The Faculty of Engineering offers undergraduate programs in the fields of Engineering and Computer Science. Programs leading to the degree of Bachelor of Engineering are in the fields of Biomedical, Civil, Computer, Electrical, and Mechanical Engineering and a Bachelor of Software Engineering is offered. Programs leading to a Bachelor of Science are in Computer Science and can be combined with programs in Geography, Health Information Science, Mathematics, Music, Physics, Psychology, Statistics, and Visual Arts. Co-operative Education is mandatory for all Engineering degree programs, Health Information Science and Computer Science combined program and optional for the other Computer Science programs.
General Information

DEGREES AND PROGRAMS OFFERED

See the table below for a listing of the Faculty of Engineering undergraduate degree offerings. The Co-operative Education Program is mandatory for all Bachelor of Engineering and Software Engineering programs and the Combined program in Health Information Science and Computer Science and optional for other Computer Science programs. All students in these programs graduate with the Coop designation on their academic documents. The Co-operative Education Programs within the Faculty of Engineering are described in “Engineering Co-operative Education Programs” (page 129).

<table>
<thead>
<tr>
<th>Degree</th>
<th>Program</th>
<th>Options, Specialization Areas and Combined Programs</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSc</td>
<td>Computer Science</td>
<td>Honours: &lt;br&gt;• Honours Software Engineering Option &lt;br&gt;Options: &lt;br&gt;• Computer Communications and Networks &lt;br&gt;• Computer Graphics &amp; Gaming &lt;br&gt;• Software Engineering &lt;br&gt;• Theory &lt;br&gt;General</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined Programs: &lt;br&gt;• Computer Science and Mathematics &lt;br&gt;• Computer Science and Statistics &lt;br&gt;• Geography and Computer Science (Geomatics) &lt;br&gt;• Health Information Science and Computer Science &lt;br&gt;• Music and Computer Science &lt;br&gt;• Physics and Computer Science &lt;br&gt;• Psychology and Computer Science &lt;br&gt;• Visual Arts and Computer Science</td>
<td></td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>Specialization Areas: &lt;br&gt;• Electrical &lt;br&gt;• Mechanical</td>
<td>Options: Biomedical, Computer Music</td>
<td></td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>Computer Engineering</td>
<td>Specialization Areas: &lt;br&gt;• Communications &lt;br&gt;• Computational Intelligence &lt;br&gt;• Computer Systems &lt;br&gt;• Digital &amp; Embedded Systems &lt;br&gt;• Digital Signal Processing &lt;br&gt;• Electrical Energy Systems &lt;br&gt;• Electromagnetics &amp; Photonics &lt;br&gt;• Electronics &lt;br&gt;• Mechatronics &lt;br&gt;• Network Security &amp; Privacy</td>
<td>Options: Biomedical, Computer Music</td>
</tr>
<tr>
<td>BEng</td>
<td>Electrical Engineering</td>
<td>Specialization Areas: &lt;br&gt;• Communications &lt;br&gt;• Computational Intelligence &lt;br&gt;• Computer Systems &lt;br&gt;• Digital &amp; Embedded Systems &lt;br&gt;• Digital Signal Processing &lt;br&gt;• Electrical Energy Systems &lt;br&gt;• Electromagnetics &amp; Photonics &lt;br&gt;• Electronics &lt;br&gt;• Mechatronics &lt;br&gt;• Network Security &amp; Privacy</td>
<td>Options: Biomedical, Computer Music</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineering</td>
<td>Specialization Areas: &lt;br&gt;• Advanced Materials &lt;br&gt;• Biomedical Engineering &lt;br&gt;• Computer Aided Engineering &amp; Advanced Manufacturing</td>
<td>Energy Systems, Thermo-Fluids &amp; Aerodynamics, Mechatronics</td>
</tr>
<tr>
<td></td>
<td>Software Engineering</td>
<td>Specialization Areas: &lt;br&gt;• Biomedical Engineering &lt;br&gt;• Communications &amp; Networks &lt;br&gt;• Computational Intelligence &lt;br&gt;• Embedded Systems &lt;br&gt;• Graphics &amp; Gaming</td>
<td>High Performance Computing, Human Computer Interaction, Mechatronics, Programming Languages &amp; Architectures, Security &amp; Privacy, Theory of Computation</td>
</tr>
</tbody>
</table>

1. Major programs only
2. Honours and Major programs available.
3. General may be BA or BSc. Combined Visual Arts and Computer Science, Combined Music & Computer Science may be BFA or BSc
**Availability of Courses**

Generally, courses offered in the Faculty of Engineering are open to students in other faculties who have satisfied any prerequisite courses. However, some courses or sections are open only to students in the Faculty of Engineering or to students in specific programs. Faculty of Engineering program students are given registration priority in some courses. Courses and applicable restrictions are listed at [www.uvic.ca/engineering/courseaccess.php](http://www.uvic.ca/engineering/courseaccess.php).

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

**Minors**

Minor degree programs are offered by the Computer Science, Electrical and Computer Engineering, and Mechanical Engineering departments within the Faculty of Engineering. Students should refer to the specific departmental entry for further details. Students should consult the appropriate advising centre for the development and approval of the Minor. Courses that fulfill requirements for a Minor cannot form part of the requirements for the degree.

**Limitation of Enrolment**

Enrolment in any course or degree program may be limited by the availability of staff and resources. Applicants who meet the minimum academic requirements are not guaranteed admission to any program.

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**Computer Science Programs**

**Undergraduate Programs**

The Department of Computer Science offers the following programs leading to the degree of Bachelor of Science:

- Major and Honours in Computer Science
- Honours with Software Engineering option
- Major in Computer Science (Computer Communications & Networks Option)
- Major in Computer Science (Computer Graphics and Gaming Option)
- Major and Honours in Computer Science (Software Engineering Option)
- Major in Computer Science (Theory Option)

Students who plan to pursue one of these programs and who meet the qualifications set out below should apply to the Undergraduate Admissions Office and should indicate that they wish to register in the Faculty of Engineering for their first year of study.

Students may complete a combined degree program in the following areas offered by the faculties indicated:

- Faculty of Fine Arts
  - Music and Computer Science
- Visual Arts and Computer Science
- Faculty of Human and Social Development
  - Health Information Science and Computer Science
- Faculty of Science
  - Computer Science and Mathematics
  - Computer Science and Statistics
  - Physics and Computer Science
- Faculty of Social Sciences
  - Geography and Computer Science (Geomatics)
  - Psychology and Computer Science

Students undertaking a combined degree program normally register in the faculty offering the degree as indicated above. Students are advised to consult the specific degree requirements for the combined program, particularly regarding admission requirements, application and possible enrolment limitations.

Students may also undertake a BSc or BA General degree program.

Students undertaking a General degree in Computer Science normally register in the faculty offering the second specialization area of their degree in their first year.

Students may also complete a Minor in Computer Science.

**Computer Science Co-operative Education Programs**

Please refer to “Computer Science and Math Co-op Program” (page 113).

**Computer Science/Mathematics Work Experience Program**

Please refer to the “Computer Science/Math Work Experience Program” (page 114).

**Graduate Programs**

The Department of Computer Science offers the following graduate degrees: MA, MSc, PhD. For information, please see the UVic Graduate Calendar.

**Admission Requirements**

All applicants are advised to carefully review the section on "Undergraduate Admission" (page 31).

**Graduates of Secondary Schools**

Applicants who are seeking admission to the Faculty of Engineering to follow a BSc in Computer Science program based on graduation from a BC/Yukon secondary school should refer to "Undergraduate Admission" (page 31).

Applicants seeking admission based on graduation from secondary schools elsewhere in Canada or abroad require equivalent qualifications to those specified as admission requirements for BC/Yukon secondary school graduates (see "Year 1 Admission Requirements: BC/Yukon Secondary School Graduate", page 34). Applicants are advised to contact Admission Services for further information regarding requirements.

**Transfers from Other Faculties**

A student in another faculty who wishes to transfer into a BSc program in the Faculty of Engineering must have completed 12 units of courses including CSC 110 and MATH 100 or MATH 109. Transfer applicants must also have a minimum C+ average on the most recent 12 units of courses at the time of transfer.

**Transfers from Other Institutions**

To be eligible for admission to a BSc program in the Faculty of Engineering on the basis of work completed at another postsecondary institution, a student must be eligible for transfer credit for at least 12 units of courses and have at least a C+ average on their most recent 12 units of courses. Transfer students must also have completed the equivalent of CSC 110 and MATH 100 or MATH 109.

**Admission to Specific Computer Science Programs**

On admission, students are normally placed in the BSc Major Program.

Applications for admission to Computer Science Co-op programs are normally completed at the end of the student’s first term of studies but are accepted until the beginning of a student’s third year. Application deadlines are September 15 and January 15. Detailed information is available at the Computer Science and Math Co-Op Office.

Applications for admission to the Honours Program in Computer Science are normally made at the end of the student’s second year of studies.
On admission to a Major or Honours Program in Computer Science, a student from outside the faculty must register in the Faculty of Engineering.

Credit for Courses Offered by Other Faculties or Institutions
All courses in other faculties are acceptable for use as elective credit for Major and Honours Programs in Computer Science, if the regulations of the department offering the courses permit and prerequisites are met.

Students already enrolled in a BSc degree program who plan to undertake work at another institution must receive prior written approval from the department of Computer Science if they wish such courses to be credited towards the BSc degree. A Letter of Permission to take courses elsewhere is provided by the Computer Science Advising Office. Credit for courses completed elsewhere will only be granted for courses in which a grade of 55% or higher, or the equivalent, was awarded. For some courses a higher minimum grade may be required as specified in the letter of permission.

Students authorized to attend another university who accept a degree from that institution give up the right to a University of Victoria degree until they have satisfied the University's requirements for a second bachelor's degree (see "Second Bachelor's Degrees", page 56).

Interfaculty Programs
Students planning to complete a Double Major or Double Honours Program in Computer Science and another discipline may choose to register in the Faculty of Engineering or the faculty of the other discipline. Students can arrange for an Interfaculty Double Honours or Major program through the Computer Science Advising Office. Such programs involve satisfying the Honours or Major requirements of two disciplines in two different faculties. Agreement to details of all such programs must be signed by the student and by representatives of the academic units involved. Students undertaking an interfaculty program will be subject to the regulations of the faculty in which they are registered. Only one BSc degree with a Double Major or a Double Honours or a Joint Major/Honours will be awarded on the recommendation of the faculty in which the student is registered.

Students in a Major or Honours Program may also arrange to undertake a Minor offered in another discipline.

ACADEMIC REGULATIONS

Academic Performance
Students in a BSc degree program are subject to the University regulations on academic performance (See "Standing" page 54).

Graduation Standing
The graduation standing for students in a BSc Major or Honours Program is determined in accordance with University regulations (See "Standing" page 54).

BSC PROGRAM REQUIREMENTS

Requirements Common to All BSc Degrees
Each candidate for a BSc degree is required:

1. to have satisfied the "Academic Writing Requirement" (page 43)
2. to include in the first 15 units presented for the degree not more than 9 units in Computer Science and at least 3 units from each of two other departments
3. to include in the next 15 units presented for the degree at least 3 units of courses other than Computer Science and Software Engineering
4. to include in the remaining units presented for the degree at least 21 units of courses numbered at the 300 or 400 level (this is a general University regulation); 18 of these units must be taken at UVic including
   • at least 13.5 of the 19.5 units at the 300 or 400 level required for the Honours Program; or
   • at least 12 of the 15 units at the 300 or 400 level required for the Major Program
5. to satisfy the requirements of a Major or Honours program in Computer Science as specified below
6. to present credit in a minimum of 60 units of university-level courses numbered 100 and above; at least 30 of these 60 units must normally be completed at UVic

Academic Advice
Students considering or enrolled in a Major or Honours Program in Computer Science should seek academic advice through the Computer Science Advising Office. Students considering or enrolled in a combined BSc in Computer Science should seek academic advice from the Computer Science Advising Office and advisers for the second discipline.

Availability of Courses to Students in Other Faculties
All undergraduate courses offered by the department of Computer Science are open to all undergraduate students at the university if the regulations of their degree program permit and prerequisites are met.

Academic Writing Requirement
Students taking a Major or Honours degree program in Computer Science must take ENGL 135. Please see Academic Writing Requirements (AWR) for Combined programs on pages 108-113. See "Academic Writing Requirement" (page 43) for more information.

Limitation of Enrolment
Students are advised that because of limited staff and facilities, it may be necessary to limit enrolment in certain courses. Course enrolment limits will be listed during registration.

Advanced Placement
Students who demonstrate to the department that they have mastered the material of a course may be granted advanced placement.

Course Challenge for CSC 110
The CSC 110 course challenge exam is intended to allow registered undergraduate students to receive credit on the basis of knowledge or experience acquired outside the University. A student may challenge CSC 110 one time only by taking this special examination. The grade received will be entered into the student’s academic record, further determining the student’s sessional standing. See "Credit by Course Challenge" (page 53) for regulations about taking a challenge exam.

In order to take the exam, the student must first apply through Undergraduate Records using the Course Challenge form <www.uvic.ca/registrar/assets/docs/record-forms/course-challenge.pdf>, which will be forwarded to the Department of Computer Science for approval, and the student will be informed of the time of the exam, held once a term, normally within the first week of the term. The Course Challenge fee must be paid before the challenge examination is undertaken. Once the results have been approved by the Chair, a report of the grade awarded will be sent to both the student and to Undergraduate Records, and become part of the student’s academic record.

Course Credit Restriction
Students may obtain credit for only one Computer Science course in each of the following pairs:

CSC 110 or CSC 111
CSC 106 or CSC 212
CSC 115 or CSC 160
CSC 250 or CSC 355
Major and Honours Programs

Students planning to complete a Major or Honours program in Computer Science register in the Faculty of Engineering. Students registered in another faculty may transfer into a BSc program in the Faculty of Engineering. See “Transfers from Other Faculties” (page 103).

All students planning to complete a Major or Honours Program in Computer Science must file a Record of Degree Program form before registering for third year in the Faculty of Engineering. Computer Science Degree Programs are submitted to the Computer Science Advising Office.

Admission to the Honours Program

Students who wish to be admitted to the Honours Program should apply to the Honours Adviser on completion of their second year. Entry requires a GPA of at least 6.0 calculated over all required second-year CSC, SENG, MATH and STAT courses.

Students may be admitted to the Honours Program upon completion of their third year provided they have a GPA of at least 6.0 calculated over all CSC and SENG courses taken in their third year based on a minimum of 12 units of course work for that year.

A GPA of 6.0 in third year is needed to progress to fourth year in the Honours Program. Students who do not achieve this GPA will be required to transfer to the Major Program.

