

# M.P.S. IN OCEAN SCIENCES

## Overview

The MPS in Ocean Sciences program offers two tracks: Applied Remote Sensing and Natural Hazards and Catastrophes.

### Applied Remote Sensing Track

The routine use of remote sensing techniques has become an indispensable element of many activities in our modern world. A huge variety of sensors on satellites, airplanes, unmanned aerial vehicles (“drones”), and other platforms provide data for a variety of applications on a regular basis. The Applied Remote Sensing (<https://mps.rsmas.miami.edu/degree-tracks/applied-remote-sensing/>) track offered by the Rosenstiel School of Marine, Atmospheric and Earth Science and Center for Southeastern Tropical Advanced Remote Sensing (<https://www.rsmas.miami.edu/research/centers/cstars/>) (CSTARS) provides theoretical knowledge and experiential learning for careers in the field of remote sensing in both public and private sectors. Working professionals in this field may also acquire additional training to expand their current knowledge and skillset.

### Natural Hazards and Catastrophes Track

The Rosenstiel School of Marine, Atmospheric and Earth Science conducts world-class research on the earth systems responsible for natural disasters, including the atmosphere, the ocean and solid earth. To meet society’s need for a skilled workforce, the Natural Hazards and Catastrophes (<https://www.mps.rsmas.miami.edu/degree-tracks/natural-hazards-and-catastrophes/>) track offers an educational opportunity for students seeking to fill positions offered by the private and civil sectors to assess risks and exposures associated with natural hazards.

## Admission Requirements

### Prerequisites:

1. Bachelor of Science degree (B.S.) or Bachelor of Arts degree (B.A.)

*Note to students: Deficiencies in required coursework may be considered on a case by case basis for otherwise highly qualified students or those demonstrating experience with these skills.*

All application requirements are available here (<https://mps.rsmas.miami.edu/prospective-students/admissions/>).

### Applied Remote Sensing Track

#### Additional Prerequisites:

1. Bachelor of Science degree (B.S.) in Mathematics, Physics, Geosciences, Engineering or an equivalent degree.
2. Successful completion of the following (or equivalent) undergraduate courses: Calculus, Statistics, Physics, Computer Programming (Matlab, IDL, C, or Fortran).

### Natural Hazards and Catastrophes Track

#### Additional Prerequisites:

1. Bachelor of Science degree (B.S.) or Bachelor of Arts degree (B.A.)
2. At least one of the following: one semester of Statistics or Calculus or 6 credits in Geoscience

## Curriculum Requirements

### Applied Remote Sensing Track

Code	Title	Credit Hours
OCE 606	Introduction to Ocean Remote Sensing	3
OCE 707	Advanced Ocean Remote Sensing	3
OCE 603	Physical Oceanography	3
OCE 608	Introduction to Ocean Systems Engineering	3
OCE 637	Natural Hazards: Atmosphere and Ocean (or ELECTIVE)	3
OCE 676	Wave Propagation in the Ocean Environment	3
EVR 660 & EVR 661	Introduction to Marine Geographic Information Systems and Introduction to Marine Geographic Information Systems - Laboratory (or ELECTIVE)	3
RSM 612	Statistics for Marine Scientists (or ELECTIVE)	3
OCE 805	MPS Internship <sup>1</sup>	2-6
<b>Total Credit Hours</b>		<b>30</b>

<sup>1</sup> Enrollment in 2 - 6 internship credits required during a student's time in MPS. Completion of less than 2 internship credits must be approved by MPS Director. Typically 2 semesters are needed to complete all aspects of the internship phase of MPS.

### Elective Options

Students may take any elective on the RSMAS campus with the consent of their faculty advisor. Below are a few examples of courses past students in this program used as electives.

Code	Title	Credit Hours
ATM 651	Introduction to Atmospheric Dynamics	3
ATM 662	Advanced Weather Forecasting	3
MBE 615	Tropical Marine Ecology	3
EVR 602	Economics of Natural Resources	3
EVR 610	Environmental Planning and the Environmental Impact Statement	3
EVR 616	Ocean Policy	3
EVR 620	Environmental Law and Policy	3
EVR 630	Port Operations and Policy	3
EVR 633	Decision Analysis: Natural Hazards and Catastrophes	3
EVR 677	Management and Conservation of Marine Ecosystems	3
EVR 720	Coastal Law and Policy	3
MGS 634	Hydrological Hazards	3
MGS 635	Geological Hazards	3
OCE 624	Applied Data Analysis	3
OCE 651	Applied Ocean Acoustics and Marine Mammals	3
OCE 705	Chemical Oceanography	3
OCE 790	Mechanics and Thermodynamics of the Air-Sea Interface	3

## Curriculum Requirements

### Natural Hazards and Catastrophes Track

Code	Title	Credit Hours
RSM 612 or EVR 624	Statistics for Marine Scientists Statistics and Data Analysis for Environmental Science and Policy	3
EVR 620	Environmental Law and Policy (or ELECTIVE)	3
EVR 633	Decision Analysis: Natural Hazards and Catastrophes	3
MGS 635	Geological Hazards	3
OCE 637	Natural Hazards: Atmosphere and Ocean	3
MGS 634	Hydrological Hazards	3
EVR 660 & EVR 661	Introduction to Marine Geographic Information Systems and Introduction to Marine Geographic Information Systems - Laboratory	3
RSM 613	Statistical Modeling of Extreme and Rare Events (or ELECTIVE)	3
OCE 805	MPS Internship <sup>1</sup>	2-6
<b>Total Credit Hours</b>		<b>30</b>

<sup>1</sup> Enrollment in 2 - 6 internship credits required during a student's time in MPS. Completion of less than 2 internship credits must be approved by MPS Director. Typically 2 semesters are needed to complete all aspects of the internship phase of MPS.

