Biology - Environmental Science Concentration (B.S.)

Certain pre-qualified students may be accepted into the major; others will need to complete the following:

2.5 overall GPA required

Please note: The Biology, Molecular Biology, and Marine Biology and Coastal Science majors have retention policies. By the end of their second semester in the major (i.e. spring semester), students must maintain a minimum GPA of 2.5 and have completed the following courses with a C- or better grade: BIOL112 or BIOL113, and CHEM106 or CHEM120, and MATH111 or AMAT120.

Students are required to meet with their assigned advisor.

Contact: Dr. Dirk Vanderklein, Science Hall 107A, vanderkleid@montclair.edu.

Program Requirements Overview

Unless otherwise noted, 120 credits of coursework is required for the baccalaureate degree with a minimum 2.0 overall GPA, and a minimum 2.0 major GPA.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General Education Requirements</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>World Languages and Cultures Requirements</td>
<td>3-9</td>
</tr>
<tr>
<td></td>
<td>Major Requirements</td>
<td>75-78</td>
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<td></td>
<td>Free Electives</td>
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<td>Total Credits</td>
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Major Requirements

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<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 112</td>
<td>Principles of Biology: Introduction to the Cell</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 113</td>
<td>Principles of Biology: Organisms and Diversity</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 213</td>
<td>Introduction to Ecology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 230</td>
<td>Cell and Molecular Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 380</td>
<td>Genetics</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 417</td>
<td>Evolutionary Biology</td>
<td>3</td>
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<tr>
<td></td>
<td>Major Electives</td>
<td>7</td>
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<tr>
<td></td>
<td>Select two courses from the list (see below)</td>
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Environmental Science Concentration

<table>
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<tbody>
<tr>
<td>EAES 105</td>
<td>Physical Geology</td>
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</table>

Concentration Electives

Select three courses from the list below. 9-12

Collateral Chemistry Courses

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<tbody>
<tr>
<td>CHEM 120</td>
<td>General Chemistry I</td>
<td>4</td>
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<td>CHEM 121</td>
<td>General Chemistry II</td>
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<td>Organic Chemistry I</td>
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<tr>
<td>CHEM 231</td>
<td>Organic Chemistry II</td>
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</tr>
<tr>
<td>CHEM 232</td>
<td>Experimental Organic Chemistry I</td>
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Collateral Mathematics Courses

Select two of the following options: 8

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>STAT 230</td>
<td>Data Science and Statistics</td>
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<tr>
<td>STAT 231</td>
<td>Data Science and Biostatistics</td>
<td></td>
</tr>
<tr>
<td>AMAT 120</td>
<td>Applied Calculus A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or MATH 122 Calculus I</td>
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<tr>
<td>AMAT 220</td>
<td>Applied Calculus B</td>
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<tr>
<td></td>
<td>or MATH 221 Calculus II</td>
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Collateral Physics Courses

Select one of the following sequences: 8

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<th>Credits</th>
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<tr>
<td>PHYS 191</td>
<td>University Physics I</td>
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<tr>
<td>&amp; PHYS 192</td>
<td>and University Physics II</td>
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<tr>
<td>PHYS 193</td>
<td>College Physics I</td>
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<td>&amp; PHYS 194</td>
<td>and College Physics II</td>
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Total Credits 75-78

Concentration Electives

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<tbody>
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<td>BIOL 300</td>
<td>Environmental Biology and Related Controversial Issues</td>
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<tr>
<td>BIOL 330</td>
<td>Introduction to Animal Behavior</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 370</td>
<td>Principles of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 406</td>
<td>Scanning Electron Microscopy</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 429</td>
<td>Herpetology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 430</td>
<td>Ornithology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 431</td>
<td>Entomology</td>
<td>3</td>
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<tr>
<td>BIOL 436</td>
<td>Phylogenetic Zoology</td>
<td>4</td>
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<tr>
<td>BIOL 440</td>
<td>Gross Mammalian Anatomy</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 451</td>
<td>Comparative Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 460</td>
<td>Biological Oceanography</td>
<td>3</td>
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<tr>
<td>BIOL 461</td>
<td>Aquatic Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 467</td>
<td>Biology of the Fishes</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 480</td>
<td>Research Community I: Organism Biology</td>
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</tr>
<tr>
<td>BIOL 481</td>
<td>Research Community II: Organism Biology</td>
<td>4</td>
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<tr>
<td>BIOL 484</td>
<td>Research Community I: Ecology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 485</td>
<td>Research Community II: Ecology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 486</td>
<td>Special Topics in Biology</td>
<td>3-4</td>
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<tr>
<td>BIOL 489</td>
<td>Special Topics in Organismal Biology</td>
<td>3-4</td>
</tr>
<tr>
<td>BIOL 495</td>
<td>Special Topics in Ecology</td>
<td>3</td>
</tr>
<tr>
<td>EAES 210</td>
<td>Introduction to GIS and Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>EAES 230</td>
<td>Hydrology</td>
<td>3</td>
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<tr>
<td>EAES 250</td>
<td>Introduction to Marine Sciences</td>
<td>4</td>
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<tr>
<td>EAES 240</td>
<td>Earth System History</td>
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<tr>
<td>EAES 301</td>
<td>Climatology</td>
<td>3</td>
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<tr>
<td>EAES 302</td>
<td>Structural Geology</td>
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<tr>
<td>EAES 303</td>
<td>Environmental Field Methods</td>
<td>3</td>
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<tr>
<td>EAES 310</td>
<td>Geographic Information Systems (GIS)</td>
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<tr>
<td>EAES 320</td>
<td>Igneous Metamorphic Petrology</td>
<td>4</td>
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<tr>
<td>EAES 322</td>
<td>Environmental Geochemistry</td>
<td>3</td>
</tr>
<tr>
<td>EAES 330</td>
<td>Fluvial Geography</td>
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</tr>
<tr>
<td>EAES 331</td>
<td>Geohydrology</td>
<td>3</td>
</tr>
<tr>
<td>EAES 332</td>
<td>Hydroclimatology</td>
<td>3</td>
</tr>
<tr>
<td>EAES 337</td>
<td>Environmental Isotope Geochemistry</td>
<td>3</td>
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</tbody>
</table>
Biology - Environmental Science Concentration (B.S.)

