B.S.M.A.S. IN OCEANOGRAPHY

Oceanography

The BSMAS in Oceanography is designed to give students a broad overview of the ocean sciences (physical, chemical, biological and geological oceanography, and ocean-atmosphere interactions as they relate to weather and climate) and specialized knowledge in one or more subdisciplines. Students are encouraged, but not required, to complete a second major in chemistry, physics, biology, geological sciences, meteorology, mathematics, computer science or engineering.

Undergraduate students are encouraged to work with the faculty and are able to earn course credit by conducting independent research under the supervision of leading scientists in their field. Research foci include air-sea interaction and remote sensing, biogeochemical cycles in the ocean, large-scale ocean dynamics, and biophysical interactions.

The Bachelor of Science degree program is meant for students planning to continue with graduate studies in ocean science, as preparation for professional school or as preparation for a technical career in government or private industry

Curriculum Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSC 103</td>
<td>Survey of Modern Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>ATM 103</td>
<td>Survey of Modern Meteorology (or ATM 103)</td>
<td>3</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 203</td>
<td>Foundations of Computational Marine Science</td>
<td>4</td>
</tr>
<tr>
<td>MSC 215</td>
<td>Chemical Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>MSC 216</td>
<td>Chemical Oceanography Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>MSC 218</td>
<td>Biological Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>or MSC 230</td>
<td>Introduction to Marine Biology</td>
<td></td>
</tr>
<tr>
<td>MSC 301</td>
<td>Introduction to Physical Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>MSC 302</td>
<td>Introduction to Physical Oceanography Lab</td>
<td>1</td>
</tr>
<tr>
<td>Select 12 credit hours from the following courses, or 500-level OCE courses may be selected</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

- MSC 220  Climate and Global Change
- MSC 316  Global Primary Production
- MSC 317  Earth's Biogeochemistry
- MSC 318  Ecological Genetics
- MSC 321  Scientific Programming in the Atmospheric Sciences
- MSC 325  Biological Oceanographic Techniques
- MSC 326  Marine Genomics
- MSC 333  Ocean Human Health
- MSC 347  Polar Science and Policy
- MSC 351  Climate, Oceanography, and Biogeography of the Galapagos
- MSC 352  Biophysical Dynamics in the Ocean: Biogeography and Evolution of the Galapagos
- MSC 355  Limnology
- MSC 364  Life in Moving Fluids
- MSC 401  Ocean Dynamics
- MSC 402  Ocean Acidification
- MSC 403  Marine Environmental Toxicology
- MSC 404  Marine Organismal and Environmental Health
- MSC 405  Observational Oceanography
- MSC 410  Marine Conservation Science
- MSC 415  Coral Reef Science and Management
- MSC 417  Marine Biota and Biogeochemical Cycles
- MSC 419  Microbial Geochemistry of the Ocean
B.S.M.A.S. in Oceanography

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSC 422</td>
<td>Marine Ecology of the Galapagos</td>
</tr>
<tr>
<td>MSC 423</td>
<td>Marine Conservation Biology and Fisheries of the Galapagos</td>
</tr>
<tr>
<td>MSC 424</td>
<td>Origin and Geology of the Galapagos Islands</td>
</tr>
<tr>
<td>MSC 426</td>
<td>Research in Microbial Genomics</td>
</tr>
<tr>
<td>MSC 432</td>
<td>Comparative Ecology of Terrestrial and Marine Systems</td>
</tr>
<tr>
<td>MSC 460</td>
<td>Spatial Applications in Marine Science</td>
</tr>
<tr>
<td>MSC 462</td>
<td>Marine Biomedicine</td>
</tr>
<tr>
<td>MSC 463</td>
<td>Conservation Genomics</td>
</tr>
<tr>
<td>MSC 465</td>
<td>Marine Comparative Immunology</td>
</tr>
</tbody>
</table>

### Supplemental Science Courses
Select 9 credit hours of science courses from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIL 160</td>
<td>Evolution and Biodiversity</td>
</tr>
<tr>
<td>BIL 250</td>
<td>Genetics</td>
</tr>
<tr>
<td>BIL 255</td>
<td>Cellular and Molecular Biology</td>
</tr>
<tr>
<td>CHM 221</td>
<td>Introduction to Structure and Dynamics</td>
</tr>
<tr>
<td>CHM 360</td>
<td>Physical Chemistry I (Lecture)</td>
</tr>
<tr>
<td>GSC 240</td>
<td>Introduction to Marine Geology</td>
</tr>
<tr>
<td>MTH 210</td>
<td>Introduction to Linear Algebra</td>
</tr>
<tr>
<td>MTH 211</td>
<td>Calculus III</td>
</tr>
<tr>
<td>MTH 311</td>
<td>Introduction to Ordinary Differential Equations</td>
</tr>
</tbody>
</table>

