

Master of Professional Science



ABOUT THE PROGRAM

The Master of Professional Science (MPS) program prepares students for science careers in industry, government, and non-profit organizations, where employment demands are growing. MPS degrees were developed and implemented nationally in response to employer demands for well-rounded, highly trained employees with a breadth of knowledge and practical skills to address emerging environmental issues and improve the management of natural and cultural resources. The curriculum is structured to allow students to complete their degree in as little as 12 months, with the training and real-world experience necessary to prepare them for careers in today's professional science job market.

BACKGROUND

In 1997, the Alfred P. Sloan Foundation helped launch the first Professional Science Masters degree in response to a growing need for a workforce with science and interdisciplinary training that was not being met by traditional research-based graduate education. Their goal was to better prepare scientists for employment in new and emerging industries that lie at the intersection of science and business, law, media, and other non-traditional fields. As described by Dr. Rita Colwell, former director of the National Science Foundation, MPS programs "aim to engage students with professional goals and help them become scientists uniquely suited to the 21st-century workplace, equipped with a deeper and broader scientific knowledge than that acquired with a Bachelor of Science degree and the skills to apply it."

MPS degrees give students a distinct advantage of obtaining employment in their field of study and gaining salaries once employed. The private industry and government agencies have both testified to the need for employees with these skills and, according to a recent National Research Council study in 2008, the salaries of those who hold master's degrees in science and engineering have grown faster over the last 10 years than salaries of those with either BS or PhD degrees.



FISHERIES MANAGEMENT AND CONSERVATION

Fisheries Management and Conservation supports the management of marine resources by providing the public with quantitative knowledge and modeling of the natural and anthropogenic processes that regulate the dynamics and functioning of fishery ecosystems and by providing predictions on the future behavior of such systems. The Fisheries Management and Conservation track is a unique, academic track that allows students to develop the professional skills required to be a fishery scientist with curriculum options in various relevant areas of interest, such as fishery management, fishery surveys, and quantitative fisheries. Respectively, students will learn about: the processes influencing fisheries management and the development of fisheries policy alternatives, develop knowledge about the statistical design and implementation of fishery surveys and monitoring programs, and apply advanced statistical and mathematical modeling tools in support of fishery stock assessments. Graduates with these skills find employment in government agencies, such as the National Marine Fisheries Service, state agencies, fishery councils, regional NOAA laboratories, and Non-Governmental Organizations.

FISHERIES MANAGEMENT AND CONSERVATION

Fall Semester	Spring Semester
Fisheries Ecology and Oceanography (RSM 665)	Marine Population Assessment Surveys and Analysis (MES 645)
Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661)	Marine Population Biology Processes and Modeling (MES 646)
Biometrics in Marine Science (MES 608)	Fisheries Ecosystems: Management and Conservation of Marine Ecosystems (MES 677)
Fisheries Socioeconomics and Management (MES 625)/Or ELECTIVE	International Ocean Law & Governance (MES 710)/Or ELECTIVE

MARINE MAMMAL SCIENCE

Advances in the care and conservation of marine mammals have progressed dramatically over the last decade with the development of a greater understanding of marine mammal biology, behavior, and physiology, as well as improved diagnostic and assessment tools and techniques. Students in this degree track will be part of one of the select programs in the nation designed to prepare them for employment in marine mammal management (including associated ecosystems), population assessments, acoustics, and care. Coursework will integrate topics such as marine mammal medicine and pathology, medical diagnostics and laboratory analysis, population assessment and management, state and federal regulations, applied ocean acoustics, research, education, and applied behavior analysis. Students will have the opportunity to interact with medical, training, and research experts in our community, as well as conduct an internship at one of many marine mammal rehab, managed care, or research facilities. As part of the practical training incorporated into the Marine Mammal Science curriculum, most students will participate in mark-recapture surveys, public education, wild health assessments, behavior analysis and modification studies, clinical care and diagnostics, necropsies, and regional and national conferences.