BSc Honours: Course Requirements

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>CSC 106, 110, 115 .................................................. 4.5</td>
</tr>
<tr>
<td></td>
<td>MATH 100 or 109, 101, 122 ..................................... 4.5</td>
</tr>
<tr>
<td></td>
<td>ENGL 135, 146 or 147 .............................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>Electives ............................................................... 4.5</td>
</tr>
<tr>
<td></td>
<td>Total ........................................................................... 15.0</td>
</tr>
<tr>
<td>Year 2</td>
<td>CSC 225, 226, 230 ..................................................... 4.5</td>
</tr>
<tr>
<td></td>
<td>SENG 265 ................................................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>MATH 201 or 202 or 204 ............................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>MATH 211 ................................................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>ENGR 240 ................................................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>STAT 252 or 255 or 260 .......................................... 1.5</td>
</tr>
<tr>
<td></td>
<td>Electives ............................................................... 3.0</td>
</tr>
<tr>
<td></td>
<td>Total ......................................................................... 15.0</td>
</tr>
<tr>
<td>Year 3</td>
<td>CSC 320, 330, 355, 360, 370 .................................... 7.5</td>
</tr>
<tr>
<td></td>
<td>3.0 units of CSC or SENG 300-level .......................... 3.0</td>
</tr>
<tr>
<td></td>
<td>CSC 349A ................................................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>Electives ............................................................... 3.0</td>
</tr>
<tr>
<td></td>
<td>Total ......................................................................... 15.0</td>
</tr>
<tr>
<td>Year 4</td>
<td>CSC 499 ................................................................. 1.5</td>
</tr>
</tbody>
</table>

BSc Honours with Software Engineering Option: Course Requirements

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>CSC 106, 110, 115 .................................................. 4.5</td>
</tr>
<tr>
<td></td>
<td>MATH 100 or 109, 101, 122 ..................................... 4.5</td>
</tr>
<tr>
<td></td>
<td>ENGL 135, 146 or 147 .............................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>Electives ............................................................... 4.5</td>
</tr>
<tr>
<td></td>
<td>Total ......................................................................... 15.0</td>
</tr>
<tr>
<td>Year 2</td>
<td>CSC 225, 226, 230 ..................................................... 4.5</td>
</tr>
<tr>
<td></td>
<td>SENG 265 ................................................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>MATH 201 or 202 or 204 ............................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>MATH 211 ................................................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>ENGR 240 ................................................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>STAT 252 or 255 or 260 .......................................... 1.5</td>
</tr>
<tr>
<td></td>
<td>Electives ............................................................... 3.0</td>
</tr>
<tr>
<td></td>
<td>Total ......................................................................... 15.0</td>
</tr>
<tr>
<td>Year 3</td>
<td>CSC 320, 330, 355, 360, 370 .................................... 7.5</td>
</tr>
<tr>
<td></td>
<td>3.0 units of CSC or SENG 300-level .......................... 3.0</td>
</tr>
<tr>
<td></td>
<td>CSC 349A ................................................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>Electives ............................................................... 3.0</td>
</tr>
<tr>
<td></td>
<td>Total ......................................................................... 15.0</td>
</tr>
<tr>
<td>Year 4</td>
<td>CSC 499 ................................................................. 1.5</td>
</tr>
</tbody>
</table>

1. ENGL 225 can be substituted for ENGR 240.
2. The statistics course can be taken as early as the second term of the first year.
3. MATH 222 is strongly recommended.

BSc Major: Course Requirements

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>CSC 106, 110, 115 .................................................. 4.5</td>
</tr>
<tr>
<td></td>
<td>MATH 100 or 109, 101, 122 ..................................... 4.5</td>
</tr>
<tr>
<td></td>
<td>ENGL 135, 146 or 147 .............................................. 1.5</td>
</tr>
<tr>
<td></td>
<td>Electives ............................................................... 4.5</td>
</tr>
<tr>
<td></td>
<td>Total ......................................................................... 15.0</td>
</tr>
</tbody>
</table>
### Year 2
- CSC 225, 226, 230 ......................................................... 4.5
- SENG 265 ................................................................. 1.5
- MATH 201 or 202 or 204 ........................................... 1.5
- MATH 211 ................................................................. 1.5
- ENGR 240\(^1\) ........................................................... 1.5
- STAT 252 or 255 or 260\(^2\) ...................................... 1.5
- Electives ......................................................................... 3.0
**Total** ............................................................................. **15.0**

### Year 3
- CSC 320, 360, 370 ......................................................... 4.5
- 6.0 units of CSC 300-level ........................................... 6.0
- Electives ......................................................................... 4.5
**Total** ............................................................................. **15.0**

### Year 4
- 4.5 units of CSC 400-level .......................................... 4.5
- Electives ......................................................................... 10.5
**Total** ............................................................................. **15.0**

---

**Major in Computer Science (Computer Communications \& Networks Option)**

This program is for students who wish to acquire a strong background in Communications and Networks. The Co-op option or the work experience option is strongly recommended.

### Year 1
- CSC 106, 110, 115 ......................................................... 4.5
- ENGL 135, 146 or 147 ............................................... 1.5
- MATH 100 or 109, 101, 122 ...................................... 4.5
- Electives ......................................................................... 4.5
**Total** ............................................................................. **15.0**

### Year 2
- CSC 225, 226, 230 ......................................................... 4.5
- SENG 265 ................................................................. 1.5
- MATH 201 or 202 or 204 ........................................... 1.5
- MATH 211 ................................................................. 1.5
- ENGR 240\(^2\) ........................................................... 1.5
- STAT 252 or 255 or 260\(^2\) ...................................... 1.5
- Electives ......................................................................... 3.0
**Total** ............................................................................. **15.0**

### Year 3
- CSC 320, 360, 370 ......................................................... 4.5
- CSC 361 ................................................................. 1.5

### Year 4
- 3.0 units of CSC 471, 472, 473, 486A-D ......................... 3.0
- Electives\(^6\) ...................................................................... 10.5
**Total** ............................................................................. **15.0**

---

1. ENGL 225 can be substituted for ENGR 240.
2. The statistics course can be taken as early as the second term of the first year.
3. MATH 222 is strongly recommended.
4. MATH 211 can be replaced by 100 or 109, 122.
5. CSC 305 is recommended.
6. Electives when required.
Major in Computer Science (Software Engineering Option)

Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 106, 110, 115</td>
<td>4.5</td>
</tr>
<tr>
<td>MATH 100 or 109, 101, 122</td>
<td>4.5</td>
</tr>
<tr>
<td>ENGL 135, 146 or 147</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>4.5</td>
</tr>
<tr>
<td>Total</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Year 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 225, 226, 230</td>
<td>4.5</td>
</tr>
<tr>
<td>SENG 265</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 201 or 202 or 204</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 211</td>
<td>1.5</td>
</tr>
<tr>
<td>ENGR 240</td>
<td>1.5</td>
</tr>
<tr>
<td>STAT 252 or 255 or 260</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>3.0</td>
</tr>
<tr>
<td>Total</td>
<td>15.0</td>
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</tbody>
</table>

Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 320, 360, 370</td>
<td>4.5</td>
</tr>
<tr>
<td>CSC 425</td>
<td>1.5</td>
</tr>
<tr>
<td>6.0 units of CSC 300-level</td>
<td>6.0</td>
</tr>
<tr>
<td>(1.5 units may be SENG)</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>3.0</td>
</tr>
<tr>
<td>Total</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>4.5 units of SENG 400-level</td>
<td>4.5</td>
</tr>
<tr>
<td>Electives</td>
<td>10.5</td>
</tr>
<tr>
<td>Total</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Major in Computer Science (Theory Option)

This program is for students who wish to acquire a strong background in the Theory of Computer Science.

Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 106, 110, 115</td>
<td>4.5</td>
</tr>
<tr>
<td>MATH 100 or 109, 101, 122</td>
<td>4.5</td>
</tr>
<tr>
<td>ENGL 135, 146 or 147</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>4.5</td>
</tr>
<tr>
<td>Total</td>
<td>15.0</td>
</tr>
</tbody>
</table>

1. Strongly recommend CSC 167. Recommend PSYC 100A and B or PHYS 120 and ART 100-level.
2. ENGL 225 can be substituted for ENGR 240.
3. Strongly recommend CSC 205.
4. The statistics course can be taken as early as the second term of the first year.
5. Recommend SENG 310, CSC 349A, CSC 350.
6. Recommend CSC 426.

Combined Programs in Computer Science and Mathematics, and Computer Science and Statistics

For a Combined BSc degree in Computer Science and Mathematics, or Computer Science and Statistics, students may take a Major or Honours Program. These programs are not joint degrees in Computer Science and Mathematics, but a single degree program composed of a selected combination of courses from each of the departments. Students opting for any of these combined programs are registered in the Faculty of Science and must contact the Computer Science and Mathematics and Statistics departments.

Admission to the Combined Programs in Computer Science and Mathematics or Computer Science and Statistics

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

1. completed CSC 110, 115, 106 or 212, 225, 230, and SENG 265
2. completed at least 10.5 units of the Mathematics and Statistics courses required for the degree
3. attained a grade of at least B+ in all 200-level Computer Science and SENG courses
4. attained a GPA of at least 6.5 in all 200-level Mathematics and Statistics courses

Students may also be admitted to one of the Combined Honours Programs upon completion of their third year providing they have at
least 4.5 units of 300/400 level credit from each department with a minimum GPA of 6.0 in all courses completed at the 300/400 level in the two departments.

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

**BSc Honours: Combined Program in Computer Science and Mathematics**

<table>
<thead>
<tr>
<th>Year 1</th>
<th></th>
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<tbody>
<tr>
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<tr>
<td>MATH 100 or 109, 112</td>
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<table>
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<tr>
<th>Year 2</th>
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<tbody>
<tr>
<td>CSC 106, 110, 115</td>
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<td>MATH 100 or 109, 112</td>
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<td>Electives</td>
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<table>
<thead>
<tr>
<th>Year 3</th>
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<tbody>
<tr>
<td>Two of MATH 301, 311, 322, 335, 342, MATH 352 or STAT 350, MATH 377, STAT 359</td>
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<tr>
<td>Two of CSC 305, 322, 330, 350, 360, 361, 370</td>
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</tr>
<tr>
<td>Electives</td>
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<table>
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<tbody>
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<td>Two of MATH 422, 423, 442, 446, 447, 449, 451, 452</td>
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</table>

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

**BSc Honours: Combined Program in Computer Science and Statistics**

<table>
<thead>
<tr>
<th>Year 1</th>
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<tbody>
<tr>
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<td>4.5</td>
</tr>
<tr>
<td>MATH 100 or 109, 112, 211</td>
<td>6.0</td>
</tr>
<tr>
<td>Electives</td>
<td>4.5</td>
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<table>
<thead>
<tr>
<th>Year 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 225, 226, 230</td>
<td>4.5</td>
</tr>
<tr>
<td>MATH 200, 204, 222</td>
<td>4.5</td>
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<tr>
<td>SENG 265</td>
<td>1.5</td>
</tr>
<tr>
<td>STAT 260, 261</td>
<td>3.0</td>
</tr>
</tbody>
</table>

1. Students who have not satisfied the Academic Writing Requirement must choose 1.5 units from ENGL 135, 146, 147.
2. MATH 211 can be replaced by MATH 110.
3. Students planning to take STAT 350 in third year should register for STAT 261.
4. Electives should include at least 4.5 units of 300/400 level courses to be chosen with at least 1.5 units from each department.
### BSc Major: Combined Program in Computer Science and Statistics

**Year 1**
- CSC 106, 110, 115 ................................................................. 4.5
- MATH 100 or 109, 112, 211$^2$ ............................................. 6.0
- Electives$^3, 3$ ................................................................. 4.5
- **Total** ........................................................................ 15.0

**Year 2**
- CSC 225, 226, 230 ................................................................. 4.5
- MATH 200, 204, 222 ................................................................. 4.5
- SENG 265 ................................................................. 1.5
- STAT 260, 261 ................................................................. 3.0
- Electives$^3$ ................................................................. 1.5
- **Total** ........................................................................ 15.0

**Year 3**
- CSC 320 ................................................................. 1.5
- CSC 370 ................................................................. 1.5
- MATH 348 or CSC 349A ................................................................. 1.5
- STAT 350, 353 ................................................................. 3.0
- Electives$^3, 4, 5$ ................................................................. 3.0
- **Total** ........................................................................ 15.0

**Year 4**
- CSC 446, SENG 474 ................................................................. 3.0
- STAT 453 ................................................................. 1.5
- SENG 474 ................................................................. 1.5
- Electives$^3, 4, 5, 6$ ................................................................. 10.5
- **Total** ........................................................................ 15.0

1. Students who have not satisfied the Academic Writing Requirement must choose 1.5 units from ENGL 135, 146, 147.
2. MATH 211 can be replaced by MATH 110.
3. Recommended electives are: COM 100, 240, 270, CSC 445, SENG 411.
4. At least one elective from CSC.
5. Courses should include at least 21 units at the 300 or 400 level, of which at least 18 units must have been taken at UVic.

### Combined Program in Geography and Computer Science (Geomatics)

The Department of Geography and the Department of Computer Science have designed a program leading to a combined BSc Major Degree. The Geomatics program is aimed at students whose interests span the fields of cartography, Computer Science, Geographic Information Systems, remote sensing, spatial analysis and surveying.

Students intending to pursue this combined program must consult the Undergraduate Adviser in either Geography or Computer Science after completing all of the first-year requirements.

### Geography/Computer Science Co-op

Students in the Geography/Computer Science Combined Program who wish to participate in Co-op may, if eligible, enroll in and undertake work terms in one or both of the Geography and/or Computer Science Co-op programs. The Co-op degree requires successful completion of three Co-op work terms. Completion of a minimum of one work term in each area adds the combined nature of their Co-op degree to the official record.

### Geography and Computer Science (Geomatics) Program Requirements

**Year 1**
- CSC 106, 110, 115 ................................................................. 4.5
- GEOG 101A or 101B or 103 ................................................................. 1.5
- MATH 102$^1$, 122; 151 or 211 ................................................................. 4.5
- Elective$^2$ ................................................................. 4.5
- **Total** ........................................................................ 15.0

**Year 2**
- CSC 225, 226, 230 ................................................................. 4.5
- GEOG 222, 226, 228 ................................................................. 4.5
- SENG 265 ................................................................. 1.5
- **Total** ........................................................................ 15.0

**Year 3**
- CSC 320 ................................................................. 1.5
- CSC 370 ................................................................. 1.5
- MATH 348 or CSC 349A ................................................................. 1.5
- STAT 350, 353 ................................................................. 3.0
- Electives ................................................................. 4.5
- **Total** ........................................................................ 15.0

**Year 4**
- CSC 446 ................................................................. 1.5
- STAT 453 ................................................................. 1.5
- SENG 474 ................................................................. 1.5
- Electives$^3, 4, 5, 6$ ................................................................. 10.5
- **Total** ........................................................................ 15.0

1. Students who have not satisfied the Academic Writing Requirement must choose 1.5 units from ENGL 135, 146, 147.
2. MATH 211 can be replaced by MATH 110.
3. Recommended electives are: COM 100, 240, 270, CSC 445, SENG 411.
4. At least one elective from CSC.
5. Courses should include at least 21 units at the 300 or 400 level, of which at least 18 units must have been taken at UVic.
**Combined Major Program in Health Information Science and Computer Science**

Students must apply for the combined program through the School of Health Information Science office. This is a mandatory Co-op program.

Students with a previous degree in Computer Science or a related degree are not eligible for this combined program (see Second Bachelor’s Degree). Students who have failed a work term or do not maintain a GPA of 4.0 or better in each academic term will normally be required to withdraw from the School for at least one calendar year. This is a full-time program only.

**Health Information Science/Computer Science Co-op**

Health Information Science/Computer Science Students admitted to the Combined Program in Health Information Science and Computer Science are required to take part in the Co-op Program. In addition to their academic requirements, they must successfully complete a minimum of three work terms with at least one in each area, and be enrolled in a minimum of 6.0 units of course work each campus term. The granting of work term credit by challenge is not permitted in this program.

