The Bachelor of Science in Computer Science and Behavioral Neuroscience underscores how research in neuroscience has become a computational field of study. The combined major is designed for students who are interested in applying mathematical and computational methodologies toward understanding human behavior, artificial intelligence, and the human-machine interface. Courses across multiple science disciplines—including biology, chemistry, and computer science—lay a strong foundation necessary to explore brain mechanisms and how they give rise to behavioral functions and pathological states using computational approaches. Students will have an opportunity to develop skills in software development as they apply algorithms and data structures to brain research and neurotechnology.

Program Requirements
Complete all courses listed below unless otherwise indicated. Also complete any corequisite labs, recitations, clinicals, or tools courses where specified and complete any additional courses needed beyond specific college and major requirements to satisfy graduation credit requirements.

Universitywide Requirements
All undergraduate students are required to complete the Universitywide Requirements (http://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/).

NUpath Requirements
All undergraduate students are required to complete the NUpath Requirements (http://catalog.northeastern.edu/undergraduate/university-academics/nupath/).

Computer Science Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Overview</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>CS 1200</td>
<td>First Year Seminar</td>
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<tr>
<td>CS 1210</td>
<td>Professional Development for Khoury Co-op</td>
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<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>CS 1800</td>
<td>Discrete Structures</td>
<td>5</td>
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<tr>
<td>CS 1802</td>
<td>Seminar for CS 1800</td>
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<tr>
<td>CS 2500</td>
<td>Fundamentals of Computer Science 1</td>
<td>5</td>
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<tr>
<td>CS 2501</td>
<td>and Lab for CS 2500</td>
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<tr>
<td>CS 2510</td>
<td>Fundamentals of Computer Science 2</td>
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</tr>
<tr>
<td>CS 2511</td>
<td>and Lab for CS 2510</td>
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Statistics Foundation
Complete one of the following. Students who receive transfer credit for the Advanced Placement Statistics exam may complete the 1 SH PSYC 2315 course (requires department permission).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ENVR 2500</td>
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<td></td>
</tr>
<tr>
<td>and ENVR 2501</td>
<td>Lab for ENVR 2500</td>
<td></td>
</tr>
<tr>
<td>PSYC 2320</td>
<td>Statistics in Psychological Research</td>
<td></td>
</tr>
</tbody>
</table>

1 Students entering through the behavioral neuroscience program may take Behavioral Neuroscience at Northeastern (BNSC 1000).

2 Students entering through the behavioral neuroscience program may take Professional Development for Co-op (EESC 2000).

Writing Requirements

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ENGW 1111 or ENGW 1102</td>
<td>First-Year Writing</td>
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Advanced Writing in the Disciplines
Complete one of the following:

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<tr>
<td>ENGW 3302</td>
<td>Advanced Writing in the Technical Professions</td>
<td>4</td>
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<tr>
<td>ENGW 3307</td>
<td>Advanced Writing in the Sciences</td>
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</tr>
<tr>
<td>ENGW 3315</td>
<td>Interdisciplinary Advanced Writing in the Disciplines</td>
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Behavioral Neuroscience Requirements

<table>
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<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>BIOL 1107</td>
<td>Foundations of Biology</td>
<td>5</td>
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<tr>
<td>and BIOL 1108</td>
<td>and Lab for BIOL 1107</td>
<td></td>
</tr>
<tr>
<td>BIOL 2299</td>
<td>Inquiries in Biological Sciences</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 2301</td>
<td>Genetics and Molecular Biology</td>
<td>5</td>
</tr>
<tr>
<td>and BIOL 2302</td>
<td>and Lab for BIOL 2301</td>
<td></td>
</tr>
<tr>
<td>CHEM 1161</td>
<td>General Chemistry for Science Majors</td>
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<tr>
<td>and CHEM 1162</td>
<td>and Lab for CHEM 1161</td>
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<tr>
<td>CHEM 1163</td>
<td>and Recitation for CHEM 1161</td>
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<td>CHEM 2311</td>
<td>Organic Chemistry 1</td>
<td>5</td>
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<tr>
<td>and CHEM 2312</td>
<td>and Lab for CHEM 2311</td>
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<tr>
<td>PSYC 1101</td>
<td>Foundations of Psychology</td>
<td>4</td>
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Mathematics Foundation

