B.S.M.A.S. IN MARINE BIOLOGY AND ECOLOGY

Overview

The Marine Biology and Ecology degree is a Bachelor of Science degree (BSMAS) and is designed to give students a strong background in biology and quantitative skills, as well as research experience in biomedicine, genomics, evolution, physiology, microbiology, immunology, and ecology. The strength of the Marine Biology & Ecology program is the opportunity for undergraduates to fully participate in research with Marine Biology and Ecology diverse faculty. These research opportunities provide skills to excel in medicine, graduate school, and other diverse fields.

Curriculum Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSC 111</td>
<td>Introduction to Marine Science</td>
<td>3</td>
</tr>
<tr>
<td>MSC 112</td>
<td>Introduction to Marine Science Lab</td>
<td>1</td>
</tr>
<tr>
<td>MBE 230</td>
<td>Introduction to Marine Biology</td>
<td>3</td>
</tr>
<tr>
<td>MBE 232</td>
<td>Introduction to Marine Biology Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>MBE 306</td>
<td>Marine Ecology</td>
<td>3</td>
</tr>
<tr>
<td>or MBE 366</td>
<td>Tropical Coastal Ecosystems</td>
<td></td>
</tr>
<tr>
<td>or MSC 422</td>
<td>Marine Ecology of the Galapagos</td>
<td></td>
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<tr>
<td>MBE 307</td>
<td>Physiology of Marine Organisms</td>
<td>3</td>
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<tr>
<td>MBE 308</td>
<td>Genetics and Evolution</td>
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</tr>
<tr>
<td>MBE 329</td>
<td>Marine Vertebrate Zoology</td>
<td>3-4</td>
</tr>
<tr>
<td>or MBE 323</td>
<td>Invertebrate Zoology</td>
<td></td>
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<tr>
<td>Select 16 credit hours of approved electives in Marine Biology and Ecology at the 300-level or above which must include research</td>
<td>16</td>
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<tr>
<td>BIL 150</td>
<td>General Biology and General Biology Laboratory</td>
<td>5</td>
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<tr>
<td>BIL 160</td>
<td>Evolution and Biodiversity and Evolution Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>BIL 255</td>
<td>Cellular and Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>CHM 121</td>
<td>Principles of Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHM 221</td>
<td>Introduction to Structure and Dynamics</td>
<td>4</td>
</tr>
<tr>
<td>Select one of the following:</td>
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<tr>
<td>MSC 203</td>
<td>Foundations of Computational Marine Science</td>
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<tr>
<td>MBE 326</td>
<td>Marine Genomics</td>
<td></td>
</tr>
<tr>
<td>MBE 536</td>
<td>Scientific Programming and Simulation Modelling</td>
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<tr>
<td>CSC 120</td>
<td>Computer Programming I</td>
<td></td>
</tr>
<tr>
<td>or Approved Computer Science course</td>
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<td>4</td>
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<tr>
<td>Select 15 to 18 credit hours of approved minor or in additional STEM electives</td>
<td>15-18</td>
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<tr>
<td>Select one of the following:</td>
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<td>3-4</td>
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<tr>
<td>GSC 111</td>
<td>Earth System History</td>
<td></td>
</tr>
<tr>
<td>GSC 110</td>
<td>The Earth System</td>
<td></td>
</tr>
<tr>
<td>MSC 215</td>
<td>Chemical Oceanography</td>
<td></td>
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<tr>
<td>MSC 301</td>
<td>Introduction to Physical Oceanography</td>
<td></td>
</tr>
<tr>
<td>MSC 424</td>
<td>Origin and Geology of the Galapagos Islands.</td>
<td></td>
</tr>
<tr>
<td>MTH 161</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>or MTH 171</td>
<td>Calculus I</td>
<td></td>
</tr>
<tr>
<td>MTH 162</td>
<td>Calculus II (fulfills the Rosenstiel BSMAS quantitative skills requirement)</td>
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<tr>
<td>or MTH 172</td>
<td>Calculus II</td>
<td></td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>Course</td>
<td>Title</td>
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<tr>
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<tr>
<td>MSC 204</td>
<td>Environmental Statistics</td>
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<tr>
<td>BIL 511</td>
<td>Advanced Biostatistics</td>
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<tr>
<td>MTH 224</td>
<td>Introduction to Probability and Statistics</td>
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<tr>
<td>PSY 292</td>
<td>Introduction to Biobehavioral Statistics Section B</td>
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Select one of the following options:  