EAES 340 Sedimentology 4
EAES 341 Principles of Soil Science 3
EAES 350 Oceanography 3
EAES 401 Geo-Ecology 3
EAES 441 Stratigraphy 4
EAES 451 Coastal Marine Geology 4

Major Electives

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>BIMS 220</td>
<td>Introduction to Marine Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 300</td>
<td>Environmental Biology and Related Controversial Issues</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 330</td>
<td>Introduction to Animal Behavior</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 350</td>
<td>Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 370</td>
<td>Principles of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 404</td>
<td>Plant and Animal Histological Techniques</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 405</td>
<td>Cell Culture</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 406</td>
<td>Scanning Electron Microscopy</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 409</td>
<td>Externship in Biological Research (Co-operative Education)</td>
<td>1-4</td>
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<tr>
<td>BIOL 410</td>
<td>Toxicology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 411</td>
<td>Introduction to Transmission Electron Microscopy</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 415</td>
<td>Population Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 418</td>
<td>Biology Independent Research</td>
<td>1-4</td>
</tr>
<tr>
<td>BIOL 420</td>
<td>Economic Botany</td>
<td>3</td>
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<tr>
<td>BIOL 425</td>
<td>Elementary Plant Physiology</td>
<td>3</td>
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<tr>
<td>BIOL 426</td>
<td>New Jersey Flora</td>
<td>4</td>
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<tr>
<td>BIOL 429</td>
<td>Herpetology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 430</td>
<td>Ornithology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 431</td>
<td>Entomology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 432</td>
<td>Medical Entomology</td>
<td>3</td>
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<tr>
<td>BIOL 433</td>
<td>Developmental Biology</td>
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<tr>
<td>BIOL 434</td>
<td>Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 435</td>
<td>Experimental Molecular Biology</td>
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<tr>
<td>BIOL 436</td>
<td>Phylogenetic Zoology</td>
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</tr>
<tr>
<td>BIOL 439</td>
<td>Biology of Animal Parasites</td>
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<td>BIOL 440</td>
<td>Gross Mammalian Anatomy</td>
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<tr>
<td>BIOL 441</td>
<td>Comparative Anatomy of Vertebrates</td>
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<td>BIOL 442</td>
<td>Human Physiology</td>
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<td>BIOL 443</td>
<td>Vertebrate Embryology</td>
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<td>BIOL 444</td>
<td>Cell Physiology</td>
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<tr>
<td>BIOL 445</td>
<td>Immunology</td>
<td>3</td>
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<tr>
<td>BIOL 446</td>
<td>Endocrinology</td>
<td>3</td>
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<tr>
<td>BIOL 447</td>
<td>Fundamentals of Pharmacology</td>
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<tr>
<td>BIOL 450</td>
<td>Medical Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 451</td>
<td>Comparative Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 460</td>
<td>Biological Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 461</td>
<td>Aquatic Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 475</td>
<td>Medical Genetics</td>
<td>3</td>
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<tr>
<td>BIOL 476</td>
<td>Biology of Cancer</td>
<td>3</td>
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<td>BIOL 480</td>
<td>Research Community I: Organism Biology</td>
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<tr>
<td>BIOL 481</td>
<td>Research Community II: Organism Biology</td>
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<td>BIOL 484</td>
<td>Research Community I: Ecology</td>
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<td>BIOL 486</td>
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<tr>
<td>BIOL 493</td>
<td>Molecular Ecology</td>
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General Education Requirements

Click here for a list of courses that fulfill General Education categories. (http://catalog.montclair.edu/programs/general-education-requirements-ba-bs/)

