MARINE ECOSYSTEMS AND SOCIETY (MES)

GRADUATE HANDBOOK 2015-2016

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Guide to the Ph.D./M.S./MPS Degrees
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SUMMARY

1. This handbook outlines the specific procedures and requirements for Doctor of Philosophy (Ph.D.), Masters of Science (M.S.) and Master of Professional Science (M.P.S) degree-seeking students in the Department of Marine Ecosystems and Society (MES) Graduate Academic Program at Rosenstiel School of Marine and Atmospheric Science (RSMAS). It serves as a supplement to the RSMAS and University of Miami (UM) Graduate Handbooks which also establish the specific academic rules by which the MES graduate program is governed.

2. Students are assigned an MES Ph.D./M.S. Committee Chair upon acceptance to RSMAS. The Chair of the student’s Dissertation/Thesis Committee will guide the student through their entire degree process. The Chair is responsible for monitoring the graduate student’s progress towards the degree. The student’s Dissertation/Thesis Committee, established early in the graduate career, meets at least once annually.

3. A graduate student is expected to defend their Ph.D. dissertation in no more than five years after entering the MES graduate student program with a B.S. degree. This will be 3-4 years if they hold a Master’s degree. A student is expected to defend their M.S. thesis two years after entering the MES graduate program. It is expected that students will complete the M.P.S. degree in about 16 months.

4. In their first year at RSMAS, a student takes courses specific to their subject of focus, passes a comprehensive exam, and forms a Committee and has their first Committee meeting. In subsequent years students should have at least one Committee meeting a year, while consulting regularly with Committee members.

5. Students are encouraged to begin forming ideas for their dissertation/thesis as early as possible. The Committee Chair and student should collaborate on a concise description of Committee meetings, as summary of each Committee meeting is provided for the student’s files, and the Chair also provides an annual summary of the student’s progress towards completion of the degree to the MES Academic Committee (AC) chair.

6. During the second year, a student completes coursework and writes and defends the proposal (early in the second year for M.S. degree) before the Committee. The Ph.D. student must successfully pass a written qualifying examination and be admitted to candidacy. Admission to candidacy has to happen at least one semester prior to the defense of the PhD. To earn their degree, M.S. and M.P.S. students must complete their written thesis/internship report and present it orally to the public and have it approved by the Committee.

7. In the third year and every year thereafter, a PhD student holds a Committee meeting and conducts research and writes dissertation chapters prior to defending.

8. The completed written dissertation must be made available to the dissertation Committee at least four weeks prior to an oral defense. Announcement of defense, usually two weeks prior to the defense, requires that the Committee approves of the dissertation in concept, must occur 2 weeks prior to the defense. At defense, the Ph.D. candidate must provide an oral public presentation of the dissertation, and then defend this dissertation in private before their Committee.

PREFACE
This section presents guidelines common to all the graduate degrees in MES: PHD, MS and MPS.

Graduate student education includes a close relationship between the Chair of a student’s Committee and the student. The Chair is responsible for advising and supporting a student’s research. The graduate student is responsible for his/her education and becoming an independent scientist. This MES Student Handbook is designed to aid students and faculty by stating the Program’s interpretations of RSMAS policy, and by stating specific Program requirements. It is ultimately the responsibility of each student and their Chair to meet all of the guidelines and requirements of the Program described in this document and the other requirements stated in the RSMAS and UM Graduate Handbooks. These handbooks evolve through time so students should always refer to the versions for the academic year that they entered the program.

A student’s dissertation/thesis/internship Committee is important to the student and to our academic institution because members of the Committee provide guidance and are the guardians of a program of excellence. The student’s dissertation/thesis/internship Committee plays an important role in the maturation and education of a graduate student. A Committee should be formed in the student’s first year and a first Committee meeting must be held soon after the Committee has been constituted. Students should discuss with their Chair possible Committee members. Students should select Committee members for their expertise, and ability to provide guidance, advice and support to the student. Committee membership needs to satisfy some rules that are specific for each degree and that are defined below. The Committee must meet at least once per year to review the student's progress (does not apply to MPS). A short summary of the meeting is sent to the RSMAS Graduate Studies Office (GSO) by the Committee chair for addition to the student's file. Faculty active participation in a student’s dissertation/thesis Committee is very important for a successful graduate program. The members of a dissertation/thesis Committee are responsible for the comprehensive and qualifying exams (only for PhDs), overseeing the student's research and approving the proposal. The Committee is also responsible for the student’s development into an independent scientist and reviewing and approving the student dissertation/thesis/internship report.