Option 1:  
- PHY 201 University Physics I for the Sciences  
- PHY 106 College Physics Laboratory I  
- PHY 202 University Physics II for the Sciences  
- PHY 108 College Physics Laboratory II  

Option 2:  
- PHY 221 University Physics I  
- PHY 222 University Physics II  
- PHY 223 University Physics III  
- PHY 224 University Physics II Lab  
  or PHY 225 University Physics III Lab  

Option 3:  
- PHY 101 College Physics I  
- PHY 106 College Physics Laboratory I  
- PHY 102 College Physics II  
- PHY 108 College Physics Laboratory II  

**General Education Requirements**  

**Written Communication Skills:**  
- WRS 105 First-Year Writing I  
- WRS 107 First-Year Writing II: STEM  
- or WRS 106 First-Year Writing II  
- or ENG 106 Writing About Literature and Culture  

**Quantitative Skills:**  
- MTH 161 Calculus I (fulfilled through the major)  
- or MTH 171 Calculus I  

**Areas of Knowledge:**  
- Arts and Humanities Cognate 9  
- People and Society Cognate 9  
- STEM Cognate (9 credits) (fulfilled through the major)  

**Total Credit Hours** 123

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1. Equivalent Biology course with permission.  
2. Research requirement can be satisfied by taking 17 credits in Saltwater Semester, study abroad (e.g., Galapagos) or 4 independent research credits, including a minimum of 3 credits in MBE 411/MSC 411 and one credit in MBE 412/MSC 412 (thesis research).  

- **Saltwater Semester (SWS)** fulfills MBE research requirement. SWS is a full semester (17 credits) at the Marine campus doing authentic field and laboratory research with lectures to enhance learning and the practical importance of scientific research. All courses are research intensive (much of the day is working in the field or laboratory) and involve authentic research. Students will do novel experiments focused on course concepts.  

3. Principles of Chemistry must be passed with a grade of "C-" or higher. Chemistry laboratories will count as STEM electives and should be taken by Pre-Medical and Pre-Veterinarian students.  
4. Computer science or programming course as approved by MBE academic advisor.  
5. 15 to 18 credits in an approved minor in any field of the student’s choice or 15 to 18 credits in STEM electives (MBE, MSC, BIL, BMB, NEU, MIC, CHM, CSC, GSC, MTH, and PHY). If approved minor is less than 15 credits, remaining credits can be taken in any field of study.  
6. Calculus I must be passed with a grade of "C-" or higher.  
7. Option 1 is recommended for Physics.
### Suggested Plan of Study

This is only a sample. There are numerous ways students can create plans of study for the Marine Biology and Ecology major. Students should feel empowered to use the information listed in the Academic Bulletin to take charge of their education, pursue their own academic interests, and create their own, unique plans of study.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
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<tr>
<td>MSC 111 Introduction to Marine Science</td>
<td>3</td>
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<tr>
<td>MSC 112 Introduction to Marine Science Lab</td>
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<tr>
<td>BIL 150 General Biology</td>
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<tr>
<td>BIL 151 General Biology Laboratory</td>
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<tr>
<td>WRS 105 First-Year Writing I</td>
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<tr>
<td>MTH 161 Calculus I</td>
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<td><strong>Credit Hours</strong></td>
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<tr>
<td><strong>Spring</strong></td>
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<tr>
<td>BIL 160 Evolution and Biodiversity</td>
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<td>BIL 161 Evolution and Biodiversity Laboratory</td>
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<tr>
<td>CHM 121 Principles of Chemistry</td>
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<td>WRS 107 First-Year Writing II: STEM</td>
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<tr>
<td>MTH 162 Calculus II</td>
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<td><strong>Credit Hours</strong></td>
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<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Credit Hours</th>
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<tr>
<td><strong>Fall</strong></td>
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<tr>
<td>MBE 230 Introduction to Marine Biology</td>
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<tr>
<td>MBE 232 Introduction to Marine Biology Laboratory</td>
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<tr>
<td>BIL 255 Cellular and Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>CHM 221 Introduction to Structure and Dynamics</td>
<td>4</td>
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<tr>
<td>MSC 204 Environmental Statistics</td>
<td>3</td>
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<td>A&amp;H Course #1</td>
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<tr>
<td>or other Approved Computer Science course</td>
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<tr>
<td>MBE 306 Marine Ecology</td>
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<tr>
<td>MBE 307 Physiology of Marine Organisms</td>
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<tr>
<td>MBE 308 Genetics and Evolution</td>
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<tr>
<td>CSC 120 Computer Programming I</td>
<td>4</td>
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<tr>
<td>GSC 111 Earth System History</td>
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<tr>
<td><strong>Credit Hours</strong></td>
<td>17</td>
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<td><strong>Spring</strong></td>
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<tr>
<td>MBE 329 Marine Vertebrate Zoology</td>
<td>3</td>
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<tr>
<td>Minor course or STEM Elective #1</td>
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<tr>
<td>A&amp;H Course #2</td>
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<tr>
<td>P&amp;S Course #1</td>
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<tr>
<td>P&amp;S Course #2</td>
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<td><strong>Credit Hours</strong></td>
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<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
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<tr>
<td>Saltwater Semester. 16 credit Research Intensive Courses: Lab and Lectures.</td>
<td>16</td>
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<tr>
<td><strong>Credit Hours</strong></td>
<td>16</td>
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<tr>
<td><strong>Spring</strong></td>
<td></td>
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<tr>
<td>MBE 329 Marine Vertebrate Zoology</td>
<td>3</td>
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<tr>
<td>Minor course or STEM Elective #1</td>
<td>3</td>
</tr>
<tr>
<td>A&amp;H Course #2</td>
<td>3</td>
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<tr>
<td>P&amp;S Course #1</td>
<td>3</td>
</tr>
<tr>
<td>P&amp;S Course #2</td>
<td>3</td>
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<tr>
<td><strong>Credit Hours</strong></td>
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<table>
<thead>
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<th>Senior Year</th>
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<tr>
<td>PHY 201 University Physics I for the Sciences</td>
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</tr>
<tr>
<td><strong>Credit Hours</strong></td>
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Mission

The mission of the Rosenstiel School of Marine, Atmospheric, and Earth Science is to deepen our collective knowledge of our planet through cutting-edge scientific research on the oceans, atmosphere, geology, biota, and the human dimension, while training the next generation of scientists. We transfer the knowledge gained to our students, the national and international scientific community, and to policymakers and the public.

The educational mission of the BS degree in Marine Biology and Ecology at the University of Miami is to graduate students with the ability to integrate knowledge of the marine system, and its biota, ecology, physiology, and genetics to provide students a foundation for successful careers.

Goals

The MBE departmental major curriculum will provide the rigor, flexibility, depth and integration to enable students to:

• Design their course of study that provides both depth and breadth in marine biology and ecology and science related courses.
• Undertake active research experiences, which will allow them to gain a strong understanding of the scientific process.
• Learn from the diverse and outstanding group of professors, researchers, and classmates.
• Prepare themselves for the public and private sector employment, graduate school, and successful careers.

Student Learning Outcomes

Students completing the MBE departmental major will be able to:

• Master a broad set of fundamental biological knowledge including how to search for, understand the primary scientific literature, and understand how fundamental biological principles relate to the marine environment.
• Solve problems competently by identifying the relevant features of the problem and developing a strategy to solve the problem.
• Use computers and computational approaches to acquire and process data as well as use software to analyze data.
• Understand and synthesize the objectives of research experiments, properly conduct experiments, and appropriately record, analyze, and communicate the results.
• Effectively communicate the concepts, results, and implications of their laboratory experiments and independent research both orally and in the written form to experts in the field, scientists in other disciplines, and the general public.