RSMAS GENERAL (RSM)

RSM 500. Research Diving Techniques. 3 Credit Hours.
This course is designed to introduce students to the practices and policies of scientific diving. The object is to prepare students to use SCUBA as a research tool for the marine sciences. The course content will qualify students as scientific divers under the auspices of the UM/RSMAS Scientific Diving Program and will meet the standards set by the American Academy of Underwater Sciences (AAUS). Students must be certified as a recreational diver with a RSTC recognized certification agency; have a minimum of 10 logged open water dives, two dives within 6 months of starting the course; pass a swim test and complete a physical exam.
Requisite: Senior Standing.
Components: LEC.
Grading: SUS.
Typically Offered: Offered by Announcement Only.

RSM 512. Statistics for Marine Scientists. 3 Credit Hours.
This course covers statistical theory, tools, and methods required for data analysis, emphasizing marine science applications.
Requisite: Senior Standing.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

RSM 513. Statistical Modeling of Extreme and Rare Events. 3 Credit Hours.
The course will focus on rare events and extreme values observed in nature. In particular, students will learn: advanced statistical methods of data analysis, as well as concepts of probability and predictability; statistical modeling of rare and extreme events; and applications of these advanced techniques to real atmospheric and oceanic data. Must have taken RSM 512/RSM 612 or equivalent; or calculus; or permission from instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

RSM 520. Climate and Society. 3 Credit Hours.
This course is designed to provide students from different disciplinary backgrounds with an overview of physical processes, general concepts and policy debates surrounding climate issues.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

RSM 521. Object-Oriented Programming and Agent-Based Modelling. 3 Credit Hours.
Hands-on training in object-oriented programming using Java, including Java statistical packages, and in the development of agent-based and individual-based simulation models for ecological, physiological, social, economic and physical sciences. Course includes introductions to cellular automatons and models based on social and behavioral networks. No prior programming experience required.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

RSM 546. Presentation Boot Camp. 1 Credit Hour.
This course focuses on presenting scientific concepts and research findings more effectively to both technical audiences and the general public.
Requisite: Senior Standing.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

RSM 547. Methods for Marine and Atmospheric Education. 3 Credit Hours.
This course focuses on curriculum and instructional methods for teaching marine and atmospheric content in formal and informal settings. The course will introduce students to recent national science and engineering, climate, and ocean education standards and best curricula and instructional approaches for teaching and learning science. The course will also focus on identifying and analyzing research on marine and atmospheric education and effectively communicating scientific topics to different audiences.
Requisite: Senior Standing.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.
RSM 548. Management and Leadership in Marine and Atmospheric Science. 3 Credit Hours.
The goal of this course is to become an effective leader/manager while leveraging the individual strengths of a team in the marine and atmospheric field. The course will use leadership theories and case studies to understand how decisions affect outcomes. Students will develop the ability to manage teams effectively amidst a changing world. Students discuss literature and case studies to explore the foundations of effective leadership and support task triage, decision-making, shared mental models, and appropriate executive styles. The course will introduce students to recent national science and engineering, climate, and ocean standards and best approaches when it comes to managing a staff in the marine and atmospheric sciences. The course will also focus on identifying and analyzing marine and atmospheric leadership and effectively communicating scientific topics to different audiences.

Components: LEC.
Grading: GRD.
Typically Offered: Spring.

RSM 565. Fish Ecology and Oceanography. 3 Credit Hours.
This course is intended to introduce students to key biological, ecological, oceanographic, and climatic processes of direct relevance to fishery species, with a view toward development of an ecosystem perspective.

Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

RSM 566. Polar Science. 3 Credit Hours.
The course covers the physical, chemical and biological components of the polar oceans, atmosphere and coastal regions. The interactions between ocean, ice, atmosphere and land are discussed in detail not only in terms of local relationships, with links to the climate system.

Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

RSM 567. Motorboat Operator Certification Course. 1-2 Credit Hours.
The MOCC course was developed and formalized by the United States Department of the Interior in the early 1990's. This course is designed to give students broad academic knowledge and practical training running small boats (boats 26' in length or shorter). In addition to the relevant theory, students will get hands-on training trailering small boats, launching and loading at boat ramps, slow and high speed maneuvering, marlinspike (knot tying), as well as in water emergency training and the use of flares and pyrotechnics. The MOCC certification is the training standard for occupational small boating and used by government organizations, public and private research organizations, public aquaria, etc. The certification is a marketable skill for students moving ahead in their careers in marine science. Students must have a valid U.S. drivers license and good driving record (less than 6 points) to be eligible for training in this course.

Components: LEC.
Grading: SUS.
Typically Offered: Offered by Announcement Only.

RSM 568. Techniques in Respirometry, Swim Performance and Behavior of Aquatic Organisms. 2 Credit Hours.
The objectives of this course is to give participants an understanding and overview of methods and hands-on with modern equipment. The emphasis of the course will be on marine fish, but the techniques can be used for freshwater fish and aquatic invertebrates as well. The course is based on lectures, lab exercises and plenary discussions. The final part of the course constitutes a written project based on data collected during the week.

Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

RSM 571. Special Topics. 1-4 Credit Hours.
Lectures and research projects in special topics related to Marine and Atmospheric Science.

Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

RSM 572. Special Topics. 1-4 Credit Hours.
Lectures and research projects in special topics related to Marine and Atmospheric Science.

Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

RSM 573. Special Topics. 1-3 Credit Hours.
Lectures and research projects in special topics related to Marine and Atmospheric Science.

Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.
RSM 600. Research Diving Techniques. 3 Credit Hours.
This course is designed to introduce students to the practices and policies of scientific diving. The object is to prepare students to use SCUBA as a research tool for the marine sciences. The course content will qualify students as scientific divers under the auspices of the UM/RSMAS Scientific Diving Program and will meet the standards set by the American Academy of Underwater Sciences (AAUS). Students must be certified as a recreational diver with a RSTC recognized certification agency; have a minimum of 10 logged open water dives, two dives within 6 months of starting the course; pass a swim test and complete a physical exam.
Components: LEC.
Grading: SUS.
Typically Offered: Fall & Spring.

RSM 611. Principles of Mass Spectrometry and Applications to Marine, Atmospheric, and Environmental Science. 3 Credit Hours.
This course goes in depth into the principles and uses of mass spectrometry. It is intended for graduate students who use mass spectrometry to conduct their research. Concepts taught will include the components of mass spectrometers (vacuum systems, ionization methods, mass analyzers, detectors), different types of mass spectrometers and their uses, and coupling chromatography to mass spectrometry. Each student will be required to give presentations on new advances in mass spectrometry and an in-depth presentation on a mass spectrometer that they use and new findings in the literature relevant to their technique and personal research.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

RSM 612. Statistics for Marine Scientists. 3 Credit Hours.
This course covers statistical theory, tools, and methods required for data analysis, emphasizing marine science applications.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

RSM 613. Statistical Modeling of Extreme and Rare Events. 3 Credit Hours.
The course will focus on rare events and extreme values observed in nature. In particular, students will learn: advanced statistical methods of data analysis, as well as concepts of probability and predictability; statistical modeling of rare and extreme events; and applications of these advanced techniques to real atmospheric and oceanic data.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

RSM 615. Marine Tourism and Conservation. 3 Credit Hours.
This course introduces students to critical concepts in the practice and management of marine tourism, and explores the potential of tourism to contribute to marine conservation across different geographical locations and taxa. Discussion, readings, and lectures encourage students to draw connections between the biology and ecology of organisms and ecosystems and existing human-environment relationships. We also consider the social context in which tourism is occurring, and how this may shape the success or failure of tourism operators in contributing to conservation. This course will also explore questions about “consumptive” and “non-consumptive” uses of marine resources. Discussion will evaluate both the potential and the limitations of marine tourism as a tool for environmental protection.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

RSM 620. Climate and Society. 3 Credit Hours.
This course is designed to provide students from different disciplinary backgrounds with an overview of physical processes, general concepts and policy debates surrounding climate issues.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

RSM 621. Object-Oriented Programming and Agent-Based Modelling. 3 Credit Hours.
Hands-on training in object-oriented programming using Java, including Java statistical packages, and in the development of agent-based and individual-based simulation models for ecological, physiological, social, economic and physical sciences. Course includes introductions to cellular automata and models based on social and behavioral networks. No prior programming experience required.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.
RSM 622. Data Management for Scientists. 2 Credit Hours.
This course will cover techniques used in data profiling, filtering, and archiving. Online tools will be used for elaborating data management plans and well-established database techniques for manipulating data. Participants will develop data management plans and introduce techniques for data manipulation, such as database design and implementation concepts, query coding, and data cleaning/importing/exporting. Course participants will be exposed to theoretical concepts and engage in hands-on activities throughout the semester. Participants are encouraged to bring their own data for processing or asked to select a dataset from the many online data repositories.
Components: LEC.
Grading: SUS.
Typically Offered: Fall.

RSM 645. Science Communication: Professional Writing. 1 Credit Hour.
This course introduces students interested in scientific research to various techniques for processing and presenting research data and information. Students will learn techniques to effectively present research to the general public and to the scientific community in written form, such as research papers, grant proposals, conference presentations and fact pages.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

RSM 646. Presentation Boot Camp. 1 Credit Hour.
This course focuses on presenting scientific concepts and research findings more effectively to both technical audiences and the general public.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

RSM 647. Methods for Marine and Atmospheric Education. 3 Credit Hours.
This course focuses on curriculum and instructional methods for teaching marine and atmospheric content in formal and informal settings. The course will introduce students to recent national science and engineering, climate, and ocean education standards and best curricula and instructional approaches for teaching and learning science. The course will also focus on identifying and analyzing research on marine and atmospheric education and effectively communicating scientific topics to different audiences.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