Although the student’s Committee is responsible for reviewing the student’s progress, the MES faculty also review the progress of all MES students once a year.

**COMPREHENSIVE EXAM FORMAT**

All MES graduate students must pass a comprehensive exam by the end of their first year. The exam’s format for M.Sc and PhD. Students will be defined by the student’s Committee Chair in consultation with the Committee. The format for MPS students is defined below.

Passing the exam requires 100% pass (P/F) on the comprehensive questions. A single retake is possible at the discretion of the student’s Committee and the program faculty. A failed Comprehensive Exam with no endorsement to retake the exam will result in immediate dismissal from the MES graduate program. A failed retake of the Comprehensive Exam will also result in immediate dismissal from the MES graduate program.

**RESEARCH ETHICS**

All RSMAS students must take the Research ethics course (RSM700; 0 cr). All students anticipating serving as teaching assistants must take Educational Training (RSM771). This course counts toward the 24-cr minimum course credits.
DEFENSE OF THESIS/DISSERTATION

MES requires a public oral presentation of a M.P. internship report, M.S. Thesis and a Ph.D. dissertation. The complete written thesis/dissertation must be provided to the Committee four weeks prior to the oral defense. The Announcement of Defense form, signed by all Committee members, must be submitted to GSO two weeks before the intended defense. The final dissertation/thesis must be signed by all Committee members and turned in to GSO by the end of the subsequent full semester following the date of defense as according to deadlines established by the UM graduate school.

LEAVE OF ABSENCE

Any time the student is not registered at the University for a period of one or more semesters constitutes a leave of absence. All leaves must be approved in advance by the MES AC via memorandum from the student's Chair and indicating the Chair's approval. The readmission form must be approved by the MES AC. Students are cautioned that the Recency of Credit rule set by the Graduate School continues during leaves of absence.

STUDENT FILES AND STUDENT PROGRESS

The MES AC tracks the progress of MES students. Thus it is useful if students filing relevant forms with GSO correspond with the MES AC about these submissions. All graduate students must maintain a GPA >3.0 at all times. This is a requirement of the Graduate School (GS) and is checked each semester by GSO. A student whose GPA falls below 3.0 is automatically placed on RSMAS academic probation. If the GPA is not increased to 3.0 in the subsequent semester, the student may be dismissed from the program.

ERRORS, APPEALS AND CHANGES IN POLICY

Occasionally, a student who intended to enter the PhD program is registered as an MS student at the time of acceptance. To correct this error, a memorandum signed by the student's Chair is sent to GSO with a copy directed to the MES AC. The same process is followed for the opposite circumstances.

The student may appeal any decision made by the MES AC to the RSMAS Graduate AC, and, if necessary, subsequently to the Associate Dean for Graduate Education.

All students should be aware that there is no right to a degree, and that the MPS, MS and PhD degrees are conferred only with approval of their graduate, thesis, or dissertation Committees, respectively, and completion of all degree requirements defined by the Department, the School, and the University. The MES faculty recognizes that the guidelines for obtaining degrees will evolve in any healthy program. Any faculty member or student who has recommendations about these guidelines should contact the MES Graduate program Director.
DOCTORATE IN MARINE ECOSYSTEMS AND SOCIETY DEGREE (PHD)

SUMMARY OF PHD DEGREE IN MES

**Year 1:** Courses taken. Comprehensive exam passed at the end of summer semester. Student dissertation Committee formed, first Committee meeting held.

**Year 2:** Courses completed. Proposal written and approved, and qualifying exams passed, second Committee meeting held.

**Years 2-4:** Annual meetings with the dissertation Committee, conduct research and begin writing dissertation chapters.

**Year 5:** Complete writing of dissertation and defense.

THE PHD DEGREE

PhD students are expected to finish the PhD program in five years, except if they enter the program with a MS, in which case they are expected to complete it in four years. Students are required to meet annually with their Committee and provide a succinct one-page annual progress report to their Chair. The Chair is expected to add a statement summarizing the Chair’s views about the student’s progress to the annual report. The annual report will be considered by the MES faculty in their annual student review.