MARINE MAMMAL SCIENCE

Fall Semester	Spring Semester
Biology of Marine Mammals (MBE 604)	Marine Mammal Disease and Medicine (MBE 605)
Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661)	Research Techniques in Marine Mammal Science (MBE 632)/Or ELECTIVE
Statistics for Environmental Management (RSM 612) OR Biometrics in Marine Science (MES 608)	Marine Population Surveys & Analysis (MES 645) OR Marine Population Biology & Modeling (MES 646)
Marine Mammal Conservation and Management (MES 670)	Applied Marine Mammal Acoustics (OCE 651)

*Summer Course - Marine Mammal Applied Behavior Analysis and Managed Care (MBE507/607)

TROPICAL MARINE ECOSYSTEM MANAGEMENT

The Master of Professional Science Degree in Tropical Marine Ecosystem Management provides students with advanced training in the theoretical aspects of tropical marine ecology, as well as the practical aspects needed to begin a career in this field. Theory focuses on nearshore, benthic ecosystems common to tropical and subtropical regions worldwide (coral reefs, seagrasses, and mangroves) and emphasizes threats facing these ecosystems. Practical aspects of the course include field methods and techniques, taxonomy and identification of common vertebrates, invertebrates, algae and marine plants, GIS and remote sensing of shallow water marine environments, scientific diving (through the American Academy of Underwater Sciences), and small boat handling (through the Department of the Interior's Motorboat Operator Certification Course). This degree is excellent preparation for technical positions in marine conservation and management and marine ecosystem science at one of a number of state and federal agencies, institutions, and NGOs.

TROPICAL MARINE ECOSYSTEM SCIENCE

Fall Semester	Spring Semester
Tropical Marine Ecology (MBE 615)	Field Techniques and Instrumentation in Tropical Marine Ecology (MBE 621)
Research Diving (RSM 600)(Can be taken in Fall or Spring)	Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661) -(Can be taken in Fall or Spring)
Statistics for Environmental Management (RSM 612)/ Or Biometrics in Marine Science (MES 608)	Marine Population Biology & Modeling (MES 646)/Or ELECTIVE
Environmental Law (MES 620)/Or Coastal Law & Policy (MES720)/Or Ocean Policy and Development (MES 616)/ Or ELECTIVE	Environmental Planning and the Environmental Impact Statement (MES 610)/Or ELECTIVE

AQUACULTURE

Sustainable aquaculture is recognized as the best alternative to produce protein to feed the world in decades to come. The UM-RSMAS Aquaculture Program has been playing a major role spearheading advanced aquaculture technologies.

Our academic and research program is centered on innovative approaches to ensure that seafood production is science-based, wholesome, environmentally sustainable and economically viable. It addresses important and contentious issues that shape the future of sustainable aquaculture development, the technologies and policies that govern production, and our understanding of the limits and capacities of the environment. We are engaged in collaborations around the world and are nationally and internationally recognized for our science-based contributions to the field. Our aquaculture courses cover everything related to the field from basic science and technology to environmental, legal, business, and marketing.

AQUACULTURE

Fall Semester	Spring Semester
Aquaculture I (MES 612)	Aquaculture II: Advanced Techniques in Sustainable Aquaculture (Lab Course: MES 613)
Aquaculture IV: Aquaculture Business, Regulatory, and Environmental Considerations (MES 617)	Seafood Market and Marketing (MES 628)
Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661)	Fish Physiology (MBE 686)/ Biology, Ecology & Management of Mangrove Ecosystems (MES 629)/ Or ELECTIVE
Economics of Natural Resources (MES 602) Or Fisheries Socioeconomics and Management (MES 625)	Aquaculture III (MES 619) — *SUMMER FIELD COURSE Or ELECTIVE

COASTAL ZONE MANAGEMENT

Over half of the world's population resides in growing coastal areas. These areas are major economic engines, supporting port and shipping, tourism, fisheries, aquaculture, and oil and gas mining activities. The coastal zone — comprised of near-shore waters and lands — represents some of the most fragile habitats on the planet. Balancing economic development and coastal protections is a major challenge that resource managers face in the 21st Century. Similarly, adaptation to climate change, sea level rise, coastal erosion, and hurricanes pose additional challenges for coastal managers. The track in Coastal Zone Management will introduce participants to the legal and governance frameworks in this increasingly important discipline. Coursework will integrate topics such as coastal fisheries management, marine protected areas, port management, tourism development, environmental impact assessment, and oil exploration. Students will have opportunities to engage in internships with private, public or non-governmental agencies (NGO's) and conduct relevant fieldwork. Additional internship possibilities also exist with environmental advocacy groups and consulting firms. This track is part of the Marine Ecosystems and Society Department at RSMAS, which has long-established links and study sites in Panamá and the Caribbean (among other countries), where students receive hands-on experience and work directly on coastal zone management issues.