### Elective Options

Students may substitute elective coursework for one or more of the above courses with the consent of their faculty advisor. Below are a few examples of courses past students in this program used as electives.

Code	Title	Credit Hours
OCE 676	Wave Propagation in the Ocean Environment	3
ATM 765	General Circulation of the Atmosphere	3

ATM 731	Air-Sea Interaction	3
EVR 720	Coastal Law and Policy	3
EVR 618	Coastal Zone Management	3
EVR 620	Environmental Law and Policy	3
EVR 610	Environmental Planning and the Environmental Impact Statement	3
MGS 614	Geophysics	3
EPH 612	Global Health	3
EPH 600	Introduction to the Science Practice of Public Health	3
ATM 651	Introduction to Atmospheric Dynamics	3
EVR 630	Port Operations and Policy	3
MGS 679	Plate Tectonics	3
OCE 606	Introduction to Ocean Remote Sensing	3
MSC 321	Scientific Computing in Marine and Atmospheric Sciences	3
CAE 660	Sustainable Construction	3
EPH 640	Urban Environment and Public Health	3
CAE 630	Water Resources Engineering II	3
OCE 721	Waves and Tides I	3
OCE 624	Applied Data Analysis	3

## Suggested Plan of Study

### Applied Remote Sensing Track

Year One		Credit Hours
<b>Fall</b>		
OCE 642		3
OCE 686		3
RSM 612	Statistics for Marine Scientists *	3
MGS 635	Geological Hazards	3
<b>Credit Hours</b>		<b>12</b>
<b>Spring</b>		
OCE 643		3
OCE 687		3
OCE 637	Natural Hazards: Atmosphere and Ocean *	3
EVR 660 & EVR 661	Introduction to Marine Geographic Information Systems and Introduction to Marine Geographic Information Systems - Laboratory	3
<b>Credit Hours</b>		<b>12</b>
<b>Summer</b>		
OCE 805	MPS Internship <sup>1</sup>	2-6
<b>Credit Hours</b>		<b>6</b>
<b>Total Credit Hours</b>		<b>30</b>

\* or Elective

<sup>1</sup> Enrollment in 2 - 6 internship credits required during a student's time in MPS. Completion of less than 2 internship credits must be approved by MPS Director. Typically 2 semesters are needed to complete all aspects of the internship phase of MPS.

## Suggested Plan of Study

### Natural Hazards and Catastrophes Track

Year One		Credit Hours
<b>Fall</b>		
RSM 612 or EVR 624	Statistics for Marine Scientists or Statistics and Data Analysis for Environmental Science and Policy	3
EVR 620	Environmental Law and Policy *	3
EVR 633	Decision Analysis: Natural Hazards and Catastrophes	3

MGS 635	Geological Hazards	3
<b>Credit Hours</b>		<b>12</b>
<b>Spring</b>		
OCE 637	Natural Hazards: Atmosphere and Ocean	3
MGS 634	Hydrological Hazards	3
EVR 660 & EVR 661	Introduction to Marine Geographic Information Systems and Introduction to Marine Geographic Information Systems - Laboratory <sup>1</sup>	3
RSM 613	Statistical Modeling of Extreme and Rare Events <sup>*</sup>	3
<b>Credit Hours</b>		<b>12</b>
<b>Summer</b>		
OCE 805	MPS Internship <sup>2</sup>	2-6
<b>Credit Hours</b>		<b>6</b>
<b>Total Credit Hours</b>		<b>30</b>

\* or Elective

<sup>1</sup> Can be taken in Fall or Spring

<sup>2</sup> Enrollment in 2 - 6 internship credits required during a student's time in MPS. Completion of less than 2 internship credits must be approved by MPS Director. Typically 2 semesters are needed to complete all aspects of the internship phase of MPS.

## Mission

### Applied Remote Sensing Track

The Applied Remote Sensing (<https://mps.rsmas.miami.edu/degree-tracks/applied-remote-sensing/>) track, in conjunction with the Center for Southeastern Tropical Advanced Remote Sensing (<https://www.rsmas.miami.edu/research/centers/cstars/>) (CSTARS) provides students with theoretical knowledge and practical, real-world experiences geared towards a successful career in the field of remote sensing in both public and private sectors. This program is also appropriate for those already in the workforce who require additional training or are looking to expand upon their knowledge and skills.

### Natural Hazards and Catastrophe Track

The mission of the Natural Hazards and Catastrophes track is to provide students with the skills and knowledge necessary to understand earth system natural hazards (atmospheric, oceanic, geological and hydrological) and the data analytics tools required to assess the associated risks. The strategic selection of electives exposes students to legal and regulatory knowledge, communication and media training, and the development of project management skills, all designed to prepare them to address these challenges as future global leaders. The Natural Hazards and Catastrophes track prepares its students for employment in several sectors, including insurance and re-insurance industry, architecture, emergency management, engineering, public health and science.

## Student Learning Outcomes

- Students will demonstrate professionalism in all aspects of field and lab work during their internships.
- Students will write up a final report and deliver a final presentation based on the work completed in their internship.

### Applied Remote Sensing Track

- Applied Remote Sensing students will learn theoretical knowledge and practical skills using a variety of remote sensing instruments to produce, measure, and interpret data from high-resolution satellite images for application to various end-users in the private and public sectors.

### Natural Hazards and Catastrophes Track

- Students will understand earth system natural hazards (atmospheric, oceanic, geological and hydrological) and apply data analytics tools (e.g. statistics, data management, programming, GIS, and remote sensing) required to assess associated risks. In addition, students will develop project management skills, understand the legal and regulatory frameworks and regulations, apply communication and media training to address earth system natural hazards.