THE STUDENT’S DISSERTATION COMMITTEE

The dissertation Committee will consist of no fewer than five members: the chair, who will be an MES member (Appendix 1) of the University Graduate Faculty, three members also from the Graduate Faculty of UM (from RSMAS or not, but at least one more from MES), and one member from outside RSMAS (this can be a faculty member at UM or a scientist/faculty from outside of the University).

The MES AC requests copies of the approved appointment to Student’s Committee form, changes in the membership of the Committee, and the annual progress report. Originals of forms go to GSO.

COURSE INFORMATION AND REQUIREMENTS

Sixty credits beyond the baccalaureate degree are the minimum requirement for the Ph.D., and not less than half of the total credits must be in work open only to graduate students (>700). At least 24 must have been taken in residence at the University of Miami. A minimum of 12 dissertation research credits must be taken. The faculty Chair and student should consider carefully how many credits to transfer when the student enrolls in the MES program with an MS degree from another school (see the RSMAS Handbook). Transferred credits should be relevant to the MES PhD program.

REQUIRED COURSES

The course schedule will be developed by the student in consultation with the Chair of the Dissertation Committee. Commonly students will be associated with specific academic tracks (Fisheries and Aquaculture, Conservation Biology, Coastal Zone Management, Exploration science…). There are no generally required MES courses, however, some academic tracks within MES may have specific course requirements. Additionally, students must attend all MES student seminars. Students will give one student seminar at the beginning of their third semester at RSMAS (not counting summers) and every year after with the exception of the semester where they defend their thesis/dissertation. In every subsequent fall and spring semester, students should be full-time enrolled via a combination of necessary course work and research activities. Full time status is achieved by either total 9 course cr, or 1 cr research (MES810 or 830).
WAIVER OF MES COURSES:
Any student who has successfully completed one or more courses equivalent to an MES course at an accredited institution and that is transferring such credits as part of a previously obtained MS, may petition the MES AC to certify that such course is equivalent to an existing MES/RSM course. Once the certification is provided the student may claim the course as a course that helps satisfy the 50% MES/RSM course requirement. This is accomplished by an interview with the MES/RSM course instructor, after which the instructor will send a recommendation memorandum to the MES AC.

DISSERTATION PROPOSAL

The dissertation proposal is the foundation for qualifying exams and both must be completed by the end of the second year.

The first step in designing a research project is to formulate clearly stated hypotheses. Students are advised to "be specific and informative and avoid redundancies." The following components are suggested.

**SUMMARY** (1 page or less) describing the specific aims and the importance of the research.

**PROJECT DESCRIPTION** (12-15 pages for components 1-5) consisting of:

1. **Specific Aims.** Provide a list of aims that state concisely and realistically what the research described in the proposal is intended to accomplish and/or what hypothesis is to be tested. Do not exceed one page.
2. **Background and Significance.** Briefly sketch the background to the hypothesis, critically evaluate existing knowledge, and specifically identify how the research will advance the field. State concisely the importance of the research by relating the specific aims to longer-term objectives.
3. **Progress Report/Preliminary Studies.** This section provides an account of the investigator's preliminary studies pertinent to the research.
4. **Experimental Design and Methods.** Should discuss in detail the experimental design and how these experiments address the specific aims. Should provide detailed procedures for those approaches or techniques that are novel or not well established.
5. **Provide a tentative sequence and timetable for the investigation.** Discuss the potential difficulties and limitations of the proposed procedures and briefly list alternative approaches to achieve the aims.
6. **Literature Cited.** List all publications cited in the proposal in a standardized format.

**Recommendation in the event of numerous revisions:**
Numerous edits to the proposal by the Committee should be avoided. The chair of the Committee is primarily responsible for providing a sound document to the student’s dissertation Committee. The Committee is responsible for approving the proposal and experimental approach. If there are many questions concerning study design, a Committee meeting should be held to discuss these problems.

**APPROVAL OF DISSERTATION PROPOSAL**

The proposal defense provides the student and the dissertation Committee the opportunity to more fully discuss the objectives and methods of the proposed research, after the Committee has had time to read and review it. The student provides a presentation on the proposed work and the hypothesis, methods, and breadth of the research are discussed, including alternate approaches. Finally, since the qualifying examination is based on subjects necessary to execute the proposed research, this meeting is an excellent time to define the reading and types of information the student should prepare for it.