There is no specific coursework required in this track. Curriculum will be decided on a case-by-case basis during academic advising. However, students select from a variety of multidisciplinary courses across many departments and schools at RSMAS/UM, in a holistic effort to meet their personal and professional goals.

The only mandatory course in this track is Coastal Zone Management (MES 618) which is offered in Spring.



EXPLORATION SCIENCE

Exploration Science is the applied practice and study of field research using a variety of methods, technologies, and approaches to drive question-based scientific endeavors. This field fosters scientific inquiry and the application of expedition skills within a context that acknowledges the cultural and ethical implications of exploration.

Exploration Science combines scientific research theory and field skills with an outreach and educational component for experimental and virtual expeditions bringing discovery to a wider audience. Utilizing new technologies to engage and educate the public, Exploration Science students will be involved in citizen science project design, exploration technology applications, and field-based skills training, while receiving essential background information on the history, ethics and risks related to exploration. Students will be able to tailor their degree to best fit their interests and goals and will be prepared to lead and conduct professional exploration initiatives and expeditions in a variety of environments.

This track is being offered at RSMAS in partnership with UM's Abess Center for Ecosystem Science and Policy. The Abess Center fosters innovative, interdisciplinary initiatives that bridge the gap between science and environmental policy.

For More Information Please Visit: <http://exploration.miami.edu>

EXPLORATION SCIENCE

Fall Semester	Spring Semester
Research Diving (RSM 600) and Motorboat Operator Certificate (RSM 667)	Exploration Technology and Media (Documentary Video Production and New Media for Exploration) (MES 665)
Citizen and Participatory Science (MES 664)	Exploration Science Field Studies (MES 627)/ Or ELECTIVE
Gold and Glory: Ethics of Exploration (MES 674)	Field Techniques and Instrumentation in Tropical Marine Ecology (MBE 621)/Or ELECTIVE
Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661)/Or ELECTIVE	Intermediate Spatial Analysis (MES 662)/ Or ELECTIVE

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MARINE CONSERVATION

The Marine Conservation track provides students with advanced training in both the theoretical aspects of marine science and conservation, as well as the practical aspects required to begin a career in this field. This degree track is unique in that students design a curriculum that emphasizes their personal goals and interests, while focusing on innovative solutions to current marine ecosystem and organism threats. The goal of the track is to advance conservation efforts, scientific literacy and communication, public outreach and integration, and education within the marine realm. Practical aspects of the program will vary between individuals but may include exposure to field methods and techniques, GIS and remote sensing of shallow water marine environments, the development of environmental impact statements, coastal law, the development of social media, scientific communication, and statistics for environmental management.

This program includes two semesters of coursework and a 3–12 month internship at one of a number of local federal agencies, institutions, and NGOs, in which students apply both the theory and practical aspects of their training to real-world projects. This degree provides excellent preparation for employment in areas of marine conservation, management, media, education, and ecosystem science.

MARINE CONSERVATION

Fall Semester	Spring Semester
Marine Conservation Biology (MES 671)	Marine Conservation Outreach (MES 673) Or ELECTIVE
Environmental Law (MES 620) Or Coastal Law (MES 720) Or Ocean Policy Development and Analysis (MES 616)	Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661) (Can be taken in Fall or Spring)
Statistics for Environmental Management (RSM 612)/Or Biometrics in Marine Science (MES 608)	Coastal Zone Management (MES 618) Or Marine and International Ocean Law and Governance (MES 710)/ Or ELECTIVE
Tropical Marine Ecology (MBE615)/ Or ELECTIVE	Scientific Communication (RSM 645)/ Or ELECTIVE

UNDERWATER ARCHAEOLOGY

Underwater archaeology is the study of the remains of past human activity through the exploration of a variety of submerged sites, from shipwrecks in saltwater to freshwater caves and springs. Archaeological sites and artifacts can play a large role in education, community cohesion, national identity, economic development, sustainable tourism, conservation, and, of course, entertainment among others. The material culture of our shared heritage and past provides cultural continuity, perspective, and a tangible link to those who preceded us. Shipwrecks and submerged sites have long fascinated humankind, perhaps never more so than in modern day, and given climate change and rising water temperatures worldwide, it is becoming even more important to document, study, manage, and find innovative ways to preserve what remains of our past.