### Other Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIL 150</td>
<td>General Biology</td>
</tr>
<tr>
<td>BIL 151</td>
<td>General Biology Laboratory</td>
</tr>
<tr>
<td>CHM 121</td>
<td>Principles of Chemistry</td>
</tr>
<tr>
<td>CHM 113</td>
<td>Chemistry Laboratory I</td>
</tr>
<tr>
<td>ENG 105</td>
<td>English Composition I</td>
</tr>
<tr>
<td>ENG 107</td>
<td>English Composition II: Science and Technology</td>
</tr>
<tr>
<td>or ENG 106</td>
<td>English Composition II</td>
</tr>
<tr>
<td>GSC 111</td>
<td>Earth System History</td>
</tr>
<tr>
<td>MTH 161</td>
<td>Calculus I</td>
</tr>
<tr>
<td>or MTH 171</td>
<td>Calculus I</td>
</tr>
<tr>
<td>MTH 162</td>
<td>Calculus II</td>
</tr>
<tr>
<td>or MTH 172</td>
<td>Calculus II</td>
</tr>
</tbody>
</table>

Select one of the following:

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

Select one of the following options:

**Option 1:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 201</td>
<td>University Physics I for the Sciences</td>
</tr>
<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>
</tr>
</tbody>
</table>

**Option 2:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<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>PHY 225</td>
<td>University Physics III Lab</td>
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</tbody>
</table>

### Electives

- Arts and Humanities Cognate Courses: 9 credits
- People and Society Cognate Courses: 9 credits
### Additional Electives

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>18</td>
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### Total Credit Hours

<table>
<thead>
<tr>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>120-121</td>
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</tbody>
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1. Principles of Chemistry must be passed with a grade of "C-" or higher.
2. Calculus I must be passed with a grade of "C-" or higher.

### Sample Plan of Study

#### Freshman Year

**Fall**

<table>
<thead>
<tr>
<th>Course</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>BIL 150</td>
<td>General Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIL 151</td>
<td>General Biology Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ENG 105</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>MTH 161</td>
<td>Calculus I</td>
<td>4</td>
</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIL 160</td>
<td>Evolution and Biodiversity ¹</td>
<td>4</td>
</tr>
<tr>
<td>GSC 111</td>
<td>Earth System History</td>
<td>4</td>
</tr>
<tr>
<td>ENG 107 or 106</td>
<td>English Composition II: Science and Technology or English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MTH 162</td>
<td>Calculus II</td>
<td>4</td>
</tr>
</tbody>
</table>

**Credit Hours**

<table>
<thead>
<tr>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>16</td>
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</table>

#### Sophomore Year

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MSC 203</td>
<td>Foundations of Computational Marine Science</td>
<td>4</td>
</tr>
<tr>
<td>MSC 204</td>
<td>Environmental Statistics</td>
<td>3</td>
</tr>
<tr>
<td>CHM 121</td>
<td>Principles of Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHM 113</td>
<td>Chemistry Laboratory I</td>
<td>1</td>
</tr>
<tr>
<td>PHY 201</td>
<td>University Physics I for the Sciences</td>
<td>4</td>
</tr>
<tr>
<td>PHY 106</td>
<td>College Physics Laboratory I</td>
<td>1</td>
</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSC 215</td>
<td>Chemical Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>MSC 216</td>
<td>Chemical Oceanography Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>MSC 218</td>
<td>Biological Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>GSC 240</td>
<td>Introduction to Marine Geology ¹</td>
<td>3</td>
</tr>
<tr>
<td>PHY 202</td>
<td>University Physics II for the Sciences</td>
<td>4</td>
</tr>
<tr>
<td>PHY 108</td>
<td>College Physics Laboratory II</td>
<td>1</td>
</tr>
</tbody>
</table>

**Credit Hours**

<table>
<thead>
<tr>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>17</td>
</tr>
</tbody>
</table>

#### Junior Year

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSC 103</td>
<td>Survey of Modern Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>MSC 301</td>
<td>Introduction to Physical Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>MSC 302</td>
<td>Introduction to Physical Oceanography Lab</td>
<td>1</td>
</tr>
<tr>
<td>CHM 221</td>
<td>Introduction to Structure and Dynamics ¹</td>
<td>4</td>
</tr>
<tr>
<td>PS Course #1 (MSC 220) ²</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Credit Hours**

<table>
<thead>
<tr>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>- 15 credit hours (Galapagos semester or study abroad are possibilities)</td>
<td>15</td>
</tr>
</tbody>
</table>

**Credit Hours**

<table>
<thead>
<tr>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
</tr>
</tbody>
</table>
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.

The educational mission of the BS degree in Oceanography at the University of Miami is to graduate students with the ability and desire to integrate knowledge of oceanography into their future careers.

**Goals**

Students completing the BSMAS in Oceanography will have acquired a broad overview of physical, chemical and biological oceanography, meteorology and earth history. In addition students will have a firm foundation in basic sciences including mathematics, physics, chemistry and biology, and will have familiarity with modern scientific computational and data analysis tools. Integration and mastery of these tools gives students the skills to:

- Have a firm understanding of the scientific process.
- Contribute to active research projects led by professors and researchers who are experts in their fields.
- Prepare students for graduate school or for successful careers in industry or public workplaces.

**Student Learning Outcomes**

- Students will demonstrate an ability to communicate effectively, both verbally and in writing.
- Students will acquire analytical and quantitative skills that will provide a basis for both critical thinking and quantitative data analysis.
- Student will have the skills to perform supervised research in oceanography.