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<thead>
<tr>
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<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>A. New Student Seminar</td>
<td>Complete a 1 credit New Student Seminar course.</td>
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<tr>
<td>C. Communication</td>
<td>1. Writing</td>
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<tr>
<td></td>
<td>2. Literature</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>3. Communication</td>
<td>3</td>
</tr>
<tr>
<td>D. Fine and Performing Arts</td>
<td>Complete a 3 credit Fine and Performing Arts course.</td>
<td>3</td>
</tr>
<tr>
<td>F. Humanities</td>
<td>1. Great Works and Their Influences</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>2. Philosophical and Religious Perspectives</td>
<td>3</td>
</tr>
<tr>
<td>G. Computer Science</td>
<td>Complete a 3 credit Computer Science course.</td>
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</tr>
<tr>
<td>H. Mathematics</td>
<td>Fulfilled by collateral Math courses in the major.</td>
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<tr>
<td>I. Natural Science Laboratory</td>
<td>BIOL 112 Principles of Biology: Introduction to the Cell (Fulfilled in the major.)</td>
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<tr>
<td>J. Physical Education</td>
<td>Complete a 3 credit Computer Science course.</td>
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<tr>
<td>K. Social Science</td>
<td>1. American and European History</td>
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<tr>
<td></td>
<td>2. Global Cultural Perspectives</td>
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<tr>
<td></td>
<td>3. Social Science Perspectives</td>
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<tr>
<td>L. Interdisciplinary Studies</td>
<td>CHEM 120 General Chemistry I (Fulfilled in the major.)</td>
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</tbody>
</table>

Total Credits 32

World Languages and Cultures Requirements

Click here for a list of courses that fulfill World Languages and Cultures categories. (http://catalog.montclair.edu/programs/world-languages-and-cultures-requirements/)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>A. World Languages</td>
<td>Based on language placement exam, complete one or two sequential courses in the same language. Requirement is automatically fulfilled by language major courses.</td>
<td>3-6</td>
</tr>
<tr>
<td>B. World Cultures</td>
<td>Based on language placement exam, complete one or two sequential courses in the same language. Requirement is automatically fulfilled by language major courses.</td>
<td></td>
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</tbody>
</table>
**Recommended Roadmap to Degree Completion**

This four-year plan is provided as an outline for students to follow in order to complete their degree requirements within four years. This plan is a recommendation and students should only use it in consultation with their academic advisor.

### First Year

<table>
<thead>
<tr>
<th>Fall</th>
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<th>Spring</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 112</td>
<td>4</td>
<td>BIOL 113</td>
<td>4</td>
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<tr>
<td>(C1) Writing</td>
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<td>GENERAL EDUCATION:</td>
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<tr>
<td>Math sequence course 1</td>
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<td>(C2) Literature</td>
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<td>CHEM 120</td>
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<td>CHEM 121</td>
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<tr>
<td>GNED 199</td>
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**Total Credits:** 16

### Second Year

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<th>Spring</th>
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<tr>
<td>BIOL 230</td>
<td>4</td>
<td>BIOL 213</td>
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<td>CHEM 230</td>
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<td>CHEM 231</td>
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<tr>
<td>CHEM 232</td>
<td>2</td>
<td>EAES 105</td>
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<tr>
<td>(C3) Communication</td>
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<td>World Cultures</td>
<td>3</td>
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<td>GENERAL EDUCATION:</td>
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<td></td>
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<tr>
<td>(L) Interdisciplinary Studies</td>
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<td>Free Elective</td>
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**Total Credits:** 15

### Third Year

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<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
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<tbody>
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<td>PHYS 191 or 193</td>
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<td>PHYS 192 or 194</td>
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<tr>
<td>GENERAL EDUCATION:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(F1) Humanities –</td>
<td>3</td>
<td>World Language 2</td>
<td>3</td>
</tr>
<tr>
<td>Great Works and Their Influences</td>
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<td></td>
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<tr>
<td>GENERAL EDUCATION:</td>
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<td></td>
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<tr>
<td>(K3) Social Science – Social Science Perspectives</td>
<td>3</td>
<td>GENERAL EDUCATION:</td>
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<td>World Language 1</td>
<td>3</td>
<td>(D) Fine and Performing Arts</td>
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</table>

**Total Credits:** 17

### Fourth Year

<table>
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<th>Credits</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>Biology Major elective</td>
<td>4</td>
<td>Environmental Science elective</td>
<td>3-4</td>
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<td>CSIT 100</td>
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<td>3 GENERAL EDUCATION</td>
<td>3</td>
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<tr>
<td>(K2) Social Science – Global Cultural Perspectives</td>
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<td>(F2) Humanities –</td>
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<td>(K1) Social Science – American and European History</td>
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<td>Philosophical and Religious Perspectives</td>
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<td>(J) Physical Education</td>
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**Total Credits:** 14-17

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**Total Credits:** 120-129