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<th>Hours</th>
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<tr>
<td>MATH 1341</td>
<td>Calculus 1 for Science and Engineering</td>
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<tr>
<td>or MATH 1251</td>
<td>Calculus and Differential Equations for Biology 1</td>
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Behavioral Neuroscience Foundations

<table>
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<tr>
<td>BIOL 3405</td>
<td>Neurobiology</td>
<td>4</td>
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<tr>
<td>or BIOL 5587</td>
<td>Comparative Neurobiology</td>
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<tr>
<td>PT 5410</td>
<td>Functional Human Neuroanatomy</td>
<td>4-5</td>
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<tr>
<td>and PT 5411</td>
<td>and Lab for PT 5410</td>
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<tr>
<td>or PSYC 3200</td>
<td>Clinical Neuroanatomy</td>
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Psychology Elective
Complete one of the following:

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<th>Hours</th>
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<tr>
<td>PSYC 3404</td>
<td>Developmental Psychology</td>
<td>4</td>
</tr>
<tr>
<td>PSYC 3406</td>
<td>Clinical Psychology and Mental Health</td>
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<tr>
<td>PSYC 3450</td>
<td>Learning and Motivation</td>
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<tr>
<td>PSYC 3451</td>
<td>Learning Principles and Behavior Analysis</td>
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</table>
Computer Science and Behavioral Neuroscience, BS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>PSYC 3452</td>
<td>Sensation and Perception</td>
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</tr>
<tr>
<td>PSYC 3464</td>
<td>Psychology of Language</td>
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</tr>
<tr>
<td>PSYC 3466</td>
<td>Cognition</td>
<td></td>
</tr>
<tr>
<td>PSYC 4524</td>
<td>Cognitive Development</td>
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**Behavioral Neuroscience Core Courses**

Complete two of the following: 8

<table>
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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>BIOL 3403</td>
<td>Animal Behavior</td>
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</tr>
<tr>
<td>BIOL 3415</td>
<td>Current Topics in Behavioral Neuroscience</td>
<td></td>
</tr>
<tr>
<td>BIOL 3601</td>
<td>Neural Systems and Behavior</td>
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</tr>
<tr>
<td>BIOL 3605</td>
<td>Developmental Neurobiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 4705</td>
<td>Neurobiology of Cognitive Decline</td>
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</tr>
<tr>
<td>BIOL 4709</td>
<td>Neurobiology of Learning and Memory</td>
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<tr>
<td>BIOL 5595</td>
<td>Cell and Molecular Neuroscience</td>
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<tr>
<td>BIOL 5601</td>
<td>Multidisciplinary Approaches in Motor Control</td>
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<tr>
<td>PSYC 3506</td>
<td>Neuropsychology of Fear</td>
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</tr>
<tr>
<td>PSYC 3508</td>
<td>Behavioral Endocrinology</td>
<td></td>
</tr>
<tr>
<td>PSYC 3510</td>
<td>Brain, Behavior, and Immunity</td>
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</tr>
<tr>
<td>PSYC 4510</td>
<td>Psychopharmacology</td>
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</tr>
<tr>
<td>PSYC 4512</td>
<td>Neuropsychology</td>
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<tr>
<td>PSYC 4514</td>
<td>Clinical Neuroscience</td>
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<tr>
<td>PSYC 4570</td>
<td>Behavioral Genetics</td>
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</table>