**Year 1**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>HINF 130, 140</td>
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<tr>
<td>CSC 106, 110, 115</td>
<td>4.5</td>
</tr>
<tr>
<td>ENGL 135, 146 or 147</td>
<td>1.5</td>
</tr>
<tr>
<td>Elective</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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**Year 2**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>HINF 200, 201, 280</td>
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<tr>
<td>1.5 units of HINF at the 200 level</td>
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<td>One of STAT 252, 255 or 260</td>
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<tr>
<td>CSC 225, 226, 230</td>
<td>4.5</td>
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**Year 3**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>4.5 units of HINF at the 300 level</td>
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<tr>
<td>CSC 375</td>
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<td>3.0 units of CSC 320, 322, 330, 355, 360, SENG 321</td>
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<tr>
<td>Electives</td>
<td>6.0</td>
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<td><strong>Total</strong></td>
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**Year 4**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>3.0 units of HINF at the 400 level</td>
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<tr>
<td>4.5 units of CSC at the 400 level</td>
<td>4.5</td>
</tr>
<tr>
<td>CSC 497</td>
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<tr>
<td>Electives</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>15.0</strong></td>
</tr>
</tbody>
</table>

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1. Students can replace MATH 102 with MATH 100 or MATH 109.  
2. "Academic Writing Requirement" (page 43) must be completed.  
3. Recommended courses include CSC 423, 426, 446, 471, 472, 473, SENG 474.  
4. Electives may also include CENG 420

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**Combined Major in Music and Computer Science**

The School of Music and the Department of Computer Science have designed a combined program leading to either a Bachelor of Fine Arts or a Bachelor of Science degree.

Enrolment in this program is limited. Applicants must complete the usual procedures for admission to the University. See "Undergraduate Admission" (page 31). The application deadline for September entry is March 31. The School requires applicants to also submit a supplemental form. See <finearts.uvic.ca/music/csmusicform/>. 

**Music/Computer Science Co-op**

Students in the Music/Computer Science Combined Program who wish to participate in Co-op may, if eligible, enrol in and undertake work terms in one or both of the Music and/or Computer Science Co-op programs. The Co-op degree requires successful completion of three Co-op work terms. Completion of a minimum of one work term in each area adds the combined nature of their Co-op degree to the official record.

**Year 1**

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<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>MUS 101A, 101B</td>
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<td>MUS 170A, 170B</td>
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<tr>
<td>MUS 207</td>
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<tr>
<td>MATH 100 or 109, 101, 122</td>
<td>4.5</td>
</tr>
<tr>
<td>CSC 106, 110, 115</td>
<td>4.5</td>
</tr>
<tr>
<td>Electives</td>
<td>1.5</td>
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<tr>
<td><strong>Total</strong></td>
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**Year 2**

<table>
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<th>Units</th>
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<tr>
<td>MUS 105 one of 180A-H</td>
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</tr>
<tr>
<td>MUS 270A and 270B2, or 181</td>
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</table>
**Combined Programs in Physics and Computer Science**

For a Combined BSc degree in Computer Science and Physics, students may take a Major or Honours Program. These programs are not joint degrees in Computer Science and Physics, but a single degree program composed of a selected combination of courses from each of the departments. Students opting for any of these combined programs are registered in the Faculty of Science and must contact the Computer Science and Physics departments.

**Physics/Computer Science Co-op**

Students in the Physics/Computer Science Combined Program who wish to participate in Co-op may, if eligible, enrol in and undertake work terms in both Co-op programs or may, if eligible, enrol and undertake work terms in only one Co-op program. They must successfully complete four work terms in order to complete their Co-op degree requirements. Students who complete at least two work terms in each area will have the combined nature of their program noted as part of the Co-op designation on their official records.

**BSc Honours: Combined Program in Physics and Computer Science**

Admission to the Honours Program requires permission of both the Department of Physics and Astronomy and the Department of Computer Science. Students should apply upon completion of second year.

### Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
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<tbody>
<tr>
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<tr>
<td>MATH 100 or 109, 101, 122</td>
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<td>PHYS 120 and 130; or 110 and 111</td>
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### Year 2

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<tbody>
<tr>
<td>CSC 225, 226, 230</td>
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<tr>
<td>MATH 200; 201 or 204, 211</td>
<td>4.5</td>
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</tbody>
</table>

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1. Students who have not satisfied the Academic Writing Requirement (AWR) should choose 1.5 units from ENGL 135, 146, 147.
2. MUS 270A/B must be taken concurrently with MUS 201A/B.
3. ELEC 407 and 484 are only offered in the summer term. Strongly recommend CSC 475 and ELEC 484.
4. May include 300- or 400-level music courses, with permission of the instructor. Recommend ELEC 459, 486, SENG 474.
FACULTY OF ENGINEERING

Year 2

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Year 3

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<td>ENGR 240</td>
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<tr>
<td>MATH 342, 346</td>
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<tr>
<td>PHYS 317, 321A, 325, 326&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>SENG 265</td>
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Year 4

<table>
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<tbody>
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<td>CSC 445 or 446</td>
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<tr>
<td>PHYS 323&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>CSC electives&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>Total</td>
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</table>

1. It is recommended that students consider the upper-level PHYS courses they wish to take when choosing the order in which to take PHYS 317, 321A, 325, 326.
2. These Computer Science electives must be at the 400 level. 1.5 units may be 400-level SENG courses.
3. These Physics electives must be at the 300 or higher level and must be chosen in consultation with the Department of Physics and Astronomy. PHYS 460A and PHYS 460B are recommended for third- and fourth-year students.

Combined Major in Psychology and Computer Science

The Department of Psychology and the Department of Computer Science have designed a program leading to a combined BSc Major Degree. Students intending to pursue this combined program must consult the Undergraduate Adviser in either Psychology or Computer Science at the latest after completing all of the first-year requirements.

Psychology/Computer Science Co-op

Students in the Psychology/Computer Science Combined Program who wish to participate in Co-op may, if eligible, enrol in and undertake work terms in one or both of the Psychology and/or Computer Science Co-op programs. The Co-op degree requires successful completion of three Co-op work terms. Completion of a minimum of one work term in each area adds the combined nature of their Co-op degree to the official record.

Year 1

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<td>BIOL 186 or 190A; and BIOL 184 or 190B</td>
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<tr>
<td>CSC 106, 110, 115</td>
<td>4.5</td>
</tr>
<tr>
<td>ENGL 135, 146 or 147</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 151, 122&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>PSYC 100A, 100B</td>
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Year 2

<table>
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<th>Course Code</th>
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<tbody>
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<td>CSC 225, 226, 230</td>
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<tr>
<td>ENGR 240</td>
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<tr>
<td>MATH 102&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>PSYC 201; and 215A or 251</td>
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Year 3

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Year 4

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<tbody>
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<td>CSC 400-level&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>CSC 497</td>
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<tr>
<td>PSYC 300/400 level</td>
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<tr>
<td>Electives</td>
<td>3.0</td>
</tr>
<tr>
<td>Total</td>
<td>15.0</td>
</tr>
</tbody>
</table>

1. Students can replace MATH 151 and 102 with MATH 100 or 109 and 101. 1.5 units of these 400-level CSC electives may be replaced by 1.5 units of 400-level SENG.

Combined Major Program in Visual Arts and Computer Science

The Department of Visual Arts and the Department of Computer Science have designed a program leading to a Bachelor of Fine Arts or a Bachelor of Science degree.

Enrolment in the program is limited. Students may be admitted directly to the program. Please see “Program Admissions” or the website <finearts.uvic.ca/visualarts/prospective_students/undergrad>.

Visual Arts/Computer Science Co-op

Students in the Visual Arts/Computer Science Combined Program who wish to participate in Co-op may, if eligible, enrol in and undertake work terms in one or both of the Visual Arts and/or Computer Science Co-op programs. The Co-op degree requires successful completion of three Co-op work terms. Completion of a minimum of one work term in each area adds the combined nature of their Co-op degree to the official record.

Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>ART 103, 104, 105, 106</td>
<td>6.0</td>
</tr>
<tr>
<td>MATH 100 or 109, 101, 122</td>
<td>4.5</td>
</tr>
<tr>
<td>CSC 106, 110, 115</td>
<td>4.5</td>
</tr>
<tr>
<td>Elective&lt;sup&gt;3&lt;/sup&gt;</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>16.5</td>
</tr>
</tbody>
</table>

Year 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 units of ART 201, 202, 211, 212, 221, 222, 241, 242, 261, 262, 271, 272</td>
<td>6.0</td>
</tr>
<tr>
<td>MATH 211</td>
<td>1.5</td>
</tr>
<tr>
<td>CSC 225, 226, 230</td>
<td>4.5</td>
</tr>
<tr>
<td>SENG 265</td>
<td>1.5</td>
</tr>
<tr>
<td>ART 150</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>15.0</td>
</tr>
</tbody>
</table>
### Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 units of ART at the 300-level</td>
<td>6.0</td>
</tr>
<tr>
<td>3.0 units of CSC 320, 360, 370</td>
<td>3.0</td>
</tr>
<tr>
<td>SENG 310</td>
<td>1.5</td>
</tr>
<tr>
<td>Electives</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15.0</strong></td>
</tr>
</tbody>
</table>

### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 units of ART at the 300 or 400 level</td>
<td>6.0</td>
</tr>
<tr>
<td>CSC 305</td>
<td>1.5</td>
</tr>
<tr>
<td>3.0 units of CSC at the 400 level</td>
<td>3.0</td>
</tr>
<tr>
<td>Electives</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15.0</strong></td>
</tr>
</tbody>
</table>

### General Degree (BA or BSc - Faculties of Humanities, Science and Social Sciences)

#### Admission to the General Program

Students intending to complete a General degree in Computer Science will normally register in the faculty of the second area of specialization required in the degree.

Completion of the following set of courses satisfies the requirements for a BA or BSc General Degree in Computer Science as offered by the Faculties of Humanities, Science and Social Sciences. Students wishing to complete a General Program should register in whichever of these three faculties is appropriate based on their second area of specialization.

### Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 110, 115</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 100 or 109 and 101; or 102 and 151</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 122</td>
<td>1.5</td>
</tr>
</tbody>
</table>

### Year 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 106, 225, 226, 230</td>
<td>6.0</td>
</tr>
<tr>
<td>SENG 265</td>
<td>1.5</td>
</tr>
<tr>
<td>1.5 units of STAT 252, 254, 255, 260, ECON 246</td>
<td>1.5</td>
</tr>
</tbody>
</table>

### Years 3 and 4

A total of 9.0 additional units of Computer Science courses numbered 300 or higher. Two of these CSC courses can be replaced by SENG courses at a similar level. | 9.0 |

### Minor in Computer Science

Students in other departments may complete a Minor in Computer Science by completing the major or Honours requirements of that department, in conjunction with either the Computer Science General Program requirement or by completing the set of courses listed below.

### Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 110, 115</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 100 or 102 or 109</td>
<td>1.5</td>
</tr>
</tbody>
</table>

### Computer Science and Math Co-op Program

Co-operative Education is optional in Computer Science and Math Co-op programs with the exception of the combined Health Information and Science program, for which it is mandatory. Students who successfully complete four work terms will receive the Co-op designation for their degree. Admission into these programs requires a separate application.

Additionally, work experience is optional in the Computer Science and Math programs. Students who successfully complete two or three work terms will receive the work experience designation for their degree. Admission to this program requires a separate application.

### Co-op Admission and Retention

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

The normal requirements for admission of students to a Computer Science/Mathematics Co-op Program are the completion of CSC 110, MATH 100 or MATH 109 and the following:

- the completion of at least 4.5 units on their last academic term
- a minimum grade of C+ in any Computer Science courses and a minimum grade of C in any Mathematics or Statistics courses taken on their last academic term
- no grades of F, E or N in courses taken on their last academic term

Students registered in a Co-op Program must normally be enrolled in at least 6.0 units of course work during each academic term. Students who fail to achieve satisfactory completion of a work term may be required to withdraw from the program. Each work term is recorded on the student’s academic record and transcript. Please refer to the general regulations pertaining to Undergraduate Co-operative Education Programs (page 64) of the University of Victoria governing all co-operative education students.

### Computer Science, Computer Science/Mathematics and Computer Science/Statistics Co-op

Students admitted to one of these programs who wish to participate in Co-op must successfully complete four work terms in order to complete their Co-op degree requirements, and satisfy the course requirements of their specific degree program.
Health Information Science/Computer Science Students admitted to the Combined Program in Health Information Science and Computer Science are required to take part in the Co-op Program. In addition to their academic requirements, they must successfully complete a minimum of three work terms with at most two in one department, and be enrolled in a minimum of 6.0 units of course work each campus term. The granting of work term credit by challenge is not permitted in this program.

Work Term Sequence
CSC/Math students’ work terms are normally of four months’ duration and alternate with academic terms. Upon approval, work terms of 4 months can be combined to 8-, 12-, or 16-month periods of employment.

Work term prerequisite
The CSC Work Placement Preparatory Course is a mandatory requirement for Computer Science/Math Co-op and Work Experience students. Students normally must have completed the preparatory course before undertaking their first work term but in all cases must complete it before taking the second work term.

Students with significant work experience may complete a “Prior Learning Assessment”. Advance placements or waivers for a course will be considered on this basis only.

Students normally must complete the “Academic Writing Requirement” (page 43) before undertaking their first work term but in all cases must complete this requirement before their second work term.

Co-op Program Fee
The university assesses a Co-op Program Fee for each work term, which is non-refundable, that is due in the first month of each work term and is subject to the University’s general fee regulations.

A fee is also assessed for work term challenges but no fee is assessed for work term transfer credits.

Work Term Credit/Reduction
Students must pass four work terms in order to qualify for the CSC/Math Co-op degree and two work term to qualify for the CSC/Math Work Experience degree.

There are, however, several clearly defined situations where this requirement may be reduced by one term. A student with extensive technical work experience completed prior to admission to the program may apply to challenge for credit one work term. No challenge credit will be granted in the combined CSC/Health Information Science programs.

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

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

Engineering Programs

PROGRAM ADMISSIONS
Students admitted to the BEng or BSEng degree program normally begin first-year Engineering courses in the September-December term each year. Students who wish extended time to complete first year can begin in the May to August term.

Completed applications must be submitted to Undergraduate Admissions and Undergraduate Records. For September admission, the application must be submitted by the preceding April 30 and all documentation must be received by May 31. For May admission, the application must be submitted by the preceding December 31 and all documentation must be received by January 31.

Graduates of Secondary Schools
Requirements for admission to the BEng and BSEng degree program for graduates of BC Secondary Schools are presented in “Year 1 Admission Requirements: BC/Yukon Secondary School Graduate” (page 34). Graduates of secondary schools other than British Columbia’s and Yukon’s require qualifications in mathematics, physics and chemistry equivalent to those specified as admission requirements for BC and Yukon secondary school graduates (see “Year 1 Admission Requirements: BC/Yukon Secondary School Graduate”, page 34). Applicants are advised to contact Undergraduate Admissions and Undergraduate Records for further information regarding requirements.

Engineering Transfer Programs
Institutions throughout British Columbia offer first-year engineering transfer programs. Students who successfully complete one of these programs are eligible for admission to second year engineering at UVic if they have attained an overall standing of at least C+ (65%) with no individual grades less than C.

Applicants Transferring from University
Applicants who have completed transferable studies while registered in other faculties at UVic or elsewhere are eligible to be considered for admission. Applicants will be evaluated on a course-by-course and student-by-student basis. Applicants in this category should normally have taken at least 12 units of courses that transfer to the following UVic courses: CSC 110 or 111, CSC 115 or 116, MATH 100, 101, and 211, PHYS 110 and 111, ENGL 135, CHEM 101 and ENGR 240 or ENGR 225.

In all cases, transfer applicants must present Physics, Mathematics and Chemistry prerequisites (or equivalent) to meet minimum program requirements. To be considered applicants must have a minimum C+ (65%) average with no individual course grade less than C (60%).

