Methods and Phenomena</td>
<td>*3</td>
<td>(fi 6)</td>
<td>(either term, 3-0-2). Discussion and demonstration of the techniques and discoveries of selected fields within experimental psychology. The course will provide laboratory experience with the empirical findings of these fields. Prerequisites: STAT 141 or 151 or SCI 151 and a 300-level PSYCO course. Students must check with the Department for the topics for the year and any additional prerequisites. [Faculty of Science]</td>
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<td>PSYCO 403</td>
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<td>*3</td>
<td>(fi 6)</td>
<td>(either term, 3-0-0). Discussion of advanced concepts and theories developed by selected fields within experimental psychology. The course will examine the relation between theory and data in these fields. Prerequisites: STAT 141 or 151 or SCI 151 and a 300-level PSYCO course. Students must check with the Department for the topics for the year and any additional prerequisites. [Faculty of Science]</td>
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<td>PSYCO 413</td>
<td>Design and Analysis of Experiments in Psychology</td>
<td>*3 (fi 6)</td>
<td>(either term, 3-0-3)</td>
<td>Provides the background necessary to design and analyze data in any area of experimental psychology and prepares students to conduct original research. Topics include sampling distributions and hypothesis testing; issues in and analysis of between-subjects, within-subjects, and mixed designs; trend analysis; planned and post hoc comparisons; fixed and random effects factors; and efficiency and power of various experimental designs. Prerequisite: STAT 141 or 151 and any 300-level PSYCO. [Faculty of Science]</td>
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<td>PSYCO 414</td>
<td>Advanced Methods: Monte Carlo Techniques</td>
<td>*3 (fi 6)</td>
<td>(either term, 3-0-3)</td>
<td>A practical introduction to computer simulation based methods of data analysis, including methods for assessing statistical accuracy of measures, performance of statistical tests, and power comparisons. Prerequisites: STAT 141 or 151 and a 300-level PSYCO course. [Faculty of Science]</td>
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<tr>
<td>PSYCO 421</td>
<td>Advanced Topics in Human Development</td>
<td>*3 (fi 6)</td>
<td>(either term, 3-0-0)</td>
<td>An in-depth review and analysis of research in an area of human development. Prerequisites: STAT 141 or 151, and PSYCO 323 or PSYCO 327 or PSYCO 329. Note: Consult with the Department for the specific topic offered each year and any additional prerequisites. [Faculty of Science]</td>
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<tr>
<td>PSYCO 457</td>
<td>Embodied Cognitive Science</td>
<td>*3 (fi 6)</td>
<td>(either term, 0-3s-0)</td>
<td>Introduction to theory and practice of embodied cognitive science, focusing on phenomena that emerge from agent-environment, including how even simple agents can produce apparently complex behavior. Prerequisites: STAT 141 or 151, PSYCO 354 and one other 300-level psychology course. [Faculty of Science]</td>
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<tr>
<td>PSYCO 483</td>
<td>Spatial Cognition and Navigation</td>
<td>*3 (fi 6)</td>
<td>(either term, 0-3s-0)</td>
<td>The course critically evaluates research and theory in spatial cognition and navigation. Topics may include research from: comparative cognition, developmental psychology, evolution and ecology, human cognition, neuroscience or artificial intelligence. Prerequisites: STAT 141 or 151, and PSYCO 351 or 381. [Faculty of Science]</td>
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### NEW COURSE

**SCI 151  InSciTE: Scientific Inquiry and Data Analysis**

*6 (fi 12) (two term, 3-0-3). This interdisciplinary science project course, which is rooted in statistical analysis and the scientific process, is the keystone course of the Interdisciplinary Science Threshold Experience (InSciTE). Students will explore connections between scientific disciplines while engaging in individual and group activities in the lecture and laboratory. This course includes both instructor- and student-directed projects that incorporate concepts and methods in applied statistics such as data collection and presentation, descriptive statistics, probability, sampling distributions, the central limit theorem, point estimation and hypothesis testing, correlation and regression analysis, goodness of fit and contingency table.

Prerequisite: Pure Mathematics 30 or Mathematics 30-1. Credit may not be obtained for both SCI 151 and either STAT 151, PEDS 109, or SOC 210. Corequisites: CHEM 101 and MATH 117 or MATH 134 or MATH 144 in the Fall term. Enrollment is by consent of the Faculty of Science and requires formal admission to InSciTE.