**Integrative Requirements**

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<tr>
<td>IS 4300</td>
<td>Human Computer Interaction</td>
<td>4</td>
</tr>
<tr>
<td>or CS 4120</td>
<td>Natural Language Processing</td>
<td></td>
</tr>
<tr>
<td>or CS 4180</td>
<td>Reinforcement Learning</td>
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<tr>
<td>PSYC 4540</td>
<td>Quantitative Topics in Psychology and Behavioral Neuroscience</td>
<td>4</td>
</tr>
<tr>
<td>or BINF 6308</td>
<td>Bioinformatics Computational Methods 1</td>
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</table>

**Upper-Division Elective**

Complete four credits from the following list, not taken to fulfill previous requirements: 4

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<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>CS 2500 or higher, except CS 5010</td>
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<tr>
<td>CY 2000 or higher, except CY 4930</td>
<td></td>
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<tr>
<td>DS 2500 or higher, except DS 4900</td>
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</tr>
<tr>
<td>IS 2000 or higher, except IS 4900</td>
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<td></td>
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<tr>
<td>BNSC 4970 or higher</td>
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<tr>
<td>BIOL 3400 or higher</td>
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</tr>
<tr>
<td>BINF 6309</td>
<td>Bioinformatics Computational Methods 2</td>
<td>2</td>
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<tr>
<td>PSYC 3200 or higher</td>
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**Supporting Courses**

<table>
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<tbody>
<tr>
<td>AFAM 2600</td>
<td>Issues in Race, Science, and Technology</td>
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</tr>
<tr>
<td>CY 4170</td>
<td>The Law, Ethics, and Policy of Data and Digital Technologies</td>
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</tr>
<tr>
<td>CY 5240</td>
<td>Cyberlaw: Privacy, Ethics, and Digital Rights</td>
<td></td>
</tr>
<tr>
<td>ENGL 2150</td>
<td>Literature and Digital Diversity</td>
<td></td>
</tr>
<tr>
<td>HIST 2220</td>
<td>History of Technology</td>
<td></td>
</tr>
<tr>
<td>INSH 2102</td>
<td>Bostonography: The City through Data, Texts, Maps, and Networks</td>
<td></td>
</tr>
<tr>
<td>PHIL 1145</td>
<td>Technology and Human Values</td>
<td></td>
</tr>
<tr>
<td>SOCL 1280</td>
<td>The Twenty-First-Century Workplace</td>
<td></td>
</tr>
<tr>
<td>SOCL 2485</td>
<td>Environment, Technology, and Society</td>
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</tr>
<tr>
<td>SOCL 4528</td>
<td>Computers and Society</td>
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</tr>
</tbody>
</table>

**Required General Electives**

Complete 16 credits of general electives. 16

**Khoury College GPA Requirement**

Minimum 2.000 GPA required in all CS, CY, DS, and IS courses

**Computer Science and Behavioral Neuroscience Major Credit Requirement**

102 SH required in the major

**NUpath Requirements Satisfied**

- Engaging with the Natural and Designed World
- Conducting Formal and Quantitative Reasoning
- Understanding Societies and Institutions
- Analyzing and Using Data
- Writing in the First Year
- Advanced Writing in the Disciplines
- Writing-Intensive in the Major
- Demonstrating Thought and Action in a Capstone

Integrating Knowledge and Skills Through Experience is satisfied through co-op.

**Program Requirement**

133 total semester hours required

**Plan of Study**

Sample Patterns:

**Five Years, Three Co-ops**

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
<th>Summer 1</th>
<th>Hours</th>
<th>Summer 2</th>
<th>Hours</th>
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<tbody>
<tr>
<td>BIOL 1107</td>
<td>5</td>
<td>BIOL 2299</td>
<td>4</td>
<td>Vacation</td>
<td>Vacation</td>
<td></td>
<td></td>
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<tr>
<td>and BIOL 1108</td>
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<td></td>
</tr>
<tr>
<td>CS 1200</td>
<td>1</td>
<td>CHEM 1161 and CHEM 1162 and CHEM 1163</td>
<td>5</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>CS 1800 and CS 1802</td>
<td>5</td>
<td>CS 2510 and CS 2511</td>
<td>5</td>
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<td>CS 2500 and CS 2501</td>
<td>5</td>
<td>MATH 1341</td>
<td>4</td>
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<tr>
<td>ENGW 1111</td>
<td>4</td>
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### Year 1