Applicants from a Technology Diploma
On successful completion of the Engineering Bridge Program offered at Camosun College, students with two-year diplomas in Electronics or Mechanical or Computer Engineering Technology may be admitted to the third year of a BEng program. Acceptance into the Bridge and BEng Programs is decided on an individual basis and must be obtained from the Faculty of Engineering before registration in any of the bridge courses or senior-level courses will be approved.

Approved Substitutions for Courses Taken at UVic
Substitutions may be permitted, on a course-by-course basis, for students in the BEng and BSEng program, when the substitute course is taken at the University of Victoria. See the table “Substitutions for BEng and BSEng.”

<table>
<thead>
<tr>
<th>Substitutions for BEng and BSEng</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 150</td>
</tr>
<tr>
<td>CHEM 101</td>
</tr>
</tbody>
</table>
Readmission to the BEng or BSEng program

Students who have withdrawn from the BEng or BSEng degree programs must reapply for admission by the deadlines listed in "Undergraduate Application and Documentation Deadlines" (page 10) and will be considered in competition with all other applicants at the time of re-application.

Applications from students who were required to withdraw for academic reasons will not be considered until the required withdrawal period has been completed (see Undergraduate Information under "Requirement to Withdraw from the University" (page 55). In addition to satisfying the Undergraduate requirements for re-admission to the University, it is expected that before re-applying to the program, students will successfully complete transferable courses that demonstrate improved academics (with all grades C+ (65%) or higher) in relevant subject areas. A student who was required to withdraw will be placed on academic probation upon re-admission to the BEng or BSEng program and must obtain Satisfactory Standing at the next standing review (See "Standing", page 54).

ACADEMIC REGULATIONS

Common 1st Year

All students with less than 12 units of applicable (i.e., courses in BEng/ BSEng 1st year) credit are admitted as undeclared students to the common 1st year of the program.

Declaration into Programs

Undeclared students (with at least 12 units of applicable coursework, including transfer credit) are given the opportunity to declare their chosen Engineering program (discipline). All students with a minimum GPA of C+ and no applicable courses with grades less than C will be considered for available seats in the disciplines. Students with grades below this threshold can contact an admissions advisor to create a plan, improve grades, and re-apply for program declaration at a future date.

Academic Terms and Co-operative Education

The academic schedule for the BEng and BSEng degree programs consists of eight academic terms and six work/other terms.

The academic terms are scheduled from September to December, January to April, and May to August. After the start of second year, students normally alternate between academic terms and co-operative work terms. The typical path through the programs is shown in the table "Academic and Work/Other Term Schedule." Four of the six work/other terms are normally used to satisfy the co-operative education requirements. The remaining two terms (8 months) may be used for other academic work (completion of an option or a Minor), gaining additional work experience, or any other activity. In some programs it is possible to interchange the two terms of 4th year. Please refer to the appropriate program entry for more information.

Each student in a BEng or BSEng degree program will be assigned to a graduating class, which at any point in time will determine the student’s current academic term or work/other term for the purposes of other regulations.

Co-op Work Term Requirement

The Co-operative Education requirement of the BEng/BSEng degree programs is a minimum of 4 terms of guided (co-operative) work. Students work with the Engineering/CSC/Math Co-operative Education office to apply for, obtain, complete, and assess 4 work terms in order to graduate from the programs. This requirement cannot be avoided or replaced.

Program Change Requests

Students who have completed at least one term of full-time studies in the BEng or BSEng programs who wish to alter their program or take a leave of absence should meet with their program adviser to map out plans for program completion. Although every effort will be made to detect problems during this review process, students are solely responsible for difficulties resulting from prerequisite and timetable conflicts.

Readmission to the program after a leave will depend on a seat being available at the time of re-entry and the student’s academic status at the time of the readmission request. Approval of a leave does not guarantee the absence of timetable conflicts upon the student’s reregistration. The faculty reserves the right to require that relevant course work be repeated if deemed necessary.

<table>
<thead>
<tr>
<th>Year</th>
<th>September-December</th>
<th>January-April</th>
<th>May-August</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Term 1A</td>
<td>Academic Term 1B</td>
<td>Academic Term 1C or Work/Other Term</td>
</tr>
<tr>
<td>2</td>
<td>Academic Term 2A</td>
<td>Work/Other Term</td>
<td>Academic Term 2B</td>
</tr>
<tr>
<td>3</td>
<td>Work/Other Term</td>
<td>Academic Term 3A</td>
<td>Work/Other Term</td>
</tr>
<tr>
<td>4</td>
<td>Academic Term 3B</td>
<td>Work/Other Term</td>
<td>Academic Term 4A</td>
</tr>
<tr>
<td>5</td>
<td>Work/Other Term</td>
<td>Academic Term 4B</td>
<td></td>
</tr>
</tbody>
</table>
Academic Performance
Students in the BEng and BSEng programs are subject to the University regulations on academic performance (See "Standing", page 54).

In addition, declared students on probation are normally undeclared from the disciplines and must re-qualify for available seats. These students will be moved into the general "Engineering BEng Undeclared" group and will work with Advisors to re-qualify for program declaration. See "Declaration into Programs" (page 115).

Grading
The grading system used for the BEng and BSEng degree programs is the same as that specified by the University (see "Grading", page 52).

Academic Concessions
A student whose academic performance is affected by injury, family or personal affliction, or illness may qualify for "Academic Concessions" (page 49).

Requests for academic concessions for Extended Deferred Exams should normally be submitted prior to the scheduled Deferred Exam and in no instance later than 10 working days after that date.

Review of an Assigned Grade in BEng and BSEng Program Courses, Work Terms, and Work Term Modules

- Any request for a review of a final grade must normally reach the Engineering Undergraduate Office within 21 days after the release of assigned grades.
- The review of a final grade is restricted to grade components contributed by a final examination and to any other grade components released to the student within the last 21 days before the end of classes.
- In the case of a work term or work term module evaluation, the review will be restricted to the component on which a failing grade was assigned.
- The grade determined by means of a review will be recorded as the final official grade, regardless of whether it is identical to or higher or lower than the original grade.
- Before requesting a review, students should make every reasonable effort to discuss the assigned grade with the instructor. Mathematical marking errors will be rectified without recourse to the review procedures.

Course Equivalents and Course Withdrawals
Approval may be given, at the discretion of the Associate Dean, Undergraduate Programs for a student to replace one or more BEng or BSEng degree program courses with other acceptable courses. Written approval must be obtained in advance. Normally, such replacement courses will be taken at UVic. When a replacement course is to be taken at another institution, the student must obtain a Letter of Permission from the Engineering Undergraduate Office prior to undertaking the studies (see "Letters of Permission for UVic Students to Undertake Studies Elsewhere", page 49).

Students will not be permitted to withdraw from a given course more than once.

Examinations
Deferred Examinations
- Where a student has been unable to write an examination owing to illness, family crisis or other similar circumstances, the faculty may authorize a deferred examination.
- For academic regulations regarding deferred status, please see "Deferred Status" (page 51).
- Requests for Academic Concessions for Extended Deferred Exams should normally be submitted prior to the scheduled exam and in no instance later than 10 working days after the scheduled date of the Deferred Exam.

Supplemental Examinations
- The Faculty of Engineering does not usually offer supplemental examinations. If it is offered, information will be provided on the course outline that the students will receive at the beginning of the course. See "Undergraduate Supplemental Examinations" (page 51).

Credit for Courses Offered by Other Faculties or Institutions
The Faculty of Engineering may grant credit to applicants to the BEng or BSEng degree program for courses taken at UVic or at other post-secondary educational institutions. A Letter of Permission must be obtained from the Engineering Undergraduate Office prior to undertaking studies at another institution for credit towards the UVic degree program (see "Letters of Permission for UVic Students to Undertake Studies Elsewhere", page 49). Credit will be considered only for courses that are equivalent to courses in the BEng or BSEng degree program and in which satisfactory performance has been achieved. For courses with prefixes BME, CIVE, CENG, ELEC, ENGR, MECH and SENG, detailed documentation supporting the credit request may be required; students should contact the Engineering Undergraduate Office for specific instructions before beginning studies in the faculty. Credit for courses completed while outside the Faculty of Engineering will only be granted for courses in which a grade of C (60%) or higher has been awarded on the official transcript. For some courses a higher minimum grade may be required. For courses taken prior to admission to the program, the student must initiate all requests for course credit in the first term (four months) of registration in the BEng or BSEng program.

Course Challenges
The Faculty of Engineering does not offer course challenges with the exception of CSC 110.

Graduation Requirements
Students must meet the normal University "Minimum Degree Requirements for Graduation" (page 55) including a graduating average of at least 2.0, as well as:

1. Successful completion of the full set of courses specified for the degree program.
2. Successful completion of four work terms (as defined by the student's registered program) as specified below.

The graduating average of a student in the BEng or BSEng program will be the weighted average of the grade values (other than COM, N, F and E) assigned to 300- and 400-level courses taken or challenged at UVic and used within the student’s degree program. Courses taken at the 500 level may be included in the graduating average if they are used to meet degree requirements. If the total unit value of such courses does not exceed 30 units, then all such courses will be included in the average. If the total exceeds 30 units, then the average will be taken on a maximum of 30 units of such courses, chosen so as to give the highest average. In the case where those 30 units include a fraction of a course, then the calculation will be based on the 30 units plus the remaining fraction of
that same course. A course that has been used to satisfy the requirements for one degree or in the calculation of the student’s graduating average for one degree cannot be used for credit towards another degree. Senior level courses used to complete a Minor in some other area are excluded from the graduating average computation.

**First Year Schedule**

All Bachelor of Engineering and Software Engineering programs have their first year courses in common which are typically completed in fall and Spring terms. Alternative schedules are available. Students seek admission to specific programs prior to second year.

**Biomedical Engineering**

This program is accredited by the Canadian Engineering Accreditation Board (CEAB) of the Canadian Council of Professional Engineers. Accreditation ensures that graduates of the program satisfy the academic requirements for registration with the provincial Association of Professional Engineers.

Consistent with all BEng programs, the curriculum consists of the common set of first year courses, six terms unique to the degree and four Co-operative Education terms.

**Program Requirements**

Many courses are offered only one time per year. Refer to the Faculty web site for course scheduling information. Consult with a program adviser for schedule planning advice.

**Year 1**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 150</td>
<td>1.5</td>
</tr>
<tr>
<td>CSC 111</td>
<td>1.5</td>
</tr>
<tr>
<td>ENGR 130, 110, 120, 141</td>
<td>7.0</td>
</tr>
<tr>
<td>MATH 100 or 109, 101, 110</td>
<td>4.5</td>
</tr>
<tr>
<td>PHYS 110, 111</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17.5</strong></td>
</tr>
</tbody>
</table>

**Year 2**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME 200, 201</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 231</td>
<td>1.5</td>
</tr>
<tr>
<td>CSC 116</td>
<td>1.5</td>
</tr>
<tr>
<td>ELEC 216, 250</td>
<td>3.0</td>
</tr>
<tr>
<td>ELEC 260</td>
<td>1.5</td>
</tr>
<tr>
<td>MECH 242</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 200, 204</td>
<td>3.0</td>
</tr>
<tr>
<td>MECH 220, 240</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18.0</strong></td>
</tr>
</tbody>
</table>

**Year 3**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME 320</td>
<td>1.5</td>
</tr>
<tr>
<td>BME 335, 350</td>
<td>3.5</td>
</tr>
<tr>
<td>ELEC 330 or 365</td>
<td>1.5</td>
</tr>
<tr>
<td>ELEC 360 or MECH 380</td>
<td>1.5</td>
</tr>
<tr>
<td>ECON 180</td>
<td>1.5</td>
</tr>
<tr>
<td>MECH 345</td>
<td>1.5</td>
</tr>
<tr>
<td>STAT 254 or 260</td>
<td>1.5</td>
</tr>
<tr>
<td>Two of ELEC 300, 310, 320, 340, MECH 320 or 335</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Year 4**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 349A</td>
<td>1.5</td>
</tr>
<tr>
<td>ENGR 297, 446, 498</td>
<td>4.0</td>
</tr>
<tr>
<td>BME 499</td>
<td>1.5</td>
</tr>
<tr>
<td>Two Biomedical Engineering electives</td>
<td>3.0</td>
</tr>
<tr>
<td>Two Biological Science electives</td>
<td>3.0</td>
</tr>
<tr>
<td>Three Technical electives</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17.5</strong></td>
</tr>
</tbody>
</table>

In addition, students must complete four Co-op work terms (ENGR 001, 002, 003, 004) as per the Faculty of Engineering “Academic and Work/Other Term Schedule” (page 115).

1. Not acceptable if student presents credit in ELEC 365.
2. A Complementary Studies Elective course deals with central issues in humanities or social sciences. The chosen course must be approved, prior to registration, by the Faculty of Engineering. Consult the Faculty website for a current list of approved courses.
3. CSC 115 may be substituted in a term when CSC 116 is not offered. CSC 116 is strongly recommended.

**Biomedical Engineering Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME 401</td>
<td>Special Topics in Biomedical Engineering</td>
</tr>
<tr>
<td>BME 403</td>
<td>Medical Image Processing</td>
</tr>
<tr>
<td>BME 434</td>
<td>Biophotonics</td>
</tr>
<tr>
<td>BME 481</td>
<td>Biomaterials &amp; Tissue Engineering</td>
</tr>
<tr>
<td>MECH 483</td>
<td>Mechanics &amp; Energy Conversion in Living Cells</td>
</tr>
<tr>
<td>PHYS 432</td>
<td>Medical Physics</td>
</tr>
</tbody>
</table>

**Biological Science Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 232</td>
<td>Organic Chemistry with Biological Applications</td>
</tr>
<tr>
<td>BIOC 299</td>
<td>Biochemistry for Non-Majors</td>
</tr>
<tr>
<td>BIOC 300A</td>
<td>General Biochemistry I</td>
</tr>
<tr>
<td>BIOL 360</td>
<td>Cell Biology</td>
</tr>
<tr>
<td>BIOL 367</td>
<td>Neurobiology: Molecules to Behaviour</td>
</tr>
</tbody>
</table>

**Technical Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME 498</td>
<td>Honours Thesis</td>
</tr>
<tr>
<td>CENG 455**</td>
<td>Real Time Computer Systems Design Project</td>
</tr>
<tr>
<td>ELEC 404</td>
<td>Microwaves and Fiber Optics</td>
</tr>
<tr>
<td>ELEC 412</td>
<td>Electronic Devices II</td>
</tr>
<tr>
<td>ELEC 420</td>
<td>Nanotechnology</td>
</tr>
<tr>
<td>ELEC 450</td>
<td>Communications Theory and Systems II</td>
</tr>
<tr>
<td>ELEC 453</td>
<td>Antennas and Propagation</td>
</tr>
<tr>
<td>ELEC 484</td>
<td>Audio Signal Processing</td>
</tr>
<tr>
<td>ELEC 485</td>
<td>Pattern Recognition</td>
</tr>
<tr>
<td>ELEC 466</td>
<td>System on a Chip Engineering for Signal Processing</td>
</tr>
<tr>
<td>MECH 410</td>
<td>Computer Aided Design</td>
</tr>
<tr>
<td>MECH 420</td>
<td>Finite Element Applications</td>
</tr>
<tr>
<td>MECH 430</td>
<td>Robotics</td>
</tr>
</tbody>
</table>
### Technical Electives*

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 458</td>
<td>Mechatronics</td>
<td>1.5</td>
</tr>
<tr>
<td>MECH 466</td>
<td>MEMS</td>
<td>1.5</td>
</tr>
<tr>
<td>MECH 495</td>
<td>Computational Fluid Dynamics and Heat Transfer</td>
<td>3.0</td>
</tr>
<tr>
<td>MECH 499</td>
<td>Technical Project</td>
<td>2.0</td>
</tr>
</tbody>
</table>

*One of these electives may be replaced by a 300-level CENG, CSC, ELEC, MECH or SENG course if the course is a prerequisite for a 400-level technical elective. Also, additional BME electives may be used to replace technical electives from this list.