The MPS Underwater Archaeology track (UARCH) is a two-year program that focuses on the theory, field techniques, and management practices necessary to work within the field of archaeology and the broader general field of marine sciences. Coursework integrates topics such as site mapping and documentation, interpretation of shipwrecks and submerged sites, best management practices, marine protected areas, and marine survey technology. UARCH students receive training as AAUS Science Divers during their first semester. Students will have opportunities to work side-by-side with professional archaeologists through internships and field projects with private, public, or non-governmental agencies, both nationally and internationally, and conduct relevant fieldwork.

UNDERWATER ARCHAEOLOGY

Fall Semester	Spring Semester
Theory and Method in Underwater and Maritime Archaeology (MES 632)	Underwater Archaeology Field Techniques (MES 614)
Submerged Cultural Resource Management (MES 626)	Marine Archaeological Survey and Technology (MES 615)
Motorbot Operator Certificate Course (RSM 667)	Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661)
Research Diving (RSM 600)	The Archeology of Seafaring (MES 672)

BROADCAST METEOROLOGY

Broadcast meteorology is a rapidly growing and evolving field and one of the largest sources of employment in the private sector of meteorology. This track prepares students for both on-camera and behind-the-scenes careers in broadcast meteorology, as well as the opportunity to develop the knowledge and training necessary to enter the broader field of science journalism. The curriculum integrates graduate coursework in broadcast journalism from UM's School of Communications, with advanced courses in Meteorology at RSMAS. Students receive hands-on training in UM's state-of-the-art digital studio and learn the proper techniques involved in preparing and presenting a complete and professional weathercast. The UMTV studio is fully equipped to deliver professional, on-air graphics with real-time data feeds and visualization software from Weather Central. Students will learn to research, analyze, predict, and then graphically and verbally communicate local and national weather forecasts "on camera." Students will also learn how to master breaking news, severe weather bulletins, ad-libbing, deadlines, teamwork, and other skills vital to a successful career in broadcasting. Students also participate in UM's award-winning news broadcast "NewsVision," which is aired daily on local cable channels to the university and the surrounding community. This enables students to apply their knowledge of journalism and weather forecasting in a TV studio and develop their skills in communication, computer graphics, and on-camera delivery. The coursework is designed to provide students with a solid foundation in both meteorology and broadcast journalism, in order to meet the basic requirements of the AMS Certification for Broadcast Meteorology and also provide students with a greater understanding of the broad environmental issues of the 21st Century.

BROADCAST METEOROLOGY

Fall Semester	Spring Semester
Introduction to Atmospheric Science (ATM 651) Or Introduction to Weather and Climate (ATM 614)	Broadcast Meteorology (ATM 632)
Writing and Reporting Across Platforms (JMM 615)	Television News Reporting (JMM 617)
Advanced Weather Forecasting (ATM 662)	Climate and Society (RSM 620)
News Technologies (JMM 605) Or Interactive Storytelling (JMM 619)	General Circulation of the Atmosphere (ATM 765) Or ELECTIVE

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CLIMATE & SOCIETY

This degree track emphasizes the relationship between weather, climate and societal impacts. The financial consequences resulting from natural and anthropogenic climate change, rising sea levels, and extreme weather events pose important scientific and socioeconomic challenges, both in terms of urban planning and managing the financial risks associated with these changes. Employers in government, insurance, energy, and a number of other weather-impacted industries are seeking professionals who are fluent in both the fundamentals of business and the physical sciences.

Social vulnerability, mitigation strategies, and adaptive capacity in the face of climate change are strongly mediated by legal, socioeconomic, policy, psychological, epidemiological and cultural factors, including housing and construction codes, environmental risk perception, and health management/delivery. This theme draws on UM's breadth and depth in interdisciplinary climatological and meteorological research, addressing risk management in the human health, fisheries, agriculture, water management, natural hazards, and coastal zone sectors. Faculty from RSMAS, Miller School of Medicine, and Geography contribute to the climate and society theme with their analysis of both climate trends and hazards, while faculty at the Schools of Law, Architecture, and the College of Engineering focus on the legal, material, and aesthetic aspects of the built environment that influence the mitigation of vulnerability and development of more resilient urban systems.