<table>
<thead>
<tr>
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<th>Fall Hours</th>
<th>Spring Hours</th>
<th>Summer 1 Hours</th>
<th>Summer 2 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 1107 and BIOL 1108</td>
<td>5</td>
<td>BIOL 2299</td>
<td>4</td>
<td>CS 3500 and CS 3501</td>
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### Year 2

<table>
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<tr>
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<th>Spring Hours</th>
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<th>Summer 2 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 2301 and BIOL 2302</td>
<td>5 CHEM 2311 and CHEM 2312</td>
<td>5</td>
<td>Vacation</td>
<td>Co-op</td>
</tr>
<tr>
<td>BIOL 3405 or 5587</td>
<td>4 CS 1210</td>
<td>1</td>
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<tr>
<td>CS 3500 and CS 3501</td>
<td>5 CS 3000</td>
<td>4</td>
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<tr>
<td>PSYC 1101</td>
<td>4 PSYC 3200</td>
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### Year 3

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<tbody>
<tr>
<td>CS 3200</td>
<td>4 PSYC elective</td>
<td>4 Co-op</td>
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<tr>
<td>CS 4500</td>
<td>4 General elective</td>
<td>4</td>
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<tr>
<td>BNS core</td>
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<tr>
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### Year 4

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<th>Spring Hours</th>
<th>Summer 2 Hours</th>
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</thead>
<tbody>
<tr>
<td>Co-op</td>
<td>CS 4100</td>
<td>4</td>
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</tr>
<tr>
<td>BNS core</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS integrative course</td>
<td>4</td>
<td></td>
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<td>General elective</td>
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### Year 5

<table>
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<th>Fall Hours</th>
<th>Spring Hours</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Co-op</td>
<td>BNS integrative course</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Computing and social issues</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper-division elective</td>
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<td></td>
</tr>
<tr>
<td>General elective</td>
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Total Hours: 134

### Four Years, Two Co-ops

<table>
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<th>Summer 2 Hours</th>
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</thead>
<tbody>
<tr>
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<td>5</td>
<td>BIOL 2299</td>
<td>4</td>
<td>CS 3500 and CS 3501</td>
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<table>
<thead>
<tr>
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<th>Spring Hours</th>
<th>Summer 1 Hours</th>
<th>Summer 2 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1200</td>
<td>1 CHEM 1161 and CHEM 1162 and CHEM 1163</td>
<td>5 PSYC 1101</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CS 1800 and CS 1802</td>
<td>5 CS 2510 and CS 2511</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 2500 and CS 2501</td>
<td>5 MATH 1341</td>
<td>4</td>
<td></td>
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<tr>
<td>ENGW 1111</td>
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<table>
<thead>
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<th>Fall Hours</th>
<th>Spring Hours</th>
<th>Summer 1 Hours</th>
<th>Summer 2 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-op</td>
<td>CS 4500</td>
<td>4 Upper-division elective</td>
<td>4 Co-op</td>
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<tr>
<td>BNS core</td>
<td>4 General elective</td>
<td>4</td>
<td>ENGW 3302 (online)</td>
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<tr>
<td>BNS core</td>
<td>4</td>
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<tr>
<td>CS integrative course</td>
<td>4</td>
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<table>
<thead>
<tr>
<th>Semester</th>
<th>Fall Hours</th>
<th>Spring Hours</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-op</td>
<td>CS 4100</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BNS integrative course</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computing and social issues</td>
<td>4</td>
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Total Hours: 134