** Additional prerequisites required

### Business Minor

A Business Minor develops business skills that are frequently required by practicing Engineers. See "Business Minor Program" (page 326) for requirements.

---

### Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CHEM 150</td>
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<tr>
<td>CSC 111</td>
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<td>ENGR 130</td>
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<td>MATH 100</td>
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<tr>
<td>PHYS 110</td>
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Total .............................................................................................. 17.5

### Year 2

<table>
<thead>
<tr>
<th>Course</th>
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<td>CIVE 200</td>
<td></td>
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<td>GEOG 103</td>
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<tr>
<td>MATH 200</td>
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<tr>
<td>CIVE 220</td>
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<td>STAT 254</td>
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Total .............................................................................................. 16.5

### Year 3

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<tr>
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<tr>
<td>CIVE 310</td>
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<td>1.5</td>
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<tr>
<td>CIVE 345</td>
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</table>

Total .............................................................................................. 17.5

### Year 4

<table>
<thead>
<tr>
<th>Course</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CIVE 400</td>
<td></td>
<td>2.0</td>
</tr>
</tbody>
</table>

---

### Civil Engineering

This new program is designed to be accredited by the Canadian Engineering Accreditation Board of the Canadian Council of Professional Engineers and accreditation will be sought at the earliest opportunity. Accreditation ensures that graduates of the program satisfy the academic requirements for registration with the provincial Associations of Professional Engineers.

Consistent with all BEng programs, the curriculum consists of the common set of first year courses, six terms unique to the degree and four Co-operative Education terms.

### Program Requirements

Many courses are offered only one time per year. Refer to the Faculty web site for course scheduling information. Consult with a program adviser for schedule planning advice.

### List of Fourth Year Technical Electives*

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVE 410</td>
<td>Solid Waste, Air, and Water Pollution</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 411</td>
<td>Resilient Smart Cities</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 420</td>
<td>Advanced Mechanics of Solids</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 421</td>
<td>Advanced Structural Analysis</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 440</td>
<td>Hydrology and Hydraulics</td>
<td>1.5</td>
</tr>
<tr>
<td>MECH 446</td>
<td>Introduction to Ocean Engineering</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 445</td>
<td>Groundwater Hydrology</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 450</td>
<td>Green Building Design</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 451</td>
<td>Sustainable Buildings: Retrofitting, Repairs and Recycling</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 452</td>
<td>Engineering for Earthquakes &amp; Extreme Events</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 456</td>
<td>Sustainability and Advanced Concrete Technology</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 457</td>
<td>Behaviour and Design of Steel Structures</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 460</td>
<td>Intelligent Transportation Systems &amp; Safety</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 480A</td>
<td>Special Topics</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 480B</td>
<td>Special Topics</td>
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</tr>
<tr>
<td>CIVE 480C</td>
<td>Special Topics</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 480D</td>
<td>Special Topics</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 480E</td>
<td>Special Topics</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 480F</td>
<td>Special Topics</td>
<td>1.5</td>
</tr>
<tr>
<td>CIVE 499</td>
<td>Research Project</td>
<td>1.5</td>
</tr>
</tbody>
</table>

*Not all technical electives listed may be available.

### Business Minor

A Business Minor develops business skills that are frequently required by practicing Engineers. See "Business Minor Program" (page 326) for requirements.

### Computer Engineering

This BEng program is accredited by the Canadian Engineering Accreditation Board (CEAB) of the Canadian Council of Professional Engineers. Accreditation ensures that graduates of the program satisfy the academic requirements for registration with the provincial Association of Professional Engineers.

### Program Requirements

Many courses are offered only one time per year. Refer to the Department web site for course scheduling information. Consult with the program adviser for schedule planning advice.
**MATH 200, 204** .......................................................................................................... 3.0
**ELEC 216, 220, 250, 260** ....................................................................................... 6.0
**Total** .............................................................................................. 17.5

**MATH 100 or 109, 101, 110** ................................................................................ 4.5

**PHYS 432 (1.5) Medical Physics**
**ELEC 434 (1.5) Biophotonics**

as one of the Technical Electives:

**This option also requires completion of one of the following courses**

**ENGR 423 (1.5)** Biomedical Signal Processing
**ENGR 424 (1.5)** Biomedical Image Processing

**Total** .............................................................................................. 19.0

Seven Technical Electives ................................................................................... 10.5

200 and 201, but must then take BIOL 190A as their Science Elective. BIOL

---

**Notes:** Students in this option may take EPHE 141 and BIOL 225 in lieu of MATH 200 and 201, but must then take BIOL 190A as their Science Elective. BIOL 190A and BIOL 225 cover prerequisite material necessary for admission to the medical program at UBC. Please refer to the UBC medical program requirements at `<mdprogram.med.ubc.ca/admissions/admission-requirements>`.

-This option is offered subject to resources

-A course in this option may be replaced with another course relevant to this option with the permission of the Department.

**Computer Engineering (Computer Music Option)**

Enrolment in the Computer Music Option is limited. Students must apply for admission before registering in any of its required courses. In addition to the standard Computer Engineering program courses, the Computer Music Option requires completion of the following courses:

- **MUS 306** Recording Techniques
- **MUS 307** Introduction to Computer Music

Plus a total of 3.0 units from the following list:

- **CSC 475 (1.5)** Music Retrieval Techniques
- **ELEC 484 (1.5)** Audio Signal Processing
- **MUS 401C (1.5)** Acoustics
- **MUS 406A (1.5)** Advanced Sound Recording Techniques
- **MUS 406B (1.5)** Sound Recording Seminar
- **MUS 407E (3.0)** Computer Music Seminar

Note: A course in this option may be replaced with another course relevant to this option with the permission of the Department.

**Fast Track Master’s Option**

The department of Electrical and Computer Engineering offers outstanding undergraduate students an opportunity for a head start in a master’s program. Qualified students will be permitted to enrol in graduate-level courses during their fourth year. These courses will be in addition to any undergraduate requirements and thus can be transferred to the MSc or MEng degree program. All of the admission and transfer credit regulations of the Faculty of Graduate Studies must be met. For more information, please contact the Chair or the Graduate Adviser of the department.

**Business Minor**

A Business Minor develops business skills that are frequently required by practicing Engineers. See "Business Minor Program" (page 326) for requirements.

**Minor in Computer Systems**

A Computer Systems Minor is open to students outside of the programs in Electrical Engineering and Computer Engineering. Students must have a minimum cumulative GPA of 5. The minor requires 9 units of ELEC and CENG designated courses with a minimum of 4.5 units at the 300 level or above. For an Electrical Systems Minor, 3 or more of these units at the 300 level or above must be ELEC. For a Computer Systems Minor, 3 or more of the units at the 300 level or above must be CENG.

Courses that fulfill requirements for a Minor cannot form part of the requirements of the other program.

**Graduate Programs**

For information on studies leading to the MEng, MSc and PhD degrees, see the UVic Graduate Calendar.

**Technical Electives**

The program requires completion of seven technical electives (10.5 units) to be chosen from the lists below. Students who complete three courses (4.5 units) in one of the specialization areas listed below can request a
letter from the Electrical and Computer Engineering office confirming this; the area will not be shown on the transcript.

Students who entered the program via a bridge program must take at least two courses (i.e., 3.0 units) from the Special Bridge Students' Elective List. A printable PDF version of the electives is available at <www.ece.uvic.ca/ugrad/bridge_electives.shtml>.

Note that some courses appear under more than one category. Not all technical elective courses will be offered every year. Please check the department course schedule website for planning.

### Communications

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 460</td>
<td>Communication Networks</td>
</tr>
<tr>
<td>ELEC 404</td>
<td>Microwaves and Fiber Optics</td>
</tr>
<tr>
<td>ELEC 405</td>
<td>Error Control Coding and Sequences</td>
</tr>
<tr>
<td>ELEC 417</td>
<td>Software Defined Radio</td>
</tr>
<tr>
<td>ELEC 450</td>
<td>Communications Theory and Systems II</td>
</tr>
<tr>
<td>ELEC 456</td>
<td>Mobile Communications</td>
</tr>
</tbody>
</table>

Directed studies, selected topics, or thesis courses

### Computational Intelligence

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 420</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>CENG 421</td>
<td>Computer Vision</td>
</tr>
<tr>
<td>ELEC 435</td>
<td>Medical Image Processing</td>
</tr>
<tr>
<td>ELEC 485</td>
<td>Pattern Recognition</td>
</tr>
</tbody>
</table>

Directed studies, selected topics, or thesis courses

### Computer Systems

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 448</td>
<td>Hardware Security</td>
</tr>
<tr>
<td>CENG 450</td>
<td>Computer Systems and Architecture</td>
</tr>
<tr>
<td>CENG 453</td>
<td>Parallel and Cluster Computing</td>
</tr>
<tr>
<td>CENG 455</td>
<td>Real Time Computer Systems Design Project</td>
</tr>
<tr>
<td>SENG 422</td>
<td>Advanced Software Architecture</td>
</tr>
<tr>
<td>SENG 426</td>
<td>Software Quality Engineering</td>
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</tbody>
</table>

Directed studies, selected topics, or thesis courses

### Digital and Embedded Systems

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 441</td>
<td>Design of Digital and VLSI Systems</td>
</tr>
<tr>
<td>CENG 448</td>
<td>Hardware Security</td>
</tr>
<tr>
<td>CENG 450</td>
<td>Computer Systems and Architecture</td>
</tr>
<tr>
<td>CENG 455</td>
<td>Real Time Computer Systems Design Project</td>
</tr>
<tr>
<td>ELEC 466</td>
<td>System-on-Chip Engineering for Signal Processing</td>
</tr>
<tr>
<td>SENG 440</td>
<td>Embedded Systems</td>
</tr>
</tbody>
</table>

Directed studies, selected topics, or thesis courses

### Digital Signal Processing

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 403</td>
<td>Engineering Design by Optimization</td>
</tr>
<tr>
<td>ELEC 407</td>
<td>Digital Signal Processing II</td>
</tr>
<tr>
<td>ELEC 417</td>
<td>Software Defined Radio</td>
</tr>
<tr>
<td>ELEC 435</td>
<td>Medical Image Processing</td>
</tr>
<tr>
<td>ELEC 459</td>
<td>Applications of Digital Signal Processing Techniques</td>
</tr>
</tbody>
</table>

### Electrical Energy Systems

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 410</td>
<td>Power Electronics</td>
</tr>
<tr>
<td>ELEC 482</td>
<td>Electrical Drive Systems</td>
</tr>
<tr>
<td>ELEC 488</td>
<td>Electrical Power Systems</td>
</tr>
</tbody>
</table>

Directed studies, selected topics, or thesis courses

### Electromagnetics and Photonics

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 404</td>
<td>Microwaves and Fiber Optics</td>
</tr>
<tr>
<td>ELEC 434</td>
<td>Biophotonics</td>
</tr>
<tr>
<td>ELEC 452</td>
<td>Optical Communication Technology</td>
</tr>
<tr>
<td>ELEC 453</td>
<td>Antennas and Propagation</td>
</tr>
<tr>
<td>ELEC 454</td>
<td>Engineering Components for Wireless Systems</td>
</tr>
</tbody>
</table>

Directed studies, selected topics, or thesis courses

### Electronics

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 441</td>
<td>Design of Digital and VLSI Systems</td>
</tr>
<tr>
<td>ELEC 410</td>
<td>Power Electronics</td>
</tr>
<tr>
<td>ELEC 412</td>
<td>Electronic Devices II</td>
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<tr>
<td>ELEC 420</td>
<td>Nanotechnology</td>
</tr>
<tr>
<td>ELEC 481</td>
<td>Analog VLSI Systems</td>
</tr>
</tbody>
</table>

Directed studies, selected topics, or thesis courses

### Mechatronics

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 455</td>
<td>Real Time Computer Systems Design Project</td>
</tr>
<tr>
<td>ELEC 460</td>
<td>Control Theory and Systems II</td>
</tr>
<tr>
<td>ELEC 482</td>
<td>Electrical Drive Systems</td>
</tr>
</tbody>
</table>

Each of the following courses, which will require additional prerequisites and permission from the offering department:

- **MECH 458** Mechatronics
- **MECH 464** Mechatronics Design Project
- **MECH 466** Microelectromechanical Systems
- **SENG 466** Software for Embedded and Mechatronics Systems

Directed studies, selected topics, or thesis courses

### Networks, Security, and Privacy

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 448</td>
<td>Hardware Security</td>
</tr>
<tr>
<td>CENG 461</td>
<td>Design and Analysis of Computer Networks</td>
</tr>
<tr>
<td>ELEC 456</td>
<td>Mobile Communications</td>
</tr>
<tr>
<td>SENG 460</td>
<td>Practice of Information Security and Privacy</td>
</tr>
<tr>
<td>SENG 461</td>
<td>Network Security</td>
</tr>
<tr>
<td>SENG 462</td>
<td>Distributed Systems and the Internet</td>
</tr>
</tbody>
</table>

Directed studies, selected topics, or thesis courses
Others Technical Electives

CENG 412 Human Factors in Engineering
CENG 496 Selected Topics in Computer Engineering
ELEC 461 Dynamics and Control of Switched Mode Power Supplies
ELEC 462 Motor Drive Dynamics
ELEC 496 Selected Topics in Electrical Engineering
SENG 410 Media Applications

Each of the following courses, which will require additional prerequisites and permission from the offering department:
MECH 410 Computer Aided Design
MECH 460 Computer Aided Manufacture

Directed studies, selected topics, or thesis courses

Topics and Thesis Courses

CENG 490 Directed Studies
CENG 496 Selected Topics in Computer Engineering
CENG 498 Honours Thesis
ELEC 490 Directed Studies
ELEC 496 Selected Topics in Electrical Engineering
ELEC 498 Honours Thesis

Academic Schedules Notes

1. Not all technical electives will be offered every year. Please check the department course schedule website for planning.
2. Other 400-level or graduate courses may be considered as a Technical Elective with the permission of the department and Dean of Graduate Studies as required, refer to "Registration in Graduate Courses by Undergraduates" (page 49).
3. Courses other than those listed may be counted for credit towards a specialization with the permission of the Department.
4. Can be used for only one specialization letter, when deemed related to the specialization area by the course instructor.