CLIMATE AND SOCIETY

Fall Semester	Spring Semester
Introduction to Atmospheric Science (ATM 651) Or Intro to Weather and Climate (ATM 614)	General Circulation of the Atmosphere (ATM 765)/Or ELECTIVE
Climate Change (ATM 653)	Spatial Analysis - Intermediate Marine GIS (MES 662)
Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661)	Climate and Society (RSM 620)
Climate Change and Public Health (GEG 648)/ Or ELECTIVE	Carbon and Climate (RSM 670)/ Or ELECTIVE

WEATHER FORECASTING

This track is designed for students who have an undergraduate degree in meteorology and seek graduate level training and experience in applied weather forecasting. The curriculum includes graduate-level course work in the analysis and preparation of weather forecasts, the effective use of numerical models, satellite, Doppler radar, and upper air data, and the application of this information to support a variety of specialized end-users, including agriculture, utilities, insurance, transportation, construction and other weather-sensitive industries. Students will also develop skills in different areas of service offered by the National Weather Service, including Severe Weather, Marine and Aviation Forecasts, Hydrology, and Tropical Cyclone Forecasting. Students will receive instruction on using Weather Event Simulators developed for the National Weather Service to train their forecasters. This track also fosters skills in writing and public communication in the context of professional weather forecasting.

WEATHER FORECASTING

Fall Semester	Spring Semester
Introduction to Atmospheric Science (ATM 651)	General Circulation of the Atmosphere (ATM 765)/Or ELECTIVE
Advanced Weather Forecasting (ATM 662)	ELECTIVE
Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661)	Climate and Society (RSM 620)/Or ELECTIVE
ELECTIVE	Scientific Communication (ATM 636)/Or ELECTIVE

APPLIED REMOTE SENSING

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. From disaster response after hurricanes, earthquakes, floods, and oil spills to monitoring ship traffic and floating sea ice, remote sensing technology enables us to acquire high-resolution satellite images of most areas in the world and to obtain near-real-time measurements of sea surface temperatures, currents, wave heights, wind speeds, atmospheric temperature profiles, clouds, aerosols, and more.

The Applied Remote Sensing track offered by RSMAS and the Center for Southeastern Tropical Advanced Remote Sensing (CSTARS) is tailored to the needs of students who seek to gain 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 track is also appropriate for those already in the workforce who require additional training or are looking to expand upon their knowledge and skills. UM / RSMAS / CSTARS is one of the leading remote sensing institutions in the U.S., with direct access to data from many satellites and excellent connections to data users (and potential employers of the students) and partner institutions all over the world.

Students entering this track need to have a Bachelor's degree in Mathematics, Physics, Geosciences, or Engineering or an equivalent degree from an accredited U.S. institution of higher education. See Program Requirements for more details.

APPLIED REMOTE SENSING

Fall Semester	Spring Semester
Physics of Remote Sensing I: Passive Systems (OCE 642)	Physics of Remote Sensing II: Active Systems (OCE 643)
Applied Remote Sensing (OCE 686)	Applied Radar Remote Sensing (OCE 687)
Statistics for Environmental Management (RSM 612)/Or ELECTIVE	Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661)
Natural Hazards: Solid Earth and Oceans (OCE 682)/Or ELECTIVE	Applied Data Analysis (OCE 624)/ Or ELECTIVE

NATURAL HAZARDS AND CATASTROPHES

Society is experiencing higher frequencies of natural catastrophes, including those due to hurricanes, tornadoes, floods, storm surge, volcanic eruptions, landslides, hail, wildfires and earthquakes. As many of these disasters are sensitive to a rapidly changing climate, their impacts are outpacing society's ability to achieve resilience within the engineering, architecture, public health, business and governance sectors. The World Bank estimates the costs of these catastrophes at \$184 billion per year, with the 2011 Fukushima tsunami and nuclear disaster alone costing \$200 billion.

The University of Miami's Rosenstiel School of Marine and Atmospheric Science conducts world-class research on the earth systems responsible for these disasters, including the atmosphere, the ocean and solid earth. To meet society's need for a skilled workforce, this program 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. The goal 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 (e.g. statistics, data management, programming, GIS, and remote sensing). 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. This degree will prepare its graduates for employment in several sectors, including insurance and re-insurance industry, architecture, emergency management, engineering, public health and science.

NATURAL HAZARDS AND CATASTROPHES

Fall Semester	Spring Semester
Geological Hazards (MGS 635)	Natural Hazards: Atmosphere and Oceans (OCE 637)
Decision Analysis: Natural Hazards and Catastrophes (MES 633)	Hydrological Hazards (MGS 634)
Statistics for Environmental Management (RSM 612)	Introduction to Marine GIS (MES 660) + Marine GIS Lab (MES 661)
Environmental Law (MES 620)/Or ELECTIVE	Statistical Modeling of Extreme and Rare Events (RSM 613)/Or ELECTIVE



MASTER OF PROFESSIONAL
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