**QUALIFYING EXAMINATION**
At the end of the second year a written qualifying examination is required of all PhD students that focuses on the subject matter needed to complete the research proposed for the dissertation. The purpose of the qualifying examination is to demonstrate that the MES doctoral student has the necessary understanding and expertise in research and related fields to complete the dissertation research. The topic areas should be agreed upon by the student, chair, and the dissertation Committee soon after the proposal defense. The student is strongly encouraged to discuss the specific topics with each member of the dissertation Committee, well in advance of the examination, to clarify the expected questions. The Committee is encouraged to provide specific reading or areas of knowledge they will test the student on. The format of the qualifying exam is decided by the dissertation Committee. It is the Chair’s responsibility to provide the test and to have the student’s Committee grade it in a timely manner.

In the event of a failure, a student may be re-examined once upon the recommendation of the student's Committee in consultation with the AC. If permitted, the reexamination must be given before the end of the following semester. An additional oral qualifying examination may be required by the student's Committee, but may not serve as a substitute for the written examination, which is a Graduate School requirement. The decision of passing or failing the qualifying examination rests with the dissertation Committee. The qualifying examination (written and, if required by the Committee, oral) must be successfully completed, as documented by the dissertation Committee, before the student can be admitted to candidacy.

ADVANCEMENT TO CANDIDACY

Advancement to candidacy requires the completion of all course work and passing the qualifying exam. Students should advance to candidacy at the end of their second year but must advance at least one semester prior to defending and graduation.

MAXIMUM YEARS IN THE PHD PROGRAM AND REGENCY OF CREDIT

As designated by the Graduate School, PhD students must complete all degree requirements within eight years, including leaves of absence; credits must be revalidated after 7 years. Credits are reinstated for 4 years after completion of the Qualifying Examination. The Associate Dean may refuse to allow a student completing the 8th year in the program to register for a future semester. In such cases, the PhD work is forfeited. Recency of credit is unaffected by resetting the clock.

ADMISSION TO THE PH.D. PROGRAM

All students have to seek admission to the MES PhD program. When accepting a student into the MES PhD the Chair commits to funding the student through the five years of the PhD (four for those students that have an MSc degree). It is recommended that the process of identifying a possible Chair be initiated by the student at least three months in advance of the enrollment date.

Completion of the MS degree in MES does not guarantee acceptance to the PhD program. For students that are enrolled in the MES-MS program and that are interested in admission to the MES PhD program, the MS thesis Committee must recommend admission at the time of the MS defense in the form of a memo to the MES AC. The student must then complete a readmission form. Finally, there must be a faculty member ready to commit to act as the student's Dissertation Committee Chair.

FUNDING

Most PhD students in the Program are supported by fellowships, research assistantships and teaching assistantships. These types of support include tuition, stipend, and research funds. Research Assistants and Teaching Assistants are awarded tuition scholarships under the terms of current RSMAS policy. There are a
limited number of competitive School or University Fellowships available that provide support of varying
duration and nature. Most fellowships/scholarships are available only to doctoral students. Scholarship funds
are listed in the RSMAS handbook. Students often also seek fellowships from outside the University of Miami.

MES MASTER OF SCIENCE (M.S.) DEGREE

SUMMARY OF MS DEGREE IN MES

Year 1: Student Thesis Committee formed, first Committee meeting held. Comprehensive exam passed by the
end of the summer semester. Research defined and initiated.

Year 2: Proposal written and approved. Research completed and thesis defended and completed.

THE MS DEGREE

This is intended as a full time, 2-year (24 months) degree that includes a thesis equivalent to a single published
scientific paper.

THE STUDENT’S THESIS COMMITTEE

The Chair of the student Committee is a faculty member of MES (appendix 1) and of the Graduate Faculty of
the University. The student Committee has two more members, one must be a member of MES and of the
Graduate Faculty of the University. The third member can be an outside member, from inside or outside UM.
The MES AC requests copies of the approved appointment to Student’s Committee form, changes in the
membership of the Committee, and the annual progress report. Originals of forms go to GSO.

COURSE INFORMATION AND REQUIREMENTS

Requires 30 credits: 24 course credits (18 of which must be from UM) and 6 research credits. The first year of
the 2-yr full time program will normally consist of 18 course credits over 2 semesters and 1 research credit for
any semester in which enrollment in <9 credits, to reach full time student status. The third semester will
normally consist of 6 course credits and 2 research credits; the 4th semester will consists of the balance of
research credits required to reach 6. The thesis research will begin at the latest during summer 1, continue at a
reduced pace during the 3rd semester, and be completed during 4th semester and subsequent summer.