Academic Schedule: Computer Engineering

<table>
<thead>
<tr>
<th>Term 1A</th>
<th>Term 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 111</td>
<td>CHEM 150</td>
</tr>
<tr>
<td>ENGR 110</td>
<td>ENGR 120</td>
</tr>
<tr>
<td>ENGR 130</td>
<td>ENGR 141</td>
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<tr>
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<td>MATH 101</td>
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<tr>
<td>MATH 110</td>
<td>PHYS 111</td>
</tr>
<tr>
<td>PHYS 110</td>
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<table>
<thead>
<tr>
<th>Term 2A</th>
<th>Term 2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 241</td>
<td>CENG 242</td>
</tr>
<tr>
<td>CENG 255</td>
<td>CENG 299</td>
</tr>
<tr>
<td>CSC 1162</td>
<td>ELEC 216</td>
</tr>
<tr>
<td>ELEC 250</td>
<td>ELEC 220</td>
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</table>

<table>
<thead>
<tr>
<th>Term 3A</th>
<th>Term 3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 460</td>
<td>CENG 355</td>
</tr>
<tr>
<td>ELEC 300</td>
<td>CENG 356</td>
</tr>
<tr>
<td>ELEC 310</td>
<td>CENG 399</td>
</tr>
<tr>
<td>ELEC 320</td>
<td>2 of ELEC 350, 360, 370, or 380</td>
</tr>
<tr>
<td>ELEC 330</td>
<td>1 Natural Science Elective</td>
</tr>
<tr>
<td>ELEC 340</td>
<td></td>
</tr>
</tbody>
</table>

Academic Schedules Notes

1. Students normally must successfully complete ENGR 130 (Introduction to Professional Practice) before undertaking their first work term.
2. CSC 115 may be substituted in a term when CSC 116 is not offered. CSC 116 is strongly recommended.
3. A course in natural science as required by CEAB guidelines. A current list of acceptable courses may be obtained from the ECE Office.
4. A Complementary Studies Elective course dealing with central issues in humanities or social sciences, as required by CEAB guidelines for complementary studies, and as approved by the Faculty of Engineering. A current list of acceptable replacement courses may be obtained from the Engineering Undergraduate Office.
5. Or acceptable replacement.
6. MUS 407 is a two-term course taken in the fall and spring.
7. Alternate first year schedules for spreading the first year course load over three terms may be available, see "First Year Schedule" (page 117).
8. Students normally take ENGR 446 in the term preceding the final term of their academic programme (academic or work term.)

* Students in Computer Engineering must take a total of seven Technical electives.

Academic Schedule: Computer Engineering Technical Elective Courses

A list of available courses, and the terms in which they are normally offered, can be found at: <www.ece.uvic.ca/ugrad/electives-schedule.shtml>.

Not all technical electives will be offered every year. Not all courses are offered in the terms listed. Please check the department course schedule website for planning: <www.ece.uvic.ca/ugrad/courses.shtml>.
Electrical Engineering

This BEng program is accredited by the Canadian Engineering Accreditation Board (CEAB) of the Canadian Council of Professional Engineers. Accreditation ensures that graduates of the program satisfy the academic requirements for registration with the provincial Association of Professional Engineers.

Program Requirements

Many courses are offered only one time per year. Refer to the Department web site for course scheduling information. Consult with the program adviser for schedule planning advice.

Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 150</td>
<td>1.5</td>
</tr>
<tr>
<td>CSC 111</td>
<td>1.5</td>
</tr>
<tr>
<td>ENGR 110, 120, 130(^1), 141</td>
<td>7.0</td>
</tr>
<tr>
<td>MATH 100 or 109, 110</td>
<td>4.5</td>
</tr>
<tr>
<td>PHYS 110, 111, or 122, 125</td>
<td>3.0</td>
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Year 2

<table>
<thead>
<tr>
<th>Course</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CENG 241, 255</td>
<td>3.0</td>
</tr>
<tr>
<td>CSC 116(^2)</td>
<td>1.5</td>
</tr>
<tr>
<td>ELEC 216, 220, 250, 260, 299</td>
<td>7.5</td>
</tr>
<tr>
<td>MATH 200, 204</td>
<td>3.0</td>
</tr>
<tr>
<td>MECH 295</td>
<td>1.5</td>
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<td>STAT 254</td>
<td>1.5</td>
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<tr>
<td><strong>Total</strong></td>
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Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>CENG 355</td>
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</tr>
<tr>
<td>CSC 349A</td>
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<tr>
<td>ELEC 300, 310, 320, 330, 340</td>
<td>7.5</td>
</tr>
<tr>
<td>ELEC 350, 360, 370, 380, 399</td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>

Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 499</td>
<td>1.5</td>
</tr>
<tr>
<td>ECON 180, ENGR 297, 446</td>
<td>4.0</td>
</tr>
<tr>
<td>One Complementary Studies Elective(^4)</td>
<td>1.5</td>
</tr>
<tr>
<td>One Natural Science Elective(^3)</td>
<td>1.5</td>
</tr>
<tr>
<td>Seven Technical Electives</td>
<td>10.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</tr>
</tbody>
</table>

In addition, students must complete four Co-op work terms (ENGR 001, 002, 003, 004), as per the Faculty of Engineering “Academic and Work/Other Term Schedule” (page 115).

Electrical Engineering (Biomedical Option)

Students are admitted to the Biomedical Option at the completion of their 1B term. Enroilment is limited and students are cautioned that they must apply for admission and be admitted before registering in any of the option-required courses. In addition to the standard Electrical Engineering program courses, the Biomedical Option requires completion of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 150</td>
<td>1.5</td>
</tr>
<tr>
<td>CSC 111</td>
<td>1.5</td>
</tr>
<tr>
<td>ENGR 110, 120, 130(^1), 141</td>
<td>7.0</td>
</tr>
<tr>
<td>MATH 100 or 109, 110</td>
<td>4.5</td>
</tr>
<tr>
<td>PHYS 110, 111, or 122, 125</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19.0</strong></td>
</tr>
</tbody>
</table>

BME 200 (1.5) Molecular and Cellular Physiology for Engineers
BME 201 (1.5) Quantitative Human Physiology
ELEC 335 (1.5) Biosensors and Instrumentation
ELEC 435 (1.5) Medical Image Processing

This option also requires completion of one of the following courses as one of the Technical Electives:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 434 (1.5)</td>
<td></td>
</tr>
<tr>
<td>PHYS 432 (1.5)</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- Students in this option may take EPHE 141 and BIOL 225 in lieu of BME 200 and 201, but must then take BIOL 190A as their Science Elective. BIOL 190A and BIOL 225 cover prerequisite material necessary for admission to the medical program at UBC. Please refer to the UBC medical program requirements at <mdprogram.med.ubc.ca/admissions/admission-requirements>.
- This option is offered subject to resources.
- A course in this option may be replaced with another course relevant to this option with the permission of the Department.

Electrical Engineering (Computer Music Option)

Enrolment in the Computer Music Option is limited. Students must apply for admission before registering in any of its required courses. In addition to the standard Electrical Engineering program courses, the Computer Music Option requires completion of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUS 306</td>
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</tr>
<tr>
<td>MUS 307</td>
<td></td>
</tr>
<tr>
<td>Plus a total of 3.0 units from the following list:</td>
<td></td>
</tr>
<tr>
<td>CSC 475 (1.5)</td>
<td></td>
</tr>
<tr>
<td>ELEC 484(^5) (1.5)</td>
<td></td>
</tr>
<tr>
<td>MUS 401C (1.5)</td>
<td></td>
</tr>
<tr>
<td>MUS 406A (1.5)</td>
<td></td>
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<tr>
<td>MUS 406B (1.5)</td>
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</tr>
<tr>
<td>MUS 407(^6) (3.0)</td>
<td></td>
</tr>
</tbody>
</table>

Note: A course in this option may be replaced with another course relevant to this option with the permission of the Department.

Fast Track Master’s Option

The department of Electrical and Computer Engineering offers outstanding undergraduate students an opportunity for a head start in a master’s program. Qualified students will be permitted to enrol in graduate-level courses during their fourth year. These courses will be in addition to any undergraduate requirements and thus can be transferred to the MASc or MEng degree program. All of the admission and transfer credit regulations of the Faculty of Graduate Studies must be met. For more information, please contact the Chair or the Graduate Adviser of the department.

Business Minor

A Business Minor develops business skills that are frequently required by practicing Engineers. See “Business Minor Program” (page 326) for requirements.

Minor in Electrical Systems

An Electrical Systems Minor is open to students outside of the programs in Electrical Engineering and Computer Engineering. Students must have a minimum cumulative GPA of 5. The minor requires 9 units of ELEC and CENG designated courses with a minimum of 4.5 units at the 300 level or above. For an Electrical Systems Minor, 3 or more of these units at the 300
level or above must be ELEC. For a Computer Systems Minor, 3 or more of
the units at the 300 level or above must be CENG.

Courses that fulfill requirements for a Minor cannot form part of the
requirements of the other program.

**Graduate Programs**

For information on studies leading to the MEng, MASc and PhD degrees,
see the UVic Graduate Calendar.

**Technical Electives**

The program requires completion of seven technical electives (10.5 units)
to be chosen from the lists below. Students who complete three courses
(4.5 units) in one of the specialization areas listed below can request a
letter from the Electrical and Computer Engineering office confirming
this; the area will not be shown on the transcript.

Students who entered the program via a bridge program must take at
least two courses (i.e., 3.0 units) from the Special Bridge Students' Elective
List. A printable PDF version of the electives is available here:
<www.ece.uvic.ca/ugrad/bridge_electives.shtml>.

Note that some courses appear under more than one category. Not all
technical elective courses will be offered every year. Please check
the department course schedule website for planning.

**Communications**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>CENG 460</td>
<td>Communication Networks</td>
</tr>
<tr>
<td>ELEC 404</td>
<td>Microwaves and Fiber Optics</td>
</tr>
<tr>
<td>ELEC 405</td>
<td>Error Control Coding and Sequences</td>
</tr>
<tr>
<td>ELEC 417</td>
<td>Software Defined Radio</td>
</tr>
<tr>
<td>ELEC 450</td>
<td>Communications Theory and Systems II</td>
</tr>
<tr>
<td>ELEC 456</td>
<td>Mobile Communications</td>
</tr>
</tbody>
</table>

Directed studies, selected topics, or thesis courses

**Computational Intelligence**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 420</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>CENG 421</td>
<td>Computer Vision</td>
</tr>
<tr>
<td>ELEC 435</td>
<td>Medical Image Processing</td>
</tr>
<tr>
<td>ELEC 485</td>
<td>Pattern Recognition</td>
</tr>
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</table>

Directed studies, selected topics, or thesis courses

**Computer Systems**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 450</td>
<td>Computer Systems and Architecture</td>
</tr>
<tr>
<td>CENG 448</td>
<td>Hardware Security</td>
</tr>
<tr>
<td>CENG 453</td>
<td>Parallel and Cluster Computing</td>
</tr>
<tr>
<td>CENG 455</td>
<td>Real Time Computer Systems Design Project</td>
</tr>
<tr>
<td>SENG 422</td>
<td>Advanced Software Architecture</td>
</tr>
<tr>
<td>SENG 426</td>
<td>Software Quality Engineering</td>
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Directed studies, selected topics, or thesis courses

**Digital and Embedded Systems**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 441</td>
<td>Design of Digital and VLSI Systems</td>
</tr>
<tr>
<td>CENG 448</td>
<td>Hardware Security</td>
</tr>
<tr>
<td>CENG 450</td>
<td>Computer Systems and Architecture</td>
</tr>
<tr>
<td>CENG 455</td>
<td>Real Time Computer Systems Design Project</td>
</tr>
<tr>
<td>ELEC 466</td>
<td>System-on-Chip Engineering for Signal Processing</td>
</tr>
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</table>

Directed studies, selected topics, or thesis courses

**Digital and Embedded Systems**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENG 440</td>
<td>Embedded Systems</td>
</tr>
</tbody>
</table>
| Directed studies, selected topics, or thesis courses

**Digital Signal Processing**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>ELEC 403</td>
<td>Engineering Design by Optimization</td>
</tr>
<tr>
<td>ELEC 407</td>
<td>Digital Signal Processing II</td>
</tr>
<tr>
<td>ELEC 417</td>
<td>Software Defined Radio</td>
</tr>
<tr>
<td>ELEC 435</td>
<td>Medical Image Processing</td>
</tr>
<tr>
<td>ELEC 459</td>
<td>Applications of Digital Signal Processing Techniques</td>
</tr>
<tr>
<td>ELEC 483</td>
<td>Digital Video Processing: Algorithms and Applications in Media</td>
</tr>
<tr>
<td>ELEC 484</td>
<td>Audio Signal Processing</td>
</tr>
<tr>
<td>ELEC 486</td>
<td>Multiresolution Signal and Geometry Processing with C++</td>
</tr>
</tbody>
</table>

Directed studies, selected topics, or thesis courses

**Electrical Energy Systems**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 410</td>
<td>Power Electronics</td>
</tr>
<tr>
<td>ELEC 482</td>
<td>Electrical Drive Systems</td>
</tr>
<tr>
<td>ELEC 488</td>
<td>Electrical Power Systems</td>
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</table>

Directed studies, selected topics, or thesis courses

**Electromagnetics and Photonics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 404</td>
<td>Microwaves and Fiber Optics</td>
</tr>
<tr>
<td>ELEC 434</td>
<td>Biophotonics</td>
</tr>
<tr>
<td>ELEC 452</td>
<td>Optical Communication Technology</td>
</tr>
<tr>
<td>ELEC 453</td>
<td>Antennas and Propagation</td>
</tr>
<tr>
<td>ELEC 454</td>
<td>Engineering Components for Wireless Systems</td>
</tr>
</tbody>
</table>

Directed studies, selected topics, or thesis courses

**Electronics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
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<tbody>
<tr>
<td>CENG 441</td>
<td>Design of Digital and VLSI Systems</td>
</tr>
<tr>
<td>ELEC 410</td>
<td>Power Electronics</td>
</tr>
<tr>
<td>ELEC 412</td>
<td>Electronic Devices II</td>
</tr>
<tr>
<td>ELEC 420</td>
<td>Nanotechnology</td>
</tr>
<tr>
<td>ELEC 481</td>
<td>Analog VLSI Systems</td>
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</table>

Directed studies, selected topics, or thesis courses

**Mechatronics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CENG 455</td>
<td>Real Time Computer Systems Design Project</td>
</tr>
<tr>
<td>ELEC 460</td>
<td>Control Theory and Systems II</td>
</tr>
<tr>
<td>ELEC 482</td>
<td>Electrical Drive Systems</td>
</tr>
</tbody>
</table>

Each of the following courses, which will require additional prerequisites
and permission from the offering department:

MECH 458    | Mechatronics |
MECH 464    | Mechatronics Design Project       |
MECH 466    | Micro electromechanical Systems   |
SENG 466    | Software for Embedded and Mechatronics Systems |

Directed studies, selected topics, or thesis courses
**Networks, Security, and Privacy**

- CENG 448: Hardware Security
- CENG 461: Design and Analysis of Computer Networks
- ELEC 456: Mobile Communications
- SENG 460: Practice of Information Security and Privacy
- SENG 461: Network Security
- SENG 462: Distributed Systems and the Internet

Directed studies, selected topics, or thesis courses.

**Other Technical Electives**

- CENG 412: Human Factors in Engineering
- CENG 496: Selected Topics in Computer Engineering
- ELEC 461: Dynamics and Control of Switched Mode Power Supplies
- ELEC 462: Motor Drive Dynamics
- ELEC 496: Selected Topics in Electrical Engineering
- SENG 410: Media Applications

Each of the following courses, which will require additional prerequisites and permission from the offering department:
- MECH 410: Computer Aided Design
- MECH 460: Computer Aided Manufacture

Directed studies, selected topics, or thesis courses.

**Topics and Thesis Courses**

- CENG 490: Directed Studies
- CENG 496: Selected Topics in Computer Engineering
- CENG 498: Honours Thesis
- ELEC 490: Directed Studies
- ELEC 496: Selected Topics in Electrical Engineering
- ELEC 498: Honours Thesis

**Academic Schedules Notes:**

1. Not all technical electives will be offered every year. Please check the department course schedule website for planning.
2. Other 400-level or graduate courses may be considered as a Technical Elective with the permission of the department and Dean of Graduate Studies as required, refer to “Registration in Graduate Courses by Undergraduates” (page 49).
3. Courses other than those listed may be counted for credit towards a specialization with the permission of the Department.
4. Can be used for only one specialization letter, when deemed related to the specialization area by the course instructor.