### STAT 151 Introduction to Applied Statistics I

*3 (fi 6) (either term, 3-0-0). Data collection and presentation, descriptive statistics. Probability distributions, sampling distributions and the central limit theorem. Point estimation and hypothesis testing. Correlation and regression analysis. Goodness of fit and contingency table. Prerequisite: Mathematics 30-1 or 30-2. This course may not be taken for credit if credit has been obtained in any STAT course, or in PEDS 109, PSYCO 211 or SOC 210.

### STAT 151 Introduction to Applied Statistics II

*3 (fi 6) (either term, 3-0-0). Data collection and presentation, descriptive statistics. Probability distributions, sampling distributions and the central limit theorem. Point estimation and hypothesis testing. Correlation and regression analysis. Goodness of fit and contingency table. Prerequisite: Mathematics 30-1 or 30-2. This course may not be taken for credit if credit has been obtained in any STAT course, or in PEDS 109, PSYCO 211 or SOC 210.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<th>Corequisites</th>
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<tr>
<td>STAT 235</td>
<td>Introductory Statistics for Engineering</td>
<td>3.8 (fi 6)</td>
<td>(either term or Spring/Summer, 3-0-1.5)</td>
<td>Descriptive data analysis. Calculus of Probability. Binomial, multinomial, Poisson, normal, beta, exponential, gamma, hypergeometric, and Weibull distributions. Sampling distributions. Estimation, testing hypotheses, goodness-of-fit tests, and one-way analysis of variance. Linear correlation and regression. Sampling. Quality control. Use of a microcomputer software package for statistical analyses in engineering applications.</td>
<td>MATH 100. Corequisite: MATH 101. Credit may not be obtained in STAT 235 if credit has already been obtained in STAT 141, 151, 222, 265, 266; PSYCO 211 or SOC 210. Intended for Engineering students. Other students who take this course will receive *3.0.</td>
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<tr>
<td>STAT 252</td>
<td>Introduction to Applied Statistics II</td>
<td>3 (fi 6)</td>
<td>(either term, 3-0-2)</td>
<td>Methods in applied statistics including regression techniques, analysis of variance and covariance, and methods of data analysis. Applications are taken from Biological, Physical and Social Sciences, and Business. Credit may be received in at most one of STAT 252, 319, 337, or 341. May not be taken for credit if credit has been received for STAT 368 or 378.</td>
<td>STAT 141 or 151 or 235 or equivalent.</td>
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<tr>
<td>STAT 337</td>
<td>Biostatistics</td>
<td>3 (fi 6)</td>
<td>(first term, 3-0-2)</td>
<td>Methods of data analysis useful in Biostatistics including analysis of variance and covariance and nested designs, multiple regression, logistic regression and log-linear models. The concepts will be motivated by problems in the life sciences. Applications to real data will be emphasized through the use of a computer package. Prerequisite: STAT 151 and a 200-level Biological Science course. Note: This course may not be taken for credit if credit has already been obtained in STAT 252, 368 or 378.</td>
<td>STAT 151 or SCI 151 and a 200-level Biological Science course. Note: This course may not be taken for credit if credit has already been obtained in STAT 252, 368 or 378.</td>
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<td>Undergraduate Courses</td>
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<td>231.158 Interdisciplinary Undergraduate and Graduate Courses, INT D</td>
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<td>(New section)</td>
<td>231.158.11 Faculty of Science Courses</td>
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<tr>
<td>(new course)</td>
<td>INT D 280 The Mountain World: Introduction to Interdisciplinary Mountain Studies</td>
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<td>★3 (fi 6) (either term, 3-0-0). An interdisciplinary study of the physical and human dimensions of mountain environments. Content includes the physical (glaciers, climate, geology, etc.), biological (flora, fauna, ecology, etc.), physiological (human bodies at altitude, performance, sport, etc.), and cultural (societies, literatures, histories, etc.) dimensions of these unique regions, as well as a critical analysis of the processes of change and influence shaping local and regional mountain environments around the globe, past and present. (Offered jointly by the Faculty of Physical Education and Recreation and the Faculty of Science) [Faculty of Physical Education and Recreation]</td>
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<td>231.158.12 Faculty of Agricultural, Life and Environmental Sciences Courses</td>
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<td>231.158.26</td>
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**Rationale:** INT D 280 is a team-taught course between instructors in the Faculty of Physical Education and Recreation and the Faculty of Science. The change in notation for the course indicates now the Faculty that owns the course and the Faculties involved in teaching the course. In addition, the Department of Biological Science has concluded that there is enough science content in the course to list it as a Faculty of Science course. The Calendar change now adds a Faculty of Science category to the INT D course subject descriptor and adds INT D 280 as a course under this category.