REQUIRED COURSES

The course schedule will be developed by the student in consultation with the Chair of the thesis Committee.
There are no required MES core courses, however, students are required to take at least 12 course credits in
MES courses. Additionally students must attend all MES student seminars. Students will give one student
seminar at the beginning of their third semester at RSMAS (not counting summers) and every year after with
the exception of the semester when they defend their thesis. In every subsequent fall and spring semester,
students should be full-time enrolled via a combination of necessary course work and research activities. Full
time status is achieved by either total 9 course cr, or 1 cr research (MES810 or 830).

THESIS PROPOSAL

Written and defended before the end of the first semester of the second year. The format of the proposal should
be similar to the one described above for a dissertation proposal but the MS thesis proposal may be more
succinct.

THESIS
Preliminary research executed summer 1 (for some students this will precede 1st Committee meeting). Thereafter research will be continued during the second year. Thesis is written and defended on the last semester of the second year.

TRANSFER FROM MS TO PHD

Students may request to be considered for transfer from the MS program into the PHD program. These requests must be submitted to the MES AC prior to the start of the fourth semester and/or before the completion of 24 graduate course credits. Transfers from the MS to the PHD will not be considered after students have completed 24 or more credits. Transfer request must be accompanied by a recommendation of the student’s MS Committee. All students requesting transferring will have to fulfill the requirements of the PhD degree, including obtaining the commitment of a faculty to fund the student. Transfers are not guaranteed and if successful the PhD clock will be considered to have started upon entry to the MS degree. Such students will have the full five years to complete the PhD.

FUNDING

Two funding models currently exist:

A) Fully funded by the Chair. The Chair covers stipend, tuition, insurance and research costs (as done for PhD students).

B) A self-funded MS. Research costs of the thesis will be borne by the Chair. Tuition and insurance are paid by the student or granted to the student by fellowships obtained solely by the student or with the support of the Chair.
MASTER OF PROFESSIONAL SCIENCE DEGREE

COURSE REQUIREMENTS

24-27 graduate course credits. All students are required to complete 24 – 27 course credits. Within each track, there are required classes and electives. Coursework is multi-disciplinary and thus will be accepted from multiple departments. 3-6 internship credits. Completion of an internship with an approved agency, institution, or business, culminating in a formal report.

ADVISOR AND MENTOR

Students will be assigned an academic advisor during their first semester in residence. The advisor must hold an appointment in the Department representing the student’s track selection. This advisor will offer guidance regarding University expectations, coursework, registration, program details, and graduation requirements. At the beginning of the first semester, the student and the academic advisor will establish the curriculum to be followed, based on the track selected and the student's personal and professional goals. Each student will also identify and request the involvement of a faculty mentor, who will act as a resource to the student regarding career guidance and the selection of an appropriate internship and that will be part of the student’s internship Committee. The faculty mentor should be someone whose research and work interests the student, and his or her role as a mentor should be confirmed no later than the end of the first semester. Though RSMAS faculty members are preferred to take on the role as mentors, individuals from approved agencies, institutions, or businesses may also fulfill this role.

COMMITTEE

All MPS students must have a graduate Committee (which will be the internship Committee) of at least 3 members that will be responsible for the student’s internship. This Committee will include your academic advisor, who will act as chair of the internship Committee, and two other members, one internal mentor (i.e. faculty mentor) and one “outside” member of the Institution where the student is conducting the internship, the “internship supervisor”. The “Appointment to Student Committee” form is due during the second semester in residence.

COMPREHENSIVE EXAMINATION

A comprehensive examination is required of all MPS students after completing at least 18 course credits and prior to beginning an internship. The exam will be written and will be based on the material covered in each student’s courses. Each Department determines the content and form of the examination and establishes the test date for its students in a given year-class, according to general School guidelines. In the event of a failure, a student may be re-examined once, upon the advice of the student's advisor and at the discretion of the faculty of the Department. If granted, the re-examination must be given before the end of the following semester. The GSO should receive written notification of the examination results. Students who fail the re-examination are subject to dismissal from the school.