**Academic Schedule: Electrical Engineering**

<table>
<thead>
<tr>
<th>Term 1A</th>
<th>Term 1B</th>
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<tr>
<td>CSC 111</td>
<td>CHEM 150</td>
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<td>ENGR 110</td>
<td>ENGR 120</td>
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<td>ENGR 130</td>
<td>ENGR 141</td>
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<td>MATH 110</td>
<td>PHYS 111</td>
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<table>
<thead>
<tr>
<th>Term 2A</th>
<th>Term 2B</th>
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<tbody>
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<td>CENG 241</td>
<td>ELEC 216</td>
</tr>
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<td>CENG 255</td>
<td>ELEC 220</td>
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<td>CSC 116</td>
<td>ELEC 260</td>
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<td>ELEC 250</td>
<td>ELEC 299</td>
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<td>MATH 200</td>
<td>MECH 295</td>
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<td>STAT 254</td>
<td>MATH 204</td>
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<table>
<thead>
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<th>Term 3A</th>
<th>Term 3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 349A</td>
<td>CENG 355</td>
</tr>
<tr>
<td>ELEC 300</td>
<td>ELEC 350</td>
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<td>ELEC 310</td>
<td>ELEC 360</td>
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<td>ELEC 320</td>
<td>ELEC 370</td>
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<td>ELEC 330</td>
<td>ELEC 380</td>
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<tr>
<td>ELEC 340</td>
<td>ELEC 399</td>
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<table>
<thead>
<tr>
<th>Term 4A</th>
<th>Term 4B</th>
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</thead>
<tbody>
<tr>
<td>ELEC 499</td>
<td>ENGR 446</td>
</tr>
<tr>
<td>ENGR 280 or ECON 180</td>
<td>1 Natural Science Elective</td>
</tr>
<tr>
<td>ENGR 297</td>
<td>1 Complementary Studies Elective</td>
</tr>
<tr>
<td>Technical Electives</td>
<td>Technical Electives</td>
</tr>
</tbody>
</table>

* Students in Electrical Engineering must take a total of seven Technical Electives.

**Academic Schedule: Electrical Engineering Technical Elective Courses**

A list of available courses, and the terms in which they are normally offered, can be found at: [www.ece.uvic.ca/ugrad/electives-schedule.shtml](http://www.ece.uvic.ca/ugrad/electives-schedule.shtml).

Not all technical electives will be offered every year. Not all courses are offered in the terms listed. Please check the department course schedule website for planning: [www.ece.uvic.ca/ugrad/courses.shtml](http://www.ece.uvic.ca/ugrad/courses.shtml).

**Academic Schedules Notes:**

1. Students normally must successfully complete ENGR 130 (Introduction to Professional Practice) before undertaking their first work term.
2. CSC 115 may be substituted in a term when CSC 116 is not offered. CSC 116 is strongly recommended.
3. A course in natural science as required by CEAB guidelines. A current list of acceptable courses may be obtained from the ECE Office.
4. A Complementary Studies Elective course dealing with central issues in humanities or social sciences, as required by CEAB guidelines for complementary
Mechanical Engineering

This program is accredited by the Canadian Engineering Accreditation Board (CEAB) of the Canadian Council of Professional Engineers. Accreditation ensures that graduates of the program satisfy the academic requirements for registration with the provincial Association of Professional Engineers.

Graduate Programs

Please refer to the UVic Graduate Calendar for information on studies leading to the MEng, MASc and PhD degrees.

Program Requirements

<table>
<thead>
<tr>
<th>Year</th>
<th>Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CHEM 150</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>CSC 111</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>ENGR 110, 120, 130, 141</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td>MATH 100 or 109, 101, 110</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>PHYS 110 or 122, 111 or 125</td>
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<tr>
<td>2</td>
<td>CSC 116</td>
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<tr>
<td></td>
<td>ELEC 216, 250</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>ENGR 297</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>MATH 200, 204</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>MECH 200, 220, 240, 242, 285</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>STAT 254</td>
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<tr>
<td></td>
<td>Total</td>
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<tr>
<td>3</td>
<td>CSC 349A</td>
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<tr>
<td></td>
<td>ELEC 365</td>
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<tr>
<td></td>
<td>ECON 180</td>
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<tr>
<td></td>
<td>MECH 320, 330, 335, 345, 350, 360, 380, 390, 395</td>
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<td></td>
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<tr>
<td>4</td>
<td>MECH 400</td>
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<tr>
<td></td>
<td>ENGR 446, 498</td>
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</tbody>
</table>

In addition, students must complete four Co-op work terms (ENGR 001, 002, 003, 004), as per the Faculty of Engineering "Academic and Work/Other Term Schedule" (page 115).

1. CSC 115 may be accepted as a substitute; students need to see Mechanical Engineering for approval

Mechanical Engineering Technical Electives

The Department of Mechanical Engineering offers a large number of technical electives; the program requires completion of eight technical electives (12.0 units) to be chosen from the lists below. Students who complete 6 units in one of the specializations listed below can request a letter from the Mechanical Engineering undergraduate office confirming this; the specialization will not be shown on the transcript.

Note that some courses appear under more than one category and can be used for more than one specialization, with a maximum of 3.0 units shared between specializations. Up to two specializations will be acknowledged by the Department of Mechanical Engineering.

Computer Aided Engineering and Advanced Manufacturing

MECH 410 Computer-Aided Design and Engineering
MECH 411 Planning and Control of Production Systems
MECH 420 Finite Element Applications
MECH 450 Special Topics: Pulp and Paper Technology
MECH 455 Instrumentation
MECH 459 Fundamentals of Hybrid Vehicles
MECH 460 Computer Aided Manufacturing
MECH 462 Small Business Startup and Organization
MECH 466 Microelectromechanical Systems
MECH 495 Computational Fluid Dynamics and Heat Transfer
MECH 450A-F Special Topics
MECH 497 Green Vehicle Technology Project
MECH 498 Honours Thesis
MECH 499 Technical Project

Topic, thesis or project courses *

Advanced Materials

MECH 423 Engineering Ceramics
MECH 472 Introduction to Electron Microscopy
MECH 473 Ferrous and Non-Ferrous Metals
MECH 481 Biomaterials & Tissue Engineering

Topic, thesis or project courses *

Biomedical Engineering

ELEC 434 Biophotonics
ELEC 435 Medical Image Processing
MECH 472 Introduction to Electron Microscopy
MECH 481 Bio Materials & Tissue Engineering
MECH 483 Mechanics and Energy Conversion for Living Cells

Topic, thesis or project courses *

Energy Systems

ENGR 400 Sustainable Energy Systems Design Project
MECH 443 Advanced Thermodynamics
MECH 444 Wind Power Systems
MECH 445 Cryogenic Engineering
Courses from Other departments

With the permission of the involved departments, students may take a limited number of upper-level courses as technical electives from other departments.

MECH 500-level Courses

With the permission of the department, students may select courses as technical electives, from the list of 500-level Mechanical Engineering graduate courses.

Business Minor

The Faculty of Engineering in conjunction with the Peter B. Gustavson School of Business offers a Business Minor. See “Business Minor Program” (page 326) for requirements.

Energy Systems

MECH 446  Introduction to Ocean Engineering
MECH 447  Energy Systems
MECH 449  Fuel Cell Technology
MECH 459  Fundamentals of Hybrid Vehicles
MECH 493  Design of Thermo-Fluid Systems
MECH 494  Thermofluids and Introduction to Mass Transfer
MECH 497  Green Vehicle Technology Project

Thermo-Fluids and Aerodynamics

MECH 443  Advanced Thermodynamics
MECH 444  Wind Power Systems
MECH 446  Introduction to Ocean Engineering
MECH 447  Energy Systems
MECH 475  Aircraft Design
MECH 492  Transport Phenomena
MECH 493  Design of Thermo-Fluid Systems
MECH 494  Thermofluids and Introduction to Mass Transfer
MECH 495  Computational Fluid Dynamics and Heat Transfer

Mechatronics

MECH 421  Mechanical Vibrations
MECH 430  Robotics
MECH 455  Instrumentation
MECH 458  Mechatronics
MECH 459  Fundamentals of Hybrid Vehicles
MECH 464  Mechatronics Design Project
MECH 466  Microelectromechanical Systems
MECH 485  Mechanism and Manipulator Synthesis

Topics, Thesis or Projects Courses

* Can be used for only one specialization letter, when deemed related to the specialization area by the course instructor.

MECH 450  Special Topics Courses
MECH 498  Honours Thesis (3.0 units)
MECH 499  Technical Project (1.5 units)

Minor in Mechanical Systems

A Mechanical Systems Minor is open to all students outside the Mechanical Engineering program. It requires 9 units of MECH-designated courses, with a minimum of 4.5 units at the 300 level or above. Permission of the department is required. Courses that fulfill requirements for a Minor cannot form part of the requirements for the degree. In order to accommodate students from different backgrounds, as much flexibility as possible is given in course selection (consistent with course prerequisites). A suitable choice of fourth-year courses can lead to any areas of specialization given above in the Mechanical Engineering Technical Elective list.

Academic Schedule: BEng in Mechanical Engineering

<table>
<thead>
<tr>
<th>Term 1A</th>
<th>Term 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 111</td>
<td>CHEM 150</td>
</tr>
<tr>
<td>ENGR 130</td>
<td>ENGR 120</td>
</tr>
<tr>
<td>ENGR 110</td>
<td>ENGR 141</td>
</tr>
<tr>
<td>MATH 100 or 109</td>
<td>MATH 101</td>
</tr>
<tr>
<td>MATH 110</td>
<td>PHYS 111 or 125</td>
</tr>
<tr>
<td>PHYS 110 or 122</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 2A</th>
<th>Term 2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 116</td>
<td>ELEC 250</td>
</tr>
<tr>
<td>ELEC 216</td>
<td>ENGR 297</td>
</tr>
<tr>
<td>MATH 200</td>
<td>MATH 204</td>
</tr>
<tr>
<td>STAT 254</td>
<td>MECH 220</td>
</tr>
<tr>
<td>MECH 200</td>
<td>MECH 242</td>
</tr>
<tr>
<td>MECH 240</td>
<td>MECH 285</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 3A</th>
<th>Term 3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 349A</td>
<td>ELEC 365</td>
</tr>
<tr>
<td>MECH 320</td>
<td>ECON 180</td>
</tr>
<tr>
<td>MECH 335</td>
<td>MECH 330</td>
</tr>
<tr>
<td>MECH 345</td>
<td>MECH 360</td>
</tr>
<tr>
<td>MECH 350</td>
<td>MECH 380</td>
</tr>
<tr>
<td>MECH 390</td>
<td>MECH 395</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 4A</th>
<th>Term 4B</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 400</td>
<td>ENGR 446</td>
</tr>
</tbody>
</table>

1 For more information, see page 326.
Technical Elective Courses

Technical Electives are normally offered as follows:

<table>
<thead>
<tr>
<th>May-August Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 420</td>
</tr>
<tr>
<td>MECH 430</td>
</tr>
<tr>
<td>MECH 447</td>
</tr>
<tr>
<td>MECH 460</td>
</tr>
<tr>
<td>MECH 483</td>
</tr>
<tr>
<td>MECH 498</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>January-April Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 410</td>
</tr>
<tr>
<td>MECH 446</td>
</tr>
<tr>
<td>MECH 458</td>
</tr>
<tr>
<td>MECH 475</td>
</tr>
<tr>
<td>MECH 493</td>
</tr>
<tr>
<td>MECH 498</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>September-December Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 459</td>
</tr>
<tr>
<td>MECH 499</td>
</tr>
</tbody>
</table>

Academic Schedules Notes

1. Deviation from the standard program schedule requires submission of a Program Change Form and approval by the Department before commencement of term. Students with third- and fourth-year standing will have registration priority for 300- and 400-level courses.
2. Alternate first-year schedules for spreading the first-year course load over three terms may be available, see "First Year Schedule" (page 117).
3. ENGR 130 (Introduction to Professional Practice) is mandatory for all students. Students normally must successfully complete ENGR 130 before undertaking their first work term.
4. Students entering Mechanical Engineering through the Engineering Bridge Program must take ENGR 297 in place of one technical elective.
5. Students normally register in this course in the term preceding the final term of their academic program (academic or work term).
6. Must be a course dealing with central issues in humanities or social sciences, as required by CEAB guidelines for complementary studies, and as approved by the Program Committee. A current list of acceptable replacement courses is available from the Engineering Undergraduate Office (EVO).
7. Depending on student interest and faculty availability, courses from the Technical Electives lists will be offered by the department.
8. CSC 115 may be accepted as a substitute, students need to see Mechanical Engineering Department for approval.
9. Also offered in 4B (Spring) term.

Software Engineering

This program is accredited by the Canadian Engineering Accreditation Board (CEAB) of the Canadian Council of Professional Engineers. Accreditation ensures that graduates of the program satisfy the academic requirements for registration with the provincial Association of Professional Engineers.

Co-operative Education is mandatory in the BSEng degree program. Please refer to the Faculty of Engineering Co-operative Education Program Requirements (page 129).

BSEng Program Requirements

Please refer to table under "Academic and Work/Other Term Schedule" (page 115) for information on standard academic term and work term sequencing.

<table>
<thead>
<tr>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 111</td>
</tr>
<tr>
<td>CSC 115</td>
</tr>
<tr>
<td>ENGR 130, 110, 120, 141</td>
</tr>
<tr>
<td>MATH 100 or 109, 101, 110</td>
</tr>
<tr>
<td>PHYS 110 or 122, PHYS 111 or 125</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 255 or CSC 230</td>
</tr>
<tr>
<td>CHEM 101</td>
</tr>
<tr>
<td>CSC 225</td>
</tr>
<tr>
<td>ELEC 260, 310</td>
</tr>
<tr>
<td>ECON 180</td>
</tr>
<tr>
<td>MATH 122</td>
</tr>
<tr>
<td>SENG 265, 299, 310</td>
</tr>
<tr>
<td>STAT 260</td>
</tr>
<tr>
<td>One Complementary Studies elective</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 355 or CSC 355</td>
</tr>
<tr>
<td>CENG 460 or CSC 361</td>
</tr>
<tr>
<td>CSC 226, 320, 360, 370</td>
</tr>
<tr>
<td>ELEC 360</td>
</tr>
<tr>
<td>SENG 321, 360, 371, 399</td>
</tr>
<tr>
<td>One Natural Science elective</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 455 or CSC 460</td>
</tr>
<tr>
<td>SENG 401, 426, 440, 499</td>
</tr>
<tr>
<td>Five Technical electives</td>
</tr>
<tr>
<td>One Complementary Studies elective</td>
</tr>
<tr>
<td>One Natural Science elective</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

In addition, students must complete four Co-op work terms (ENGR 001, 002, 003, 004) as per the Faculty of Engineering "Academic and Work/ Other Term Schedule" (page 115).

BSEng 4th Year Technical Electives

The Software Engineering Program offers a large number of technical electives; the program requires completion of five technical electives (7.5
Units) normally chosen from the set of 400-level courses offered within the Faculty.

Students who transferred from other programs or post-secondary institutions must choose their electives in consultation with the Software Engineering Program Office. Their choice of electives requires pre-approval by that office.

Students who complete 3 courses (4.5 units) in one of the specialization areas listed below can optionally request a letter from the Software Engineering Program Office confirming this; the area will not be shown on the transcript.

