

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

## Overview

The Marine Science/Computer Science degree is a Bachelor of Science degree (BSMAS) that is designed to give students a strong background in ocean modeling and computer science, providing the skills and expertise required for research in applied aspects of ocean science and management.

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 development of algorithms for data capture, visualization and analysis, model development, instrumentation programming and remote sensing applications. .

The Bachelor of Science double major in Marine Science/Computer Science 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
Select two of the following laboratories:		2
MSC 216	Chemical Oceanography Laboratory	
MBE 232	Introduction to Marine Biology Laboratory	
MSC 302	Introduction to Physical Oceanography Lab	
MBE 230	Introduction to Marine Biology	3
MSC 301	Introduction to Physical Oceanography	3
MSC 321	Scientific Computing in Marine and Atmospheric Sciences	3
Select 9 credit hours of approved Rosenstiel School electives within ATM, GSC, MBE, MSC, OCE or RSM courses <sup>1</sup>		9
<b>Other Required Courses</b>		
BIL 150 & BIL 151	General Biology and General Biology Laboratory	5
CHM 121	Principles of Chemistry <sup>2</sup>	4
CHM 113	Chemistry Laboratory I	1
CSC 120	Computer Programming I	4
CSC 220	Computer Programming II	4
CSC 314	Computer Organization and Architecture	3
CSC 322	System Programming	3
CSC 431 or CSC 317	Introduction to Software Engineering Data Structures and Algorithm Analysis	3
Select 6 credit hours of approved electives, as described for Computer Science majors		6
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 or MTH 171	Calculus I <sup>3</sup> Calculus I	4
MTH 162 or MTH 172	Calculus II (fulfills the Rosenstiel BSMAS quantitative skills requirement) <sup>3</sup> Calculus II	4
MTH 210	Introduction to Linear Algebra	3
MTH 309	Discrete Mathematics I	3
MTH 311	Introduction to Ordinary Differential Equations	3
MSC 204 or MTH 224	Environmental Statistics Introduction to Probability and Statistics	3

Select one of the following options:	10	
<b>Option 1:</b>		
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	
<b>Option 2:</b>		
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	
<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>		
300+ Level Elective		3
<b>Total Credit Hours</b>		<b>120</b>

<sup>1</sup> At least 3 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> Principles of Chemistry must be passed with a grade of "C-" or higher.

<sup>3</sup> Calculus I and II must be passed with a grade of "C-" or higher.

## Suggested Plan of Study

**This is only a sample.** There are numerous ways students can create plans of study for the Marine Science/Computer Science 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.

Freshman Year		Credit Hours
<b>Fall</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>		
CSC 120	Computer Programming I	4
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>16</b>
<b>Sophomore Year</b>		
<b>Fall</b>		
MSC 215	Chemical Oceanography	3
MSC 216	Chemical Oceanography Laboratory <sup>1</sup>	1
CSC 220	Computer Programming II	4
PHY 201	University Physics I for the Sciences	4
PHY 106	College Physics Laboratory I	1
<b>Credit Hours</b>		<b>13</b>
<b>Spring</b>		
MBE 230	Introduction to Marine Biology	3
CSC 314	Computer Organization and Architecture	3
MTH 311	Introduction to Ordinary Differential Equations	3
PHY 202	University Physics II for the Sciences	4
PHY 108	College Physics Laboratory II	1
Elective #1		3
<b>Credit Hours</b>		<b>17</b>
<b>Junior Year</b>		
<b>Fall</b>		
MSC 301	Introduction to Physical Oceanography	3
CSC Course		3
MTH 210	Introduction to Linear Algebra	3
MTH 309	Discrete Mathematics I	3
Elective #2		3
<b>Credit Hours</b>		<b>15</b>
<b>Spring</b>		
MSC 302	Introduction to Physical Oceanography Lab <sup>1</sup>	1
MSC 321	Scientific Computing in Marine and Atmospheric Sciences	3
MSC Course		3
CSC 317	Data Structures and Algorithm Analysis	3
CSC 322	System Programming	3
MSC 204	Environmental Statistics	3
<b>Credit Hours</b>		<b>16</b>
<b>Senior Year</b>		
<b>Fall</b>		
MSC Course		3
CSC Course		3
300 level or higher elective		3
Elective #3		3
Elective #4		3
<b>Credit Hours</b>		<b>15</b>
<b>Spring</b>		
MSC Course		3
GSC 111	Earth System History	4
Elective #5		3
Elective #6		3
<b>Credit Hours</b>		<b>13</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 two laboratories from MSC 216, MBE 232 or MSC 302.

## 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 Computer Science, acquire valuable technical skills and learn how to apply this knowledge to real-world problems, in a time of rapidly increasing use of computational resources and methods in science and industry. 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 Computer Science.
- 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.