

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

## Overview

The BSMAS in Oceanography is designed to give students a broad foundation in both the basic sciences (mathematics, physics, chemistry and biology) and the Ocean Sciences (physical, chemical and biological oceanography, and elements of Earth and atmospheric sciences), together with specialized knowledge in one or more of these subdisciplines. Students are encouraged, but not required, to complete a minor 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 is conducted in all branches of physical, chemical and biological oceanography.

The Bachelor of Science degree program is designed to prepare students for graduate studies in Ocean Sciences, for professional school, or for a technical career in government or private industry.

## Curriculum Requirements

Code	Title	Credit Hours
<b>Oceanography Requirements</b>		
ATM 103	Survey of Modern Meteorology	3
MSC 111	Introduction to Marine Science	3
MSC 112	Introduction to Marine Science Lab	1
MSC 203	Foundations of Computational Marine Science	4
MSC 215	Chemical Oceanography	3
MSC 216	Chemical Oceanography Laboratory	1
MSC 218	Biological Oceanography	3
or MBE 230	Introduction to Marine Biology	
MSC 301	Introduction to Physical Oceanography <sup>1</sup>	3
MSC 302	Introduction to Physical Oceanography Lab	1
<b>Oceanography Elective Requirements</b>		
Select 12 credit hours from the following courses, or 500-level OCE courses may be selected <sup>2</sup>		12
GSC 462	Earth's Ancient Atmospheres, Climates, and Sea Levels	
GSC 550	Hydrogeology	
MSC 220	Climate and Global Change	
MSC 317	Earth's Biogeochemistry	
MSC 321	Scientific Computing in Marine and Atmospheric Sciences	
MBE 324	Biology of Fishes	
MSC 325	Biological Oceanographic Techniques	
MBE 326	Marine Genomics	
MBE 333	Ocean Human Health	
MSC 346	Climate Science and Policy	
MSC 348	Sea Level Rise	
MSC 351	Climate, Oceanography, and Biogeography of the Galapagos	
MSC 352	Biophysical Dynamics in the Ocean: Biogeography and Evolution of the Galapagos	
MSC 364	Life in Moving Fluids	
MBE 366	Tropical Coastal Ecosystems	
MSC 401	Ocean Dynamics	
MSC 402	Ocean Acidification	
MBE 403	Marine Environmental Toxicology	
MSC 405	Observing the Ocean	
MBE 410	Marine Conservation Science	
MBE 415	Coral Reef Science and Management	
MSC 417	Marine Biota and Biogeochemical Cycles	
MSC 419	Microbial Geochemistry of the Ocean	

MSC 422	Marine Ecology of the Galapagos	
MSC 423	Marine Conservation Biology and Fisheries of the Galapagos	
MSC 424	Origin and Geology of the Galapagos Islands.	
MBE 426	Research in Microbial Genomics	
MBE 432	Comparative Ecology of Terrestrial and Marine Systems	
MSC 460	Spatial Applications in Marine Science	
MBE 463	Conservation Genomics	
MGS 513	Introductory Geochemistry	
<b>Supplemental Science Courses</b>		
Select 9 credit hours of science courses from the following:		9
BIL 160	Evolution and Biodiversity	
BIL 250	Genetics	
BIL 255	Cellular and Molecular Biology	
CHM 221	Introduction to Structure and Dynamics	
CHM 360	Physical Chemistry I (Lecture)	
GSC 240	Introduction to Marine Geology	
MTH 210	Introduction to Linear Algebra	
MTH 211	Calculus III	
MTH 311	Introduction to Ordinary Differential Equations	
<b>Biology Requirements</b>		
BIL 150	General Biology	4
BIL 151	General Biology Laboratory	1
<b>Chemistry Requirements</b>		
CHM 121	Principles of Chemistry <sup>3</sup>	4
CHM 113	Chemistry Laboratory I	1
<b>Geological Sciences Requirement <sup>4</sup></b>		
Select one of the following:		3-4
GSC 110	The Earth System	
GSC 111	Earth System History	
MSC 424	Origin and Geology of the Galapagos Islands. (Approval Required)	
<b>Mathematics Requirements</b>		
MTH 161	Calculus I <sup>4</sup>	4
or MTH 171	Calculus I	
MTH 162	Calculus II (fulfills the Rosenstiel BSMAS quantitative skills requirement)	4
or MTH 172	Calculus II	
<b>Statistics Requirement</b>		
MSC 204	Environmental Statistics	3
or MTH 224	Introduction to Probability and Statistics	
<b>Physics Requirements</b>		
Select one of the following options:		10
Option 1 (recommended):		
PHY 201	University Physics I for the Sciences	
PHY 106	Physics Laboratory 1	
PHY 202	University Physics II for the Sciences	
PHY 108	Physics Laboratory 2	
Option 2:		
PHY 221	University Physics I	
PHY 222	University Physics II	
PHY 223	University Physics III	
PHY 224	University Physics II Lab	
<b>General Education Requirements</b>		

Written Communication Skills:		
WRS 105	First-Year Writing I	3
WRS 107	First-Year Writing II: STEM	3
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)		
<b>Electives</b>		
Additional Electives		19
<b>Total Credit Hours</b>		<b>120-121</b>

<sup>1</sup> MSC 351 and MSC 352 taken together in the Galapagos may be used to complete the MSC 301 requirement and 3 credits of major electives.

<sup>2</sup> If both MSC 218 and MBE 230 are taken, one of these courses may be counted toward the required 12 credits of Oceanography electives.

<sup>3</sup> Principles of Chemistry must be passed with a grade of "C-" or higher.

<sup>4</sup> Students who participate in the UGalapagos Program may use MSC 424 (a 3-credit course) to fulfill the Geological Sciences requirement and complete the BSMAS degree in 120 credits. All other students will need to complete 121 credits.

<sup>5</sup> Calculus I must be passed with a grade of "C-" or higher.

## Sample Plan of Study

**This is only a sample.** There are numerous ways students can create plans of study for the Oceanography 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.

<b>Freshman Year</b>		
<b>Fall</b>		<b>Credit Hours</b>
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
WRS 105	First-Year Writing I	3
MTH 161	Calculus I	4
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
BIL 160	Evolution and Biodiversity <sup>1</sup>	4
GSC 111	Earth System History	4
WRS 107	First-Year Writing II: STEM	3
MTH 162	Calculus II	4
<b>Credit Hours</b>		<b>15</b>
<b>Sophomore Year</b>		
<b>Fall</b>		
MSC 203	Foundations of Computational Marine Science	4
MSC 204	Environmental Statistics	3
CHM 121	Principles of Chemistry	4
CHM 113	Chemistry Laboratory I	1
PHY 201	University Physics I for the Sciences	4
PHY 106	Physics Laboratory 1	1
<b>Credit Hours</b>		<b>17</b>

<b>Spring</b>			
MSC 215	Chemical Oceanography		3
MSC 216	Chemical Oceanography Laboratory		1
MSC 218	Biological Oceanography		3
GSC 240	Introduction to Marine Geology <sup>1</sup>		3
PHY 202	University Physics II for the Sciences		4
PHY 108	Physics Laboratory 2		1
<b>Credit Hours</b>			<b>15</b>
<b>Junior Year</b>			
<b>Fall</b>			
ATM 103	Survey of Modern Meteorology		3
MSC 301	Introduction to Physical Oceanography		3
CHM 221	Introduction to Structure and Dynamics <sup>1</sup>		4
PS Course #1			3
<b>Credit Hours</b>			<b>13</b>
<b>Spring</b>			
Electives - 15 credit hours (Galapagos semester or study abroad are possibilities) <sup>1</sup>			15
<b>Credit Hours</b>			<b>15</b>
<b>Senior Year</b>			
<b>Fall</b>			
MSC 417	Marine Biota and Biogeochemical Cycles <sup>2</sup>		3
MSC 419	Microbial Geochemistry of the Ocean <sup>2</sup>		3
HUM Course #1			3
PS Course #2			3
PS Course #3			3
<b>Credit Hours</b>			<b>15</b>
<b>Spring</b>			
MSC 302	Introduction to Physical Oceanography Lab		1
MSC 460	Spatial Applications in Marine Science <sup>2</sup>		3
MSC 405	Observing the Ocean		3
HUM Course #2			3
HUM Course #3			3
Elective			2
<b>Credit Hours</b>			<b>15</b>
<b>Total Credit Hours</b>			<b>121</b>

<sup>1</sup> Recommended for supplemental science courses and additional electives as needed.

<sup>2</sup> Recommended for required elective credits.

## 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 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.