B.S.M.A.S. IN MARINE SCIENCE / MICROBIOLOGY AND IMMUNOLOGY

Marine Science/Microbiology and Immunology

The Marine Science/Microbiology and Immunology degree is a Bachelor of Science degree (BSMAS) that is designed to give students a strong background in molecular and cellular aspects of microbial pathogenesis and immune defenses. The ocean, which is teeming with microbes, is explored to highlight the complex biological interactions between microbes and their hosts and the environmental factors that influence these relationships. This program is ideal for students interested in the relationship between the ocean and human health and medicine as well as those interested in pursuing a pre-medical or pre-veterinary track.

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 encompasses ocean and human health, medicine, and molecular and cellular aspects of microbial pathogenesis and immune defenses.

The Bachelor of Science double major in Marine Science/Microbiology and Immunology 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
Marine Science		
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 RSMAS electives within MBE, MSC, OCE or RSM courses [1, 2]		12
Required Microbiology and Immunology Courses		**11**
Take the following:		
MIC 301	Introduction to Microbes and the Immune System	
MIC 304	Introduction to Microbes and the Immune System (Lab)	
Select one of the following:		
MIC 319	Innate Immunity	
MIC 321	Immunobiology	
Select one of the following:		
MIC 201	Modern Plagues and Society	
MIC 322	Medical Parasitology	
MIC 323	Microbial Pathogenesis and Physiology	
MIC 436	Fundamental and Medical Virology	
Microbiology and Immunology Approved Electives		**13**
MIC 201	Modern Plagues and Society	
MIC 319	Innate Immunity	
MIC 321	Immunobiology	
MIC 322	Medical Parasitology	
MIC 323	Microbial Pathogenesis and Physiology	
MIC 436	Fundamental and Medical Virology	
MIC 441	Microbiology and Immunology Colloquium	
MIC 460	Advanced Topics in Microbiology and Immunology	
Only 6 credit hours of Research in MIC may be applied toward the 16 MIC elective hours, any credits over 6 count as elective credits toward the 120 credits required for graduation or 150 credits for dual degree seeking students.		
MIC 451	Special Projects in Immunobiology	

MIC 452	Special Projects in Parasitology	
MIC 453	Special Projects in Pathogenic Bacteriology	
MIC 454	Special Projects in Microbial Genetics	
MIC 455	Special Projects in Immunogenetics	
MIC 456	Special Projects in Virology	
Maximum of 2 course from outside electives can count towards the 13 MIC elective hours		
BIL 255	Cellular and Molecular Biology	
or BIL 250	Genetics	
MBE 465	Marine Comparative Immunology [2]	
or GSC 309	Microbes and the Environment	
Additional Required Courses		
BIL 150	General Biology	4
BIL 151	General Biology Laboratory	1
BIL 160	Evolution and Biodiversity	4
BIL 161	Evolution and Biodiversity Laboratory	1
BMB 401	Biochemistry for the Biomedical Sciences	4
CHM 121	Principles of Chemistry [3]	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
MTH 161	Calculus I [4]	4
or MTH 171	Calculus I	
MTH 162	Calculus II	4
or MTH 172	Calculus II	
ENG 105	English Composition I	3
ENG 107	English Composition II: Science and Technology	3
or ENG 106	English Composition II	
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.	
Select one of the following:		3-4
MSC 204	Environmental Statistics	
MTH 224	Introduction to Probability and Statistics	
MSC 203	Foundations of Computational Marine Science	
CSC 120	Computer Programming I	
Select one of the following options: [5]		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	University Physics II Lab	
or PHY 225	University Physics III Lab	
Option 3:		

PHY 101 & PHY 106	College Physics I and College Physics Laboratory I	
PHY 102 & PHY 108	College Physics II and College Physics Laboratory II	
Electives		
Arts and Humanities Cognate Courses		9
People and Society Cognate Courses		9
Total Credit Hours		**129-131**

1 At least 6 of which must be at the 300-level or higher. MSC 204, MSC 425 and RSM 567 do not satisfy the MSC elective requirement. 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/).

2 MBE 465 or GSC 309 may double count as both Marine Science and Microbiology and Immunology upper level electives.

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

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

5 Option 1 is recommended for Physics.

Suggested Plan 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
ENG 105	English Composition I	3
MTH 161	Calculus I	4
	Credit Hours	**16**
Spring		
MIC 301	Introduction to Microbes and the Immune System	3
CHM 121	Principles of Chemistry	4
CHM 113	Chemistry Laboratory I	1
ENG 107	English Composition II: Science and Technology	3
MTH 162	Calculus II	4
	Credit Hours	**15**
Sophomore Year		
Fall		
MBE 230	Introduction to Marine Biology	3
MBE 232	Introduction to Marine Biology Laboratory	1
MIC 304	Introduction to Microbes and the Immune System (Lab)	2
GSC 111	Earth System History	4
MSC 204	Environmental Statistics	3
Elective #1		3
	Credit Hours	**16**
Spring		
MIC 321	Immunobiology	3
MIC 323	Microbial Pathogenesis and Physiology	3
BIL 160	Evolution and Biodiversity	4
BIL 161	Evolution and Biodiversity Laboratory	1
CHM 221	Introduction to Structure and Dynamics	4
CHM 205	Chemical Dynamics Laboratory	1
	Credit Hours	**16**

Junior Year		
Fall		
MSC Course		3
MIC Approved Elective		3
CHM 222	Organic Reactions and Synthesis	4
CHM 206	Organic Reactions and Synthesis Laboratory	2
PHY 201	University Physics I for the Sciences	4
PHY 106	College Physics Laboratory I	1
	Credit Hours	**17**
Spring		
MSC 215	Chemical Oceanography	3
MSC 301	Introduction to Physical Oceanography	3
MIC Approved Elective		3
PHY 202	University Physics II for the Sciences	4
PHY 108	College Physics Laboratory II	1
Elective #2		3
	Credit Hours	**17**
Senior Year		
Fall		
MSC 216	Chemical Oceanography Laboratory [1]	1
MBE 465	Marine Comparative Immunology	3
BMB 401	Biochemistry for the Biomedical Sciences	4
MSC Course		3
Elective #3		3
	Credit Hours	**14**
Spring		
MSC Course		3
MIC Approved Elective		4
ELecitve #4		3
Elective #5		3
Elective # 6		3
	Credit Hours	**16**
	Total Credit Hours	**127**

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

[1] Students must take one laboratory fromMSC 216 or MSC 302.

Mission

The mission of the Rosenstiel School of Marine and Atmospheric 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 Microbiology and Immunology, acquire valuable technical skills and learn how to apply this knowledge to real-world problems, in light of increasing stress on environment and human health. 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 Microbiology and Immunology.
- 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.