

B.S.M.A.S. IN MARINE BIOLOGY AND ECOLOGY

Overview

The Marine Biology and Ecology degree is a Bachelor of Science degree (BSMAS) and is designed to give students a strong background in biology and quantitative skills, as well as research experience in biomedicine, genomics, evolution, physiology, microbiology, immunology, and ecology. The strength of the Marine Biology & Ecology program is the opportunity for undergraduates to fully participate in research with Marine Biology and Ecology diverse faculty. These research opportunities provide skills to excel in medicine, graduate school, and other diverse fields.

Curriculum Requirements

Code	Title	Credit Hours
Marine Science & Marine Biology		
MSC 111	Introduction to Marine Science	3
MSC 112	Introduction to Marine Science Lab	1
MBE 230	Introduction to Marine Biology	3
MBE 232	Introduction to Marine Biology Laboratory	1
Marine Biology & Ecology		
MBE 306 or MBE 366 or MSC 422	Marine Ecology ¹ Tropical Coastal Ecosystems Marine Ecology of the Galapagos	3
MBE 307	Physiology of Marine Organisms ¹	3
MBE 308	Genetics and Evolution ¹	3
MBE 329 or MBE 323	Marine Vertebrate Zoology Invertebrate Zoology	3-4
Select 16 credit hours of approved electives in Marine Biology and Ecology at the 300-level or above which must include research ²		16
Other Required Courses		
BIL 150 & BIL 151	General Biology and General Biology Laboratory	5
BIL 160 & BIL 161	Evolution and Biodiversity and Evolution and Biodiversity Laboratory	5
BIL 255	Cellular and Molecular Biology	3
CHM 121	Principles of Chemistry ³	4
CHM 221	Introduction to Structure and Dynamics	4
Select one of the following:		3-4
MSC 203	Foundations of Computational Marine Science	
MBE 326	Marine Genomics	
MBE 536	Object-Oriented Programming and Agent-Based Modelling	
CSC 120	Computer Programming I	
or Approved Computer Science course ⁴		
Select 15 to 18 credit hours of approved minor or in additional STEM electives ⁵		15-18
Select one of the following:		3-4
GSC 111	Earth System History	
GSC 110	The Earth System	
MSC 215	Chemical Oceanography	
MSC 301	Introduction to Physical Oceanography	
MSC 424	Origin and Geology of the Galapagos Islands.	
MTH 161 or MTH 171	Calculus I ⁶ Calculus I	4
MTH 162 or MTH 172	Calculus II (fulfills the Rosenstiel BSMAS quantitative skills requirement) Calculus II	4
Select one of the following:		3

MSC 204	Environmental Statistics	
BIL 511	Advanced Biostatistics	
MTH 224	Introduction to Probability and Statistics	
PSY 292	Introduction to Biobehavioral Statistics Section B	
Select one of the following options: ⁷		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 106	College Physics Laboratory I	
PHY 102	College Physics II	
PHY 108	College Physics Laboratory II	
General Education Requirements		
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)		
Total Credit Hours		123

¹ Equivalent Biology course with permission.

² Research requirement can be satisfied by taking 17 credits in Saltwater Semester, study abroad (e.g., Galapagos) or 4 independent research credits, including a minimum of 3 credits in MBE 411/MSC 411 and one credit in MBE 412/MSC 412 (thesis research).

- **Saltwater Semester** (SWS) fulfills MBE research requirement. SWS is a full semester (17 credits) at the Marine campus doing authentic field and laboratory research with lectures to enhance learning and the practical importance of scientific research. All courses are research intensive (much of the day is working in the field or laboratory) and involve authentic research. Students will do novel experiments focused on course concepts.

³ Principles of Chemistry must be passed with a grade of "C-" or higher. Chemistry laboratories will count as STEM electives and should be taken by Pre-Medical and Pre-Veterinarian students.

⁴ Computer science or programming course as approved by MBE academic advisor.

⁵ 15 to 18 credits in an approved minor in any field of the student's choice or 15 to 18 credits in STEM electives (MBE, MSC, BIL, BMB, NEU, MIC, CHM, CSC, GSC, MTH, and PHY). If approved minor is less than 15 credits, remaining credits can be taken in any field of study.

⁶ Calculus I must be passed with a grade of "C-" or higher.

⁷ Option 1 is recommended for Physics.

Suggested Plan of Study

This is only a sample. There are numerous ways students can create plans of study for the Marine Biology and Ecology 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		
Fall		Credit Hours
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
	Credit Hours	16
Spring		
BIL 160	Evolution and Biodiversity	4
BIL 161	Evolution and Biodiversity Laboratory	1
CHM 121	Principles of Chemistry	4
WRS 107	First-Year Writing II: STEM	3
MTH 162	Calculus II	4
	Credit Hours	16
Sophomore Year		
Fall		
MBE 230	Introduction to Marine Biology	3
MBE 232	Introduction to Marine Biology Laboratory	1
BIL 255	Cellular and Molecular Biology	3
CHM 221	Introduction to Structure and Dynamics	4
MSC 204	Environmental Statistics	3
A&H Course #1		3
	Credit Hours	17
Spring		
	or other Approved Computer Science course	
MBE 306	Marine Ecology	3
MBE 307	Physiology of Marine Organisms	3
MBE 308	Genetics and Evolution	3
CSC 120	Computer Programming I	4
GSC 111	Earth System History	4
	Credit Hours	17
Junior Year		
Fall		
Saltwater Semester. 16 credit Research Intensive Courses: Lab and Lectures.		16
	Credit Hours	16
Spring		
MBE 329	Marine Vertebrate Zoology	3
Minor course or STEM Elective #1		3
A&H Course #2		3
P&S Course #1		3
P&S Course #2		3
	Credit Hours	15
Senior Year		
Fall		
PHY 201	University Physics I for the Sciences	4

PHY 106	College Physics Laboratory I	1
Minor course or STEM Elective #2		3
Minor course or STEM Elective #3		3
A&H Course #3		3
P&S Course #3		3
Credit Hours		17
Spring		
PHY 202	University Physics II for the Sciences	4
PHY 108	College Physics Laboratory II	1
Minor course or STEM Elective #4		3
Minor course or STEM Elective #5		3
Minor course or STEM Elective #6		3
Credit Hours		14
Total Credit Hours		128

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 Biology and Ecology at the University of Miami is to graduate students with the ability to integrate knowledge of the marine system, and its biota, ecology, physiology, and genetics to provide students a foundation for successful careers.

Goals

The MBE departmental major curriculum will provide the rigor, flexibility, depth and integration to enable students to:

- Design their course of study that provides both depth and breadth in marine biology and ecology and science related courses.
- Undertake active research experiences, which will allow them to gain a strong understanding of the scientific process.
- Learn from the diverse and outstanding group of professors, researchers, and classmates.
- Prepare themselves for the public and private sector employment, graduate school, and successful careers.

Student Learning Outcomes

Students completing the MBE departmental major will be able to:

- Master a broad set of fundamental biological knowledge including how to search for, understand the primary scientific literature, and understand how fundamental biological principles relate to the marine environment.
- Solve problems competently by identifying the relevant features of the problem and developing a strategy to solve the problem.
- Use computers and computational approaches to acquire and process data as well as use software to analyze data.
- Understand and synthesize the objectives of research experiments, properly conduct experiments, and appropriately record, analyze, and communicate the results.
- Effectively communicate the concepts, results, and implications of their laboratory experiments and independent research both orally and in the written form to experts in the field, scientists in other disciplines, and the general public.