MARINE BIOLOGY AND COASTAL SCIENCES (B.S.)

Marine Biology and Coastal Sciences represent the wide variety of ecosystems that are linked through water. The study of Marine Biology and Coastal Sciences encompasses freshwater lakes and streams, estuaries, and coastal marine habitats. These habitats are critical for numerous plants and animals, but they can be compromised by human activities. Students who pursue this major are interested in understanding the relationships among plants, animals and humans and how to protect and restore these valuable ecosystems.

This major is an interdisciplinary program of study emphasizing the four core sciences of biology, geology, chemistry, and physics. Students completing this program will be well prepared to enter the work force in research, environmental consulting, education and regulatory agencies (e.g., EPA), as well as in non-profit organizations. Additionally, students will be prepared to undertake further graduate work.

The curriculum was designed for students who have had high school biology, chemistry, and physics, and three years of college preparatory mathematics.

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>35</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>70-74</td>
</tr>
<tr>
<td></td>
<td>Free Electives ¹</td>
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<tr>
<td>Total Credits</td>
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<td>120</td>
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</table>

¹ Graduate Swing courses will count toward Free Electives for students in combined degree programs.

Major Electives

Select three courses from the list below. ²

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIMS 220</td>
<td>Introduction to Marine Biology</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>EAES 105</td>
<td>Physical Geology</td>
<td>4</td>
</tr>
<tr>
<td>EAES 230</td>
<td>Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>EAES 322</td>
<td>Environmental Geochemistry</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td>4</td>
</tr>
<tr>
<td>AQUA 495</td>
<td>Research in Aquatic and Coastal Sciences</td>
<td></td>
</tr>
<tr>
<td>BIMS 490</td>
<td>Field Methods in the Marine Sciences</td>
<td></td>
</tr>
<tr>
<td>BIOL 418</td>
<td>Biology Independent Research</td>
<td></td>
</tr>
<tr>
<td>EAES 494</td>
<td>Independent Study in Geoscience</td>
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</table>

Collateral Requirements

Chemistry Collateral

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 120</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 121</td>
<td>General Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 230</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 232</td>
<td>Experimental Organic Chemistry I</td>
<td>2</td>
</tr>
</tbody>
</table>

Physics Collateral

Select one of the following sequences: 8

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 191 &amp; PHYS 192</td>
<td>University Physics I &amp; University Physics II</td>
<td></td>
</tr>
<tr>
<td>PHYS 193 &amp; PHYS 194</td>
<td>College Physics I &amp; College Physics II</td>
<td></td>
</tr>
</tbody>
</table>

Mathematics Collateral

Select two of the following sequences: 8

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMAT 120 or MATH 122</td>
<td>Applied Calculus A or Calculus I</td>
<td></td>
</tr>
<tr>
<td>AMAT 220 or MATH 222</td>
<td>Applied Calculus B or Calculus II</td>
<td></td>
</tr>
<tr>
<td>STAT 230 &amp; STAT 231</td>
<td>Data Science and Statistics &amp; Data Science and Biostatistics</td>
<td></td>
</tr>
</tbody>
</table>

Total Credits: 67-71

² Students in the combined Marine Biology and Coastal Science Major (B.S.)/Marine Biology and Coastal Science (M.S.) program take only 2 elective courses.

Major Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 351</td>
<td>Introduction to Aquatic Ecology</td>
<td>4</td>
</tr>
</tbody>
</table>

BIMS 220 Introduction to Marine Biology 4
BIOL 113 Principles of Biology: Organisms and Diversity 4
BIOL 213 Introduction to Ecology 4
EAES 105 Physical Geology 4
EAES 230 Hydrology 3
EAES 322 Environmental Geochemistry 3
Select one of the following: 4
AQUA 495 Research in Aquatic and Coastal Sciences
BIMS 490 Field Methods in the Marine Sciences
BIOL 418 Biology Independent Research
EAES 494 Independent Study in Geoscience

Major Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIMS 490</td>
<td>Field Methods in the Marine Sciences</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 370</td>
<td>Principles of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 380</td>
<td>Genetics</td>
<td>4</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>
</tr>
<tr>
<td>BIOL 436</td>
<td>Phylogenetic Zoology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 440</td>
<td>Gross Mammalian Anatomy</td>
<td>4</td>
</tr>
</tbody>
</table>
BIOL 451  Comparative Animal Physiology  3
BIOL 460  Biological Oceanography  3
BIOL 461  Aquatic Ecology  3
BIOL 467  Biology of the Fishes  4
BIOL 480  Research Community I: Organism Biology  4
BIOL 481  Research Community II: Organism Biology  4
BIOL 482  Research Community I: Molecular Biology  4
BIOL 484  Research Community I: Ecology  4
BIOL 485  Research Community II: Ecology  4
BIOL 486  Special Topics in Biology  3-4
BIOL 489  Special Topics in Organismal Biology  3-4
BIOL 495  Special Topics in Ecology  3
CHEM 231  Organic Chemistry II  3
CHEM 233  Experimental Organic Chemistry II  2
CHEM 310  Analytical Chemistry  4
EAES 210  Introduction to GIS and Remote Sensing  3
EAES 250  Introduction to Marine Sciences  4
EAES 301  Climatology  3
EAES 302  Structural Geology  3
EAES 303  Environmental Field Methods  3
EAES 310  Geographic Information Systems (GIS)  3
EAES 311  Fundamentals of Remote Sensing of Environment  3
EAES 320  Igneous Metamorphic Petrology  4
EAES 330  Fluvial Geography  3
EAES 331  Geohydrology  3
EAES 332  Hydroclimatology  3
EAES 337  Environmental Isotope Geochemistry  3
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

**H. Mathematics**
Fulfilled by collateral mathematics requirement in the major.

**I. Natural Science Laboratory**
- BIOL 113  Principles of Biology: Organisms and Diversity (Fulfilled in the major.)

**J. Physical Education**
Complete a 1 credit Physical Education course.

**K. Social Science**
- 1. American and European History  3
- 2. Global Cultural Perspectives  3
- 3. Social Science Perspectives  3

**L. Interdisciplinary Studies**
Complete a 3 credit Interdisciplinary Studies course.

**Total Credits**  35

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**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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</thead>
<tbody>
<tr>
<td>3-6</td>
<td>3</td>
<td>0-3</td>
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</table>

**Total Credits**  3-9

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**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>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL EDUCATION:</td>
<td>1</td>
<td>GENERAL EDUCATION:</td>
<td>3</td>
</tr>
<tr>
<td>(A) New Student Seminar</td>
<td></td>
<td>(C2) Literature</td>
<td></td>
</tr>
<tr>
<td>GENERAL EDUCATION:</td>
<td>3</td>
<td>GENERAL EDUCATION:</td>
<td>3</td>
</tr>
<tr>
<td>(C1) Writing</td>
<td></td>
<td>(C3) Communication</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td></td>
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</tr>
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</table>

**Total Credits**  10