

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

## Overview

The Marine Science/Chemistry degree is a Bachelor of Science degree (BSMAS) that is designed to give students a strong background in biogeochemical cycling of nutrients, the impact and fate of marine pollutants, marine geochemistry and ocean/atmosphere interactions.

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 the role of ocean processes in carbon cycling and global climate change.

The Bachelor of Science double major in Marine Science/Chemistry 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 Requirements</b>		
MSC 111	Introduction to Marine Science	3
MSC 112	Introduction to Marine Science Lab	1
MSC 215	Chemical Oceanography	3
MSC 216	Chemical Oceanography Laboratory	1
MBE 230	Introduction to Marine Biology	3
MSC 301	Introduction to Physical Oceanography <sup>1</sup>	3
MBE 232 or MSC 302	Introduction to Marine Biology Laboratory Introduction to Physical Oceanography Lab	1
Select 6 credit hours of approved Rosenstiel School electives within ATM, GSC, MBE, MSC, OCE or RSM courses <sup>2</sup>		6
MSC chemistry elective course from approved list <sup>3</sup>		3
<b>Chemistry Requirements</b>		
CHM 121	Principles of Chemistry	4
CHM 113	Chemistry Laboratory I	1
CHM 221	Introduction to Structure and Dynamics	4
CHM 205	Chemical Dynamics Laboratory	1
CHM 222	Organic Reactions and Synthesis	4
CHM 206	Organic Reactions and Synthesis Laboratory	2
CHM 214	Quantitative Analytical Chemistry	3
CHM 320	Instrumental Methods in Chemistry and Biochemistry	2
CHM 360	Physical Chemistry I (Lecture)	3
CHM 364	Physical Chemistry (Laboratory I)	1
CHM 365	Physical Chemistry II (Lecture)	3
CHM 401	Environmental Chemistry	3
CHM 441	Inorganic Chemistry (Lecture)	3
Select one of the following Chemistry electives:		3
CHM 316	Instrumental Analytical Chemistry	
CHM 317	The Chemistry of Food and Taste.	
Any 500-level Chemistry course as described for Chemistry BS majors		
<b>Biochemistry and Molecular Biology Requirement</b>		
BMB 401	Biochemistry for the Biomedical Sciences	4
<b>Biology Requirements</b>		
BIL 150 & BIL 151	General Biology and General Biology Laboratory	5
<b>Geological Sciences Requirement <sup>5</sup></b>		<b>3-4</b>
Select one of the following:		
GSC 110	The Earth System	
GSC 111	Earth System History	
MSC 424	Origin and Geology of the Galapagos Islands. (Approval Required) <sup>5</sup>	

<b>Mathematics Requirements</b>		
MTH 161 or MTH 171	Calculus I <sup>4</sup> Calculus I	4
MTH 162 or MTH 172	Calculus II (fulfills the Rosenstiel BSMAS quantitative skills requirement) Calculus II	4
<b>Statistics Requirement</b>		
MSC 204 or MTH 224	Environmental Statistics Introduction to Probability and Statistics	3
<b>Computational Science Requirement</b>		
MSC 203 or CSC 120	Foundations of Computational Marine Science Computer Programming I	4
<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 or PHY 225	University Physics II Lab University Physics III Lab	
<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>Total Credit Hours</b>		<b>122-123</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 approved Rosenstiel School electives.

<sup>2</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>3</sup> An upper-level Rosenstiel School course with Chemistry topics, including MSC 317, MSC 402, MSC 417, MSC 419, OCE 512, and OCE 522.

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

<sup>5</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 122 credits. All other students will need to complete 123 credits.

## Suggested Plan of Study

**This is only a sample.** There are numerous ways students can create plans of study for the Marine Science/Chemistry 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>Credit Hours</b>
<b>Fall</b>		
MSC 111	Introduction to Marine Science	3
MSC 112	Introduction to Marine Science Lab	1
CHM 121	Principles of Chemistry	4
CHM 113	Chemistry Laboratory I	1
WRS 105	First-Year Writing I	3
MTH 161	Calculus I	4
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
MSC 215	Chemical Oceanography	3
MSC 216	Chemical Oceanography Laboratory	1
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>		
BIL 150	General Biology	4
BIL 151	General Biology Laboratory	1
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	Physics Laboratory 1	1
<b>Credit Hours</b>		<b>15</b>
<b>Spring</b>		
MSC 301	Introduction to Physical Oceanography	3
CHM 222	Organic Reactions and Synthesis	4
CHM 206	Organic Reactions and Synthesis Laboratory	2
PHY 202	University Physics II for the Sciences	4
PHY 108	Physics Laboratory 2	1
MSC 204	Environmental Statistics	3
<b>Credit Hours</b>		<b>17</b>
<b>Junior Year</b>		
<b>Fall</b>		
MSC 203	Foundations of Computational Marine Science	4
MBE 230	Introduction to Marine Biology	3
MBE 232	Introduction to Marine Biology Laboratory	1
CHM 214	Quantitative Analytical Chemistry	3
CHM 360	Physical Chemistry I (Lecture)	3
CHM 364	Physical Chemistry (Laboratory I)	1
<b>Credit Hours</b>		<b>15</b>
<b>Spring</b>		
CHM 317	The Chemistry of Food and Taste.	3
CHM 320	Instrumental Methods in Chemistry and Biochemistry	2
CHM 365	Physical Chemistry II (Lecture)	3
A&H Cognate Course #1		3

A&H Cognate Course #2		3
<b>Credit Hours</b>		<b>14</b>
<b>Senior Year</b>		
<b>Fall</b>		
CHM 401	Environmental Chemistry	3
BMB 401	Biochemistry for the Biomedical Sciences	4
MSC Course		3
A&H Cognate Course #3		3
P&S Cognate Course #1		3
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
CHM 441	Inorganic Chemistry (Lecture)	3
MSC Course		3
CHM/MSC Elective		3
P&S Cognate Course #2		3
P&S Cognate Course #3		3
<b>Credit Hours</b>		<b>15</b>
<b>Total Credit Hours</b>		<b>123</b>

<sup>1</sup> Students must take one laboratory from 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 Chemistry, acquire valuable technical skills and learn how to apply this knowledge to real-world problems, in light of increasing societal issues facing humanity today. 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 Chemistry.
- 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.
- Students will be able to present and synthesize background information from scientific literature and report findings from their laboratory experiments or observations from their field work.