RSM 648. Management and Leadership in Marine and Atmospheric Science. 3 Credit Hours.
The goal of this course is to become an effective leader/manager while leveraging the individual strengths of a team in the marine and atmospheric field. The course will use leadership theories and case studies to understand how decisions affect outcomes. Students will develop the ability to manage teams effectively amidst a changing world. Students discuss literature and case studies to explore the foundations of effective leadership and support task triage, decision-making, shared mental models, and appropriate executive styles. The course will introduce students to recent national science and engineering, climate, and ocean standards and best approaches when it comes to managing a staff in the marine and atmospheric sciences. The course will also focus on identifying and analyzing marine and atmospheric leadership and effectively communicating scientific topics to different audiences.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

RSM 649. Advanced Presentation Boot Camp. 1 Credit Hour.
This follow-up course builds upon the topics and approaches covered in the basic training session and focuses on advanced techniques for designing and delivering effective scientific presentations to both technical audiences and the general public. The course provides opportunities for students to expand and practice their critique language and hone their presentation evaluation and design skills.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

RSM 650. Data Management in the Research Environment. 2 Credit Hours.
This course covers theoretical and practical approaches to research data management in academic contexts. Theoretical aspects include overviews of information science, data policy and data governance. The practical approaches include skills and best practices in research data management, and basic command line computing for data analysis and visualization (python and R). The purpose of the course is to increase research productivity, to enable data stewardship, and to help the student exceed data management expectations/requirements in the research environment. This is a practical methods course with tangible products; students produce a data management plan for their specific research endeavor, or prepare and deposit data into a discipline specific repository (other projects subject to instructor approval will be considered). The class is open to all graduate students in all disciplines. There are no prerequisites and while the course is designed for the first or second year of a graduate program, students who are further along will benefit as well.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
RSM 665. Fish Ecology and Oceanography. 3 Credit Hours.
This course is intended to introduce students to key biological, ecological, oceanographic, and climatic processes of direct relevance to fishery species, with a view toward development of an ecosystem perspective.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

RSM 666. Polar Science. 3 Credit Hours.
The course covers the physical, chemical and biological components of the polar oceans, atmosphere and coastal regions. The interactions between ocean, ice, atmosphere and land are discussed in detail not only in terms of local relationships, with links to the climate system.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

RSM 667. Motorboat Operator Certification Course. 1-2 Credit Hours.
The MOCC course was developed and formalized by the United States Department of the Interior in the early 1990’s. This course is designed to give students broad academic knowledge and practical training running small boats (boats 26’ in length or shorter). In addition to the relevant theory, students will get hands-on training trailering small boats, launching and loading at boat ramps, slow and high speed maneuvering, marlinspike (knot tying), as well as in water emergency training and the use of flares and pyrotechnics. The MOCC certification is the training standard for occupational small boating and used by government organizations, public and private research organizations, public aquaria, etc. The certification is a marketable skill for students moving ahead in their careers in marine science. Students must have a valid U.S. driver’s license and good driving record (less than 6 points) to be eligible for training in this course.
Components: LEC.
Grading: SUS.
Typically Offered: Fall & Spring.

RSM 668. Techniques in Respirometry, Swim Performance and Behavior of Aquatic Organisms. 2 Credit Hours.
The objectives of this course is to give participants an understanding and overview of methods and hands-on with modern equipment. The emphasis of the course will be on marine fish, but the techniques can be used for freshwater fish and aquatic invertebrates as well. The course is based on lectures, lab exercises and plenary discussions. The final part of the course constitutes a written project based on data collected during the week.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

RSM 671. Special Topics. 1-4 Credit Hours.
Lectures and research projects in special topics related to Marine and Atmospheric Science.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

RSM 672. Special Topics. 1-4 Credit Hours.
Lectures and research projects in special topics related to Marine and Atmospheric Science.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

RSM 673. Special Topics. 1-3 Credit Hours.
Lectures and research projects in special topics related to Marine and Atmospheric Science.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

RSM 700. Research Ethics. 0 Credit Hours.
Online research ethics training, required for all graduate students.
Components: DIL.
Grading: SUS.
Typically Offered: Fall & Spring.

RSM 710. The Physical Environment of Marine Organisms. 3 Credit Hours.
The fluid environment of the sea influences the growth, distribution, and survival of marine organisms. The physical processes that affect organisms occur in space and time, ranging from the molecular properties of water to basin-wide linkages between oceanic regime and climate shifts are discussed. Course emphasis is placed on how physical processes affect the life of plankton to nekton, Students are required to present reviews based on the literature.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
RSM 771. Educational Training 1. 0 Credit Hours.
Educational training workshop and presentations.
Components: WKS.
Grading: SUS.
Typically Offered: Fall & Spring.

RSM 772. Educational Training 2. 0 Credit Hours.
First semester of educational training.
Components: WKS.
Grading: SUS.
Typically Offered: Fall & Spring.

RSM 773. Educational Training 3. 0 Credit Hours.
Second semester of educational training.
Components: WKS.
Grading: SUS.
Typically Offered: Fall & Spring.

RSM 780. Directed Readings. 1 Credit Hour.
The goal of this directed readings course is to cover a wide range of current marine and atmospheric science topics, and to give students experience independently reading about recent advances in research. The course will also give the students an opportunity to practice presentation and communication skills. Students will be assessed based on their presentations and participation.
Components: DIS.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.