**Specialization Areas**

### Biomedical

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 498</td>
<td>Bioinformatics Project¹</td>
</tr>
<tr>
<td>ELEC 435</td>
<td>Medical Image Processing</td>
</tr>
<tr>
<td>ELEC 486</td>
<td>Multiresolution Signal and Geometry Processing with C++</td>
</tr>
<tr>
<td>SENG 466</td>
<td>Software for Embedded and Mechatronic Systems</td>
</tr>
</tbody>
</table>

### Communication and Networks

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 461</td>
<td>Design and Analysis of Computer Networks</td>
</tr>
<tr>
<td>CSC 463</td>
<td>Wireless and Mobile Networks</td>
</tr>
<tr>
<td>CSC 466</td>
<td>Overlay and Peer-to-Peer Networking</td>
</tr>
<tr>
<td>CSC 467</td>
<td>Switching, Network Traffic and Quality Service</td>
</tr>
<tr>
<td>SENG 461</td>
<td>Network Security</td>
</tr>
</tbody>
</table>

### Computational Intelligence

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 420</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>or CSC 421</td>
<td>Introduction to Artificial Intelligence</td>
</tr>
<tr>
<td>CENG 421</td>
<td>Computer Vision</td>
</tr>
<tr>
<td>CSC 322</td>
<td>Logic and Programming</td>
</tr>
<tr>
<td>ELEC 485</td>
<td>Pattern Recognition</td>
</tr>
<tr>
<td>SENG 474</td>
<td>Data Mining</td>
</tr>
</tbody>
</table>

### Embedded Systems

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 450</td>
<td>Computer Systems and Architecture</td>
</tr>
<tr>
<td>CENG 455</td>
<td>Real Time Computer Systems Design Project</td>
</tr>
<tr>
<td>ELEC 407</td>
<td>Digital Signal Processing II</td>
</tr>
<tr>
<td>ELEC 426</td>
<td>Robotics</td>
</tr>
<tr>
<td>ELEC 466</td>
<td>System-on-chip Engineering for Signal Processing</td>
</tr>
<tr>
<td>ELEC 486</td>
<td>Multiresolution Signal and Geometry Processing with C++</td>
</tr>
<tr>
<td>SENG 466</td>
<td>Software for Embedded and Mechatronic Systems</td>
</tr>
</tbody>
</table>

### Graphics and Gaming

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 420</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>or CSC 421</td>
<td>Introduction to Artificial Intelligence</td>
</tr>
<tr>
<td>CSC 305</td>
<td>Introduction to Computer Graphics</td>
</tr>
<tr>
<td>CSC 461</td>
<td>Multimedia Systems</td>
</tr>
<tr>
<td>CSC 471</td>
<td>Fundamentals of Computer Rendering</td>
</tr>
<tr>
<td>CSC 472</td>
<td>Multiresolution Signal and Geometry</td>
</tr>
<tr>
<td>CSC 473</td>
<td>Fundamentals of Computer Animation</td>
</tr>
<tr>
<td>CSC 475</td>
<td>Music Retrieval Techniques</td>
</tr>
<tr>
<td>ELEC 483</td>
<td>Digital Video Processing</td>
</tr>
<tr>
<td>ELEC 484</td>
<td>Audio Signal Processing</td>
</tr>
<tr>
<td>ELEC 486</td>
<td>Multiresolution Signal and Geometry Processing With C++</td>
</tr>
</tbody>
</table>

### High Performance Computing

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 453</td>
<td>Parallel and Cluster Computing</td>
</tr>
<tr>
<td>CSC 454</td>
<td>Fault Tolerant Computing</td>
</tr>
<tr>
<td>CSC 462</td>
<td>Distributed Computing</td>
</tr>
<tr>
<td>or SENG 462</td>
<td>Distributed Systems and the Internet</td>
</tr>
<tr>
<td>CSC 464</td>
<td>Concurrency</td>
</tr>
</tbody>
</table>

### Human Computer Interaction

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 412</td>
<td>Human Factors in Engineering</td>
</tr>
<tr>
<td>CENG 420</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>or CSC 421</td>
<td>Introduction to Artificial Intelligence</td>
</tr>
<tr>
<td>CENG 421</td>
<td>Computer Vision</td>
</tr>
<tr>
<td>SENG 410</td>
<td>Media Applications</td>
</tr>
<tr>
<td>SENG 411</td>
<td>Advanced Human Computer Interaction</td>
</tr>
<tr>
<td>SENG 435</td>
<td>Computer Supported Collaborative Work</td>
</tr>
</tbody>
</table>

### Mechatronics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 460</td>
<td>Control Theory and Systems II</td>
</tr>
<tr>
<td>MECH 458</td>
<td>Mechatronics</td>
</tr>
<tr>
<td>MECH 459</td>
<td>Fundamentals of Hybrid Vehicles</td>
</tr>
<tr>
<td>MECH 466</td>
<td>Microelectromechanical Systems</td>
</tr>
<tr>
<td>MECH 497</td>
<td>Green Vehicle Technology Project</td>
</tr>
<tr>
<td>SENG 466</td>
<td>Software for Embedded and Mechatronic Systems</td>
</tr>
</tbody>
</table>

### Programming Languages and Architectures

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 322</td>
<td>Logic and Programming</td>
</tr>
<tr>
<td>CSC 330</td>
<td>Programming Languages</td>
</tr>
<tr>
<td>CSC 435</td>
<td>Compiler Construction</td>
</tr>
<tr>
<td>SENG 422</td>
<td>Advanced Software Architecture</td>
</tr>
</tbody>
</table>

### Security and Privacy

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 429</td>
<td>Cryptography</td>
</tr>
<tr>
<td>CSC 454</td>
<td>Fault Tolerant Computing</td>
</tr>
<tr>
<td>SENG 460</td>
<td>Practice of Information Security and Privacy</td>
</tr>
<tr>
<td>SENG 461</td>
<td>Network Security</td>
</tr>
</tbody>
</table>

### Theory of Computation

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 349A</td>
<td>Numerical Analysis</td>
</tr>
<tr>
<td>CSC 422</td>
<td>Graph Algorithms</td>
</tr>
<tr>
<td>CSC 423</td>
<td>Randomized Algorithms</td>
</tr>
<tr>
<td>CSC 425</td>
<td>Analysis of Algorithms</td>
</tr>
<tr>
<td>CSC 426</td>
<td>Computational Geometry</td>
</tr>
<tr>
<td>CSC 428A</td>
<td>Combinatorial Algorithms</td>
</tr>
<tr>
<td>CSC 429</td>
<td>Cryptography</td>
</tr>
</tbody>
</table>
Other courses that may qualify as technical electives are topic courses, directed studies, technical projects and other courses offered by the Faculty of Engineering. Students interested in such courses must seek pre-approval with the Software Engineering Program Office.

1. Subject to approval by BSEng Program Office

Academic Schedule: BSEng¹,²

<table>
<thead>
<tr>
<th>Term 1A</th>
<th>Term 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 111</td>
<td>CSC 115³</td>
</tr>
<tr>
<td>ENGR 130⁴</td>
<td>ENGR 120</td>
</tr>
<tr>
<td>ENGR 110⁵</td>
<td>ENGR 141</td>
</tr>
<tr>
<td>MATH 100 or 109</td>
<td>MATH 101</td>
</tr>
<tr>
<td>MATH 110</td>
<td>PHYS 111 or 125</td>
</tr>
<tr>
<td>PHYS 110 or 122</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 2A</th>
<th>Term 2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 255⁶ or CSC 230⁶</td>
<td>CSC 225</td>
</tr>
<tr>
<td>CHEM 101⁷</td>
<td>ELEC 310</td>
</tr>
<tr>
<td>ELEC 260</td>
<td>ENGR 280 or ECON 180</td>
</tr>
<tr>
<td>MATH 122</td>
<td>SENG 299</td>
</tr>
<tr>
<td>SENG 265</td>
<td>SENG 310</td>
</tr>
<tr>
<td>STAT 260</td>
<td>1 Complementary Studies elective⁹ (1.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 3A</th>
<th>Term 3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 460 or CSC 361⁸</td>
<td>CENG 355⁶ or CSC 355⁶</td>
</tr>
<tr>
<td>CSC 226</td>
<td>CSC 320</td>
</tr>
<tr>
<td>ELEC 360</td>
<td>CSC 360</td>
</tr>
<tr>
<td>SENG 321</td>
<td>CSC 370</td>
</tr>
<tr>
<td>SENG 371</td>
<td>SENG 360</td>
</tr>
</tbody>
</table>

1. Deviation from the standard program schedule requires submission of a Program Change Form and approval by the Program Office before commencement of term.
2. Alternate first year schedules for spreading the first year course load over three terms may be available. See “First Year Schedule” (page 117).
3. CSC 116 can be substituted for CSC 115.
4. Students normally must successfully complete ENGR 130 (Introduction to Professional Practice) before undertaking their first work term.
5. Students must successfully complete the Academic Writing Requirement before undertaking their second work term.
6. When both courses are offered in the same term, only one of them may be open to BSEng students.
7. CHEM 150 can be substituted for CHEM 101.
8. Offered in Term 3B to students with an approved modified program.
9. A complementary studies elective course dealing with central issues in humanities or social sciences, and as approved by the Faculty of Engineering’s BEng/BSEng Student Programs Committee. A current list of acceptable courses may be obtained from the BSEng Program Office (1.5 units).
10. A course in natural science as required by CEAB guidelines. A current list of acceptable courses may be obtained from the BSEng Program Office (1.5 units).
11. On the recommendation of the BSEng Program Office and with the permission of the ECE Department, credit for ENGR 400 may be applied in lieu of SENG 499 as the term 4B program requirement.

Minor in Software Development

A Software Development Minor is open to students outside of the Bachelor of Software Engineering Program and Computer Science Programs.

The minor requires 10.5 units of courses as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 110 or 111</td>
<td>1.5</td>
</tr>
<tr>
<td>CSC 115 or 116</td>
<td>1.5</td>
</tr>
<tr>
<td>SENG 265 and 299</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Three SENG courses at 300 or 400 level................. 4.5

Note that 200 level and higher courses that fulfill requirements for a Minor cannot form part of the requirements for the Major or Honours degree. Any such course in the Minor program may be replaced by another suitable course at the same level or higher after consultation with the Software Engineering Program Office.

Engineering Co-operative Education Programs

Engineering students are automatically admitted to the Engineering Co-op program. See general Engineering program regulations for retention.
Work Term Sequence

Work terms are normally of four months’ duration and alternate with academic terms. Upon approval, work terms of 4 months can be combined to 8-, 12-, or 16-month periods of employment. Bachelor of Engineering and Bachelor of Software Engineering students need to submit a modified program request to their respective departmental office for approval of work terms longer than 4 months.

Work term prerequisite

ENGR 130 (Introduction to Professional Practice) is prerequisite to ENGR 001. See Engineering course listing for work term prerequisite sequencing.

Co-op Program Fee

The university assesses a Co-op Program Fee for each work term, which is non-refundable, is due in the first month of each term for eight (8) terms and is subject to the University’s general fee regulations.

Note: students admitted to BEng/BSEng programs prior to September 2012 will be assessed a work term fee upon registration in each work term as per tuition regulations under “Engineering Tuition”.

Advance Credit

Students must pass four work terms in order to qualify for the BEng or BSEng Co-op degree. There are, however, several clearly defined situations where this requirement may be reduced by one or at most two work terms. Please note that the total work term credits/reductions that can be accumulated under this section is limited to a maximum of two. A student with extensive technical work experience completed prior to admission to the program may apply to challenge for credit one or two work terms.

ENGINEERING AND COMPUTER SCIENCE/MATH CO-OPERATIVE EDUCATION PROGRAMS GENERAL REGULATIONS

The University regulations with respect to “Undergraduate Co-operative Education” (page 64) are applicable to the BEng, BSEng and Computer Science/Math degree program students except to the extent that they are modified by regulations adopted by the BEng, BSEng or Computer Science/Math Co-op programs.

The faculty and departments will endeavour to inform students who appear to be at risk of violating any of these requirements. Failure to do so, however, in no way obligates the faculty or the departments to waive a requirement at a later date.

The Engineering and Computer Science/Math Co-op office is responsible for overseeing and evaluating work placements, and the assignment of the work term grades.

Students must mail or hand-deliver a hard copy of the report directly to the Engineering and Computer Science/Math Co-op program.

The report is expected to follow the guidelines as outlined by the Co-op Program.

Work Term Application and Registration

Students must be registered for the work term by completing the Work Term Registration Form.

Students are expected to participate fully in the placement process. While every attempt will be made to ensure that all eligible students are placed, the Engineering and Computer Science/Math Co-op office is under no obligation to guarantee placement.

Students should be aware that they may be required to spend work terms outside the greater Victoria area.

The Engineering and Computer Science/Math Co-op Program reserves the right to approve any employer that provides placements for students and to withdraw a student from any placement assigned to a student. The student, however, has the right to be informed in writing of the reasons for any withdrawal and can follow the student appeal procedures as outlined in the Co-operative Education Program section.

Students must be registered for the entire duration of the work term placement and, once registered, are not permitted to withdraw from the placement without penalty of failure, unless specific written permission has been granted by the Dean. Where permission is granted, an entry of WNF (Withdraw No Fault) will be entered on the transcript.

Work Term Assessment

Students are required to write a report for each four-month work term. The report is expected to follow the guidelines as outlined by the Engineering and Computer Science/Math Co-op program.

Students must mail or hand-deliver a hard copy of the report directly to the Engineering and Computer Science/Math Co-op office. Due dates and other administrative details are stipulated in the course outline for each work term. Failing grades are submitted for work term reports not handed in by the due date.

Each work term is evaluated on the basis of the student’s performance of assigned work term tasks and a final work term submission as defined by the individual department. The work term period and evaluation (grading: COM, F/X, or N/X) are recorded on the student’s official academic record. A failing grade (F/X or N/X) will be assigned if a student fails to complete satisfactorily the requirements for the work term.

The requirements for a pass grade in a Co-op work term include:

- The Co-op program’s satisfactory assessment of the work term,
- the employer’s satisfactory competency assessment of the student,
- the satisfactory completion of the final work term submission (such as work term report, competency assessment) as submitted according to the deadlines defined by the Engineering and Computer Science/Math Co-op Office.

Students who are assigned a grade of F/X or N/X for a work term that carries 4.5 units will have a 0 grade point assigned for that work term; however, the grade is excluded from the calculations of all grade point averages. For the minimum sessional grade-point average regulations that apply to all UVic students, see “Minimum Sessional Grade Point Average and Academic Standing” (page 54). An appeal of an F/X or N/X grade awarded for a work term will only be considered if it is submitted within six months of completion of the work term.

University of Victoria guidelines must be submitted within four months after making the application.

A student undertaking continuous Co-op work experience longer than four months must be registered in a separate work term for each 4 month period and may be granted credit for additional work terms provided the basic requirements for each individual work term are met. Additional work terms should incorporate increased responsibility. For any period of work beyond 4 months for which there are no additional registrations, the student will lose Co-op status and full-time standing at UVic.
Status of Students on Work Terms

Students registered for work terms are considered to be enrolled in a full-time course of studies and may not take university-level credit courses without the permission of the Program Manager of the Engineering/CSC/Math Co-op program for BEng/BSEng and CSC/Math students. Students who are not registered in academic terms or in work terms should make themselves aware of the implications of their lack of full-time status.

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Maia Hoeberechts, BSc, PhD (West. Ont.), Adjunct Professor (2012-18)

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