PRE-INTERNSHIP

Before being allowed to begin an internship, a student must:

a) submit the “Internship Agreement” Form, highlighting the timeline, goals, expectations, and objectives of the internship
b) have the internship proposal approved by your Committee
c) complete at least 12 credits, with a minimum grade point average of 3.0
d) remove all "I"s or deficiencies
INTERNSHIP

Each student will be required to complete an internship with an organization engaged in some activity associated with marine and/or atmospheric science and identify an Internship Supervisor in such organization. Such organizations can be national or international agencies, private corporations, or foreign governments with clearly defined marine-oriented programs or activities. Internships can be either paid or unpaid by the organization, or interns can complete the internship by formal participation in a University sponsored program in some area of marine science. A detailed synopsis of a proposed contribution to the hosting organization is required as a formal proposal, preferably before the internship begins, but no later than 2 weeks after the start date. The internship proposal will include: an introduction to the topic (i.e. a literature review), a statement of the problem, the purpose of the study, methods and materials (i.e. the proposed activities and analyses), a timeline, and plans for disseminating the information. An internship proposal template and guidelines will be provided. In addition, a strict requirement for the completion of the MPS degree is an oral presentation, preferably offered to the hosting organization, and a detailed report. Institutions may release an intern before the end of the proposed time commitment, and an intern may also terminate the position with an institution at any time, provided there are significant reasons not to proceed. In either case, due process will include a conference with the intern, the supervisor, and the student’s academic Committee members. The resolution of any problems should occur during this meeting. However, should the problems continue, or are deemed to be irreparable/irrevocable, the internship may be terminated, and the plans for the involved student will be reevaluated by the student’s Committee.

INTERNSHIP REPORT

The final grade (pass/fail) will be based on a written report and an oral presentation. The internship report is not a summary of involvement but rather a contributory assessment of the experience, including developmental insight and a summary of any research performed. Seven copies of the final approved report should be distributed as follows:

- One electronic copy for the representative Department (MBE, OCE, MES)
- One electronic copy to each member of your Committee
- One copy for the representative agency, institution, or business (electronic and/or hard copy at their request)
- One electronic copy to the RSMAS Library
- One electronic copy on a CD to GSO

The report must be accompanied by one original of the Certificate of Approval signed by the Academic Advisor and the MPS Associate Dean. Instructions and forms are available in GSO.

CONFERENCE

Though not mandatory, MPS students are strongly encouraged to attend a scientific conference during their academic residency at RSMAS.

RESIDENCY

For full-time students, residency will be limited to 24-months within a continuous 30-month period. A student who has not completed all of the requirements for graduation within this time period will be required to petition the division for continuation. Graduate coursework and associated credits completed at RSMAS are valid for a maximum of 5 years. If a student does not graduate within 5 years of starting the MPS program; they must be reevaluated for enrollment and continuation.
TRANSFER OF CREDITS
A total of 6 credits may be transferred into the MPS degree program from an outside institution, provided that those credits did not result in the conferral of another degree and were completed within 5 years of the start date of the MPS program. However, all courses must be evaluated by the academic advisor and approved by the instructor of the equivalent RSMAS class prior to transfer/acceptance.

UNIVERSITY OF MIAMI CREDITS TAKEN AS AN UNDERGRADUATE
If pursuing an MPS degree in MES, you may complete 6 credits of required coursework while in residence as an undergraduate. However, none of those credits can fulfill undergraduate graduation requirements.

DISTINCTION BETWEEN MPS & MS
Students in the MPS degree program must complete a 3-6 month internship and execute an internship and submit a written report for approval by their Committee. Students in the MS program must execute and write a MS thesis, which is an original research project synthesized into a manuscript comparable in scope and content to a peer-reviewed journal publication. The thesis may be conducted as part of research conducted at RSMAS or another academic institution, or as part of a collaborative effort with a federal, state, local, or non-governmental agency, or a private institution.

TRANSFER FROM MPS TO MS
Students may request to be considered for transfer from the MPS program into the MS program. These requests must be submitted PRIOR to the start of the second semester and/or before the completion of 12 graduate course credits. Transfers from the MPS to the MS will not be considered after students have completed 12 or more credits.
Appendix 1. MES graduate faculty 2015-2016

Jerald S. Ault, Professor — 305.421.4884
Theoretical population dynamics, risk assessment, fishery management systems

Andrew Bakun, Professor — 305.421.4986
Climate and Fisheries, ocean processes regulating marine population dynamics

Daniel Benetti, Professor — 305.421.4889
Aquaculture science, technology, R&D, management, project development, environmental monitoring, site and project feasibility studies, business and production planning

Kenny Broad, Professor and MES Department Chair — 305.421.4851
Environmental anthropology, climate and society interaction, environmental policy

David Die, Research Associate Professor and MES graduate program Director — 305.421.4607
Fisheries management, fish stock assessment, bio-economics

Nelson Ehrhardt, Professor — 305.421.4741
Fishery research and management; marine population dynamics analysis and modelling, fisheries oceanography

Maria L. Estevanez, Senior Lecturer — 305.421.4012
Management of recreational and commercial fishing, industry economic impact studies, marine resource allocation policy, marine geographic information systems

Neil Hammerschlag, Assistant Professor — 305.421.4356
Behavioral ecology of Sharks, predator-prey interactions, biomagnification of toxins; marine conservation; Outreach programs

David Letson, Professor — 305.421.4083
Economics of regulation, fisheries economics, water quality management

Sarah K. Meltzoff, Associate Professor — 305.421.4087
Marine resource management and sustainable development policy, social analyses of fisheries and aquaculture

Daniel O. Suman, Professor — 305.421.4685
Environmental Law, Coastal Law, Coastal Management, Environmental Planning, Marine Policy

Gary Thomas, Professor — 305.421.4733
Fishery ecology, coastal marine ecosystems, hydroacoustics
Appendix 2. MES course list course\(^1\) numbers\(^2\), semester offered\(^3\), frequency\(^4\) and descriptions.

**MES 501/601 Political Ecology of Resource Management** (3 credits) SPRING, ANNUAL
The course provides a grounding in political Ecology as an important theoretical approach to resource use and development. Within this framework, we will examine ethnicity, class and the politics of conservation.

**MES 502/602 Economics of Natural Resources** (3 credits) FALL, ANNUAL
Survey of natural resource economics as it is related to living resources, non-living resources, and environmental quality. Emphasis is on policy prescriptions derived from theoretical models. Emphasis will be on current national and regional marine resource management plans. Applied theories and analytical models used for marine resource assessment and management. Subjects include renewable resources such as fisheries, aquaculture, and forestry and non-renewable extractive resources such as fuels and minerals. Includes public finance including coast/benefit analysis. Prerequisite: *Permission of instructor*.

**MES 504/604 Fieldwork in coastal management** (3 credits) SPRING, ANNUAL
The field portion of this course will occur in Bocas del Toro, Panama, on the northwest Caribbean coast of Panama where the University of Miami has been involved in the development of a Coastal Management plan since 2004. The Bocas del Toro Archipelago of over 20 nearshore islands boasts a rich diversity of cultures, as well as high quality coastal environments. The region is currently experiencing rapid tourist growth, as well as residential development projects for foreigners. The cultural and biological diversities of the region, as well as the development pressures they face, provide an excellent opportunity to study the socio-economic and environmental impacts of tourist development; regional attempts to create land use and coastal plans; conflicts among different uses and users; and various cultural perspectives on the current and evolving situation. The course allows students to develop projects tailored to their interests and skills.

**MES 506/606 Advance Fieldwork in Coastal Cultures** (3 credits) SPRING, ANNUAL
Advance field course in which the student participates in a social and economic analysis of a coastal culture. (e.g. Louisiana bayou fishermen, Abacos boat builders, Tarpon Springs spongers). Students will utilize field research techniques learned in MAF 505 and develop skills in framing research problem. They will examine a coastal issue from an anthropological perspective structuring a field research paper.

**MES 508 Biometrics in Marine Science I** (3 credits) FALL, ANNUAL
Applied statistical analysis in marine biology and biological oceanography. Descriptive statistics, probability distributions, and hypothesis testing are discussed. Concepts of analysis of variance, simple linear regression, and computer statistical distribution-free methods are also included as well as principles and procedures with computer statistical packages for data analysis. Lecture and laboratory.

**MES 510/610 Environmental Planning and the Environmental Impact Statement** (3 credits) SPRING, ANNUAL
The course will take a broad view of environmental planning and analysis while focusing specifically on the preparation of environmental impact statements. Statutory requirements and procedures as the federal level will be examined. Judicial opinions will be studied that reflect environmental disputes and controversies. The course will also consider some of the substantive requirements of environmental impact analyses such as assessment of physical and biological environment and socioeconomic impacts.

**MES 512/612 Aquaculture Management I** (3 credits) FALL, ANNUAL
This course will examine the various strategies of resource exploitation and utilization in developing aquaculