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

### Curriculum Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td><strong>Marine Science</strong></td>
<td></td>
<td></td>
</tr>
<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>MSC 230</td>
<td>Introduction to Marine Biology</td>
<td>3</td>
</tr>
<tr>
<td>MSC 232</td>
<td>Introduction to Marine Biology Laboratory</td>
<td>1</td>
</tr>
<tr>
<td><strong>Marine Biology</strong></td>
<td></td>
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</tr>
<tr>
<td>Select one of the following:</td>
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<tr>
<td>BIL 330</td>
<td>Ecology</td>
<td></td>
</tr>
<tr>
<td>MSC 366</td>
<td>Tropical Coastal Ecosystems</td>
<td></td>
</tr>
<tr>
<td>MSC 422</td>
<td>Marine Ecology of the Galapagos</td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
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<td>3</td>
</tr>
<tr>
<td>BIL 250</td>
<td>Genetics</td>
<td></td>
</tr>
<tr>
<td>MSC 318</td>
<td>Ecological Genetics</td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
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<td>3-4</td>
</tr>
<tr>
<td>MSC 323</td>
<td>Invertebrate Zoology</td>
<td></td>
</tr>
<tr>
<td>MSC 329</td>
<td>Marine Vertebrate Zoology</td>
<td></td>
</tr>
<tr>
<td>Approved Upper-level animal diversity course</td>
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<tr>
<td>Select one of the following:</td>
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</tr>
<tr>
<td>GSC 111</td>
<td>Earth System History</td>
<td></td>
</tr>
<tr>
<td>MSC 215</td>
<td>Chemical Oceanography</td>
<td></td>
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<tr>
<td>&amp; MSC 216</td>
<td>Chemical Oceanography Laboratory</td>
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<tr>
<td>MSC 301</td>
<td>Introduction to Physical Oceanography</td>
<td></td>
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<tr>
<td>&amp; MSC 302</td>
<td>Introduction to Physical Oceanography Lab</td>
<td></td>
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<tr>
<td>MSC 424</td>
<td>Origin and Geology of the Galapagos Islands.</td>
<td></td>
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<tr>
<td>Select 12 credit hours of approved electives in Marine Science</td>
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<tr>
<td><strong>Other Required Courses</strong></td>
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<tr>
<td>BIL 150</td>
<td>General Biology</td>
<td>4</td>
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<tr>
<td>BIL 151</td>
<td>General Biology Laboratory</td>
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<tr>
<td>BIL 160</td>
<td>Evolution and Biodiversity</td>
<td>4</td>
</tr>
<tr>
<td>BIL 161</td>
<td>Evolution and Biodiversity Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>BIL 255</td>
<td>Cellular and Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIL 360</td>
<td>Comparative Physiology</td>
<td>3</td>
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<tr>
<td>Select 9 credit hours of approved electives in Biological Sciences</td>
<td>9</td>
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<tr>
<td>CHM 121</td>
<td>Principles of Chemistry</td>
<td>4</td>
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<tr>
<td>CHM 113</td>
<td>Chemistry Laboratory I</td>
<td>1</td>
</tr>
<tr>
<td>CHM 221</td>
<td>Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHM 205</td>
<td>Organic Chemistry Laboratory I</td>
<td>1</td>
</tr>
<tr>
<td>ENG 105</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENG 107</td>
<td>English Composition II: Science and Technology</td>
<td>3</td>
</tr>
<tr>
<td>or ENG 106</td>
<td>English Composition II</td>
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<tr>
<td>Select one of the following options:</td>
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<td>8-12</td>
</tr>
<tr>
<td>Option #1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTH 161</td>
<td>Calculus I</td>
<td></td>
</tr>
<tr>
<td>or MTH 171</td>
<td>Calculus I</td>
<td></td>
</tr>
<tr>
<td>MTH 162</td>
<td>Calculus II</td>
<td></td>
</tr>
<tr>
<td>or MTH 172</td>
<td>Calculus II</td>
<td></td>
</tr>
<tr>
<td>Option #2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTH 140</td>
<td>Calculus Concepts with Foundations A</td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td>Title</td>
<td>Credit Hours</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------------</td>
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</tr>
<tr>
<td>MTH 141</td>
<td>Calculus Concepts with Foundations B</td>
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</tr>
<tr>
<td>MTH 162</td>
<td>Calculus II</td>
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Select one of the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>MSC 204</td>
<td>Environmental Statistics</td>
</tr>
<tr>
<td>MTH 224</td>
<td>Introduction to Probability and Statistics</td>
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</table>

Select one of the following options: 5

Option 1:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>PHY 201</td>
<td>University Physics I for the Sciences</td>
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<tr>
<td>PHY 106</td>
<td>College Physics Laboratory I</td>
</tr>
<tr>
<td>PHY 202</td>
<td>University Physics II for the Sciences</td>
</tr>
<tr>
<td>PHY 108</td>
<td>College Physics Laboratory II</td>
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</table>

Option 2:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>PHY 221</td>
<td>University Physics I</td>
</tr>
<tr>
<td>PHY 222</td>
<td>University Physics II</td>
</tr>
<tr>
<td>PHY 223</td>
<td>University Physics III</td>
</tr>
<tr>
<td>PHY 224</td>
<td>University Physics II Lab</td>
</tr>
<tr>
<td>or PHY 225</td>
<td>University Physics III Lab</td>
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Option 3:

<table>
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<th>Course</th>
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<tbody>
<tr>
<td>PHY 101</td>
<td>College Physics I</td>
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<tr>
<td>PHY 106</td>
<td>College Physics Laboratory I</td>
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<tr>
<td>PHY 102</td>
<td>College Physics II</td>
</tr>
<tr>
<td>PHY 108</td>
<td>College Physics Laboratory II</td>
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</tbody>
</table>

Electives

| Arts and Humanities Cognate Courses | 9 |
| People and Society Cognate Courses | 9 |
| 300+ Level Elective                | 3 |
| Additional Electives               | 6 |

Total Credit Hours: 121-127

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1. Must be at the 300-level or higher. MSC 204 (http://bulletin.miami.edu/search/?P=MSC%20204/) does not satisfy the MSC elective requirement but does satisfy the Statistics requirement.

2. Biological Science electives include but are not limited to BIL, BMB, MBE, MIC, MSC, and NEU. For the Biology dual major, at least one BIL elective must be a CAPSTONE course.

3. Chemistry for the Biosciences must be passed with a grade of "C-" or higher.

4. Calculus I must be passed with a grade of "C-" or higher.

5. Option 1 is recommended for Physics.

### Suggested Plan of Study

**Course** | **Title** | **Credit Hours**
---|---|---
**Freshman Year**
**Fall**
MSC 111 | Introduction to Marine Science | 3
MSC 112 | Introduction to Marine Science Lab | 1
BIL 150 | General Biology | 4
BIL 151 | General Biology Laboratory | 1
ENG 105 | English Composition I | 3
MTH 161 | Calculus I | 4

**Credit Hours** | 16

**Spring**
BIL 160 | Evolution and Biodiversity | 4
BIL 161 | Evolution and Biodiversity Laboratory | 1
CHM 121 | Principles of Chemistry | 4
CHM 113 | Chemistry Laboratory I | 1
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 107</td>
<td>English Composition II: Science and Technology</td>
<td>3</td>
</tr>
<tr>
<td>MTH 162</td>
<td>Calculus II</td>
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<td><strong>Credit Hours</strong></td>
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<tr>
<td><strong>Sophomore Year</strong></td>
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<td><strong>Fall</strong></td>
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<tr>
<td>MSC 230</td>
<td>Introduction to Marine Biology</td>
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</tr>
<tr>
<td>MSC 232</td>
<td>Introduction to Marine Biology Laboratory</td>
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<td>BIL 255</td>
<td>Cellular and Molecular Biology</td>
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</tr>
<tr>
<td>CHM 205</td>
<td>Organic Chemistry Laboratory I</td>
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<tr>
<td>HUM Course #1</td>
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<td></td>
<td><strong>Credit Hours</strong></td>
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<tr>
<td><strong>Spring</strong></td>
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<tr>
<td>MSC 204</td>
<td>Environmental Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MSC 318 or BIL 250</td>
<td>Ecological Genetics or Genetics</td>
<td>3</td>
</tr>
<tr>
<td>MSC 366 or BIL 330</td>
<td>Tropical Coastal Ecosystems or Ecology</td>
<td>3</td>
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<tr>
<td>GSC 111</td>
<td>Earth System History</td>
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<td>HUM Course #2</td>
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<tr>
<td>MSC Course</td>
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<td>3</td>
</tr>
<tr>
<td>BIL 360</td>
<td>Comparative Physiology</td>
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<tr>
<td>PHY 201</td>
<td>University Physics I for the Sciences</td>
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<tr>
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<tr>
<td>PS Course #1</td>
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<td></td>
<td><strong>Credit Hours</strong></td>
<td><strong>17</strong></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
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<tr>
<td>MSC 329 or 323</td>
<td>Marine Vertebrate Zoology or Invertebrate Zoology</td>
<td>3-4</td>
</tr>
<tr>
<td>PHY 202</td>
<td>University Physics II for the Sciences</td>
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<tr>
<td>PHY 108</td>
<td>College Physics Laboratory II</td>
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<tr>
<td><strong>Fall</strong></td>
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</tr>
<tr>
<td>MSC 411</td>
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</tr>
<tr>
<td>MSC Course</td>
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<td>3</td>
</tr>
<tr>
<td>MSC Course</td>
<td></td>
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<tr>
<td>Biological Science Elective</td>
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<tr>
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<td></td>
<td><strong>Credit Hours</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
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</tr>
<tr>
<td>MSC 411</td>
<td>Research in Marine Science</td>
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</tr>
<tr>
<td>&amp; MSC 412</td>
<td>and Undergraduate Thesis in Marine Science</td>
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<tr>
<td>MSC Course</td>
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<tr>
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B.S.M.A.S. in Marine Biology and Ecology

<table>
<thead>
<tr>
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<tbody>
<tr>
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<td>12</td>
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<tr>
<td>Total Credit Hours</td>
<td>122-123</td>
</tr>
</tbody>
</table>

* 9 elective courses must include:
  • 3 Arts and Humanities Cognate courses
  • 3 People and Society Cognate courses
  • 1 Course (3 credits) at the 300+ level

Recommended electives to take for the Marine Biology and Ecology major.

**Mission**

The mission of the Rosenstiel School of Marine and Atmospheric 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.

**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, and synthesize 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.