

# B.S.M.A.S. IN MARINE SCIENCE / BIOLOGY

## Overview

The Marine Science/Biology degree is a Bachelor of Science degree (BSMAS) that is designed to give students a strong background in the structure and function of marine organisms from the cell and molecular level to their role in ecosystem function.

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 at UM focuses on tropical marine and coral reef ecology, fisheries conservation and management, and the use of marine organisms as models for environmental stress and human disease.

The Bachelor of Science double major in Marine Science/Biology prepares students for admission to graduate programs and for careers in teaching and research as well as for technical careers in government and private industries concerned with the oceans.

## Curriculum Requirements

Code	Title	Credit Hours
<b>Marine Science</b>		
MSC 111	Introduction to Marine Science	3
MSC 112	Introduction to Marine Science Lab	1
MSC 215	Chemical Oceanography	3
MBE 230	Introduction to Marine Biology	3
MBE 232	Introduction to Marine Biology Laboratory	1
MSC 301	Introduction to Physical Oceanography	3
MSC 216	Chemical Oceanography Laboratory	1
or MSC 302	Introduction to Physical Oceanography Lab	
Select 12 credit hours of approved Rosenstiel School electives within ATM, GSC, MBE, MSC, OCE or RSM courses <sup>1,2</sup>		12
<b>Other Required Courses</b>		
BIL 150	General Biology	4
BIL 151	General Biology Laboratory	1
BIL 160	Evolution and Biodiversity	4
BIL 161	Evolution and Biodiversity Laboratory	1
BIL 250	Genetics	3
Select three of the following:		9
BIL 255	Cellular and Molecular Biology	
BIL 320	Evolutionary Biology	
BIL 330	Ecology	
BIL 360	Comparative Physiology	
Select 9 credit hours of electives as described for Biology majors <sup>2,3</sup>		9
CHM 121	Principles of Chemistry <sup>4</sup>	4
CHM 113	Chemistry Laboratory I	1
CHM 221	Introduction to Structure and Dynamics	4
CHM 205	Chemical Dynamics Laboratory	1
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.	
MTH 161	Calculus I <sup>5</sup>	4
or MTH 171	Calculus I	
MTH 162	Calculus II (fulfills the Rosenstiel BSMAS quantitative skills requirement)	4
or MTH 172	Calculus II	
MSC 204 or a Statistics/Computer courses for Biology major		3
Select one of the following options: <sup>6</sup>		10
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 or PHY 225	University Physics II Lab University Physics III Lab	
Option 3:		
PHY 101	College Physics I	
PHY 102	College Physics II	
PHY 106	College Physics Laboratory I	
PHY 108	College Physics Laboratory II	
<b>General Education Requirements</b>		
Written Communication Skills:		
WRS 105	First-Year Writing I	3
WRS 107 or WRS 106 or ENG 106	First-Year Writing II: STEM First-Year Writing II Writing About Literature and Culture	3
Quantitative Skills:		
MTH 161 or MTH 171	Calculus I (fulfilled through the major) 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>		
200+ Level Approved Science or Mathematics Elective <sup>7</sup>		3
Additional Elective <sup>8</sup>		1-3
<b>Total Credit Hours</b>		<b>120</b>

<sup>1</sup> At least 6 of which must be at the 300-level or higher. MSC 204 and MSC 425 do not satisfy the Rosenstiel School elective requirement. ATM courses, GSC courses, and courses from other Schools are allowed only if taken from an approved list (<https://undergraduate.rsmas.miami.edu/academics/majors/marine-science-dual-major-programs/>).

<sup>2</sup> One of the following courses may fulfill requirements in both Biology and Marine Science: BIL 333, BIL 337, or an MBE or MSC course from an approved list (<https://undergraduate.rsmas.miami.edu/academics/majors/marine-science-dual-major-programs/>).

<sup>3</sup> The electives must include at least one lab or field course. Up to eight credit hours toward the requirement may be selected from courses with a biological topic within MBE or MSC courses from an approved list (<https://undergraduate.rsmas.miami.edu/academics/majors/marine-science-dual-major-programs/>).

<sup>4</sup> Principles of Chemistry must be passed with a grade of "C-" or higher.

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

<sup>6</sup> Option 1 is recommended for Physics.

<sup>7</sup> CHM 222 and CHM 206 are recommended.

## Suggested Plan of Study

**This is only a sample.** There are numerous ways students can create plans of study for the Marine Science/Biology 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	4
BIL 161	Evolution and Biodiversity Laboratory	1
CHM 121	Principles of Chemistry	4
CHM 113	Chemistry Laboratory I	1
WRS 107	First-Year Writing II: STEM	3
MTH 162	Calculus II	4
	<b>Credit Hours</b>	<b>17</b>
<b>Sophomore Year</b>		
<b>Fall</b>		
MBE 230	Introduction to Marine Biology	3
MBE 232	Introduction to Marine Biology Laboratory	1
GSC 111	Earth System History	4
MSC 204	Environmental Statistics	3
Elective #1		3
	<b>Credit Hours</b>	<b>14</b>
<b>Spring</b>		
MSC 215	Chemical Oceanography	3
MSC 216	Chemical Oceanography Laboratory <sup>1</sup>	1
MSC 203	Foundations of Computational Marine Science <sup>2</sup>	4
BIL 250	Genetics	3
Elective #2		3
Elective #3		3
	<b>Credit Hours</b>	<b>17</b>
<b>Junior Year</b>		
<b>Fall</b>		
MSC Course		3
BIL 255	Cellular and Molecular Biology	3
CHM 221	Introduction to Structure and Dynamics	4
CHM 205	Chemical Dynamics Laboratory	1
PHY 201	University Physics I for the Sciences	4
PHY 106	College Physics Laboratory I	1
	<b>Credit Hours</b>	<b>16</b>
<b>Spring</b>		
BIL 330	Ecology	3
BIL Course		3
PHY 202	University Physics II for the Sciences	4
PHY 108	College Physics Laboratory II	1
Elective #4		3
	<b>Credit Hours</b>	<b>14</b>
<b>Senior Year</b>		
<b>Fall</b>		
MSC 301	Introduction to Physical Oceanography	3

BIL 360	Comparative Physiology	3
Elective #5		3
Elective #6 <sup>3</sup>		3
Science Elective <sup>3</sup>		3
<b>Credit Hours</b>		<b>15</b>
<b>Spring</b>		
MSC Course		3
BIL/MSC Course <sup>4</sup>		3
BIL course		3
Elective #7		3
<b>Credit Hours</b>		<b>12</b>
<b>Total Credit Hours</b>		<b>121</b>

- \* 6 elective courses must include:
- 3 Arts and Humanities Cognate courses
  - 3 People and Society Cognate courses

<sup>1</sup> Students must take one laboratory from MSC 216 or MSC 302.

<sup>2</sup> Recommended elective to take for the Marine Science/Biology major.

<sup>3</sup> CHM 222 and CHM 206 are the recommended choices.

<sup>4</sup> Student will need to take 2 additional elective credits in MSC if the course can be counted for Biology only and not also Marine Science.

## 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 Science at the University of Miami is to graduate students with the ability and desire to integrate knowledge of marine science into their future careers.

## Goals

Students completing this double major will be able to master a broad set of fundamental scientific knowledge in Marine Science and Biology, acquire valuable technical skills and learn how to apply this knowledge to real-world problems, in a time of increasing stress on marine environment. The program will provide the rigor, flexibility, depth and integration to enable students to:

- Design and pursue their course of study that meets requirements of a double major in Marine Science and Biology.
- Learn from the diverse and outstanding group of professors and researchers who are experts in their fields and have active research programs.
- Undertake active research experiences, which will allow them to gain a strong understanding of the scientific process and provide them with a set of valuable experimental and computational skills.
- Prepare themselves for graduate school and for successful careers in public and private industries.

## Student Learning Outcomes

- Students will demonstrate an ability to communicate effectively.
- Students will develop analytical and quantitative skills to allow critical data analysis.
- Students will be able to do carry out supervised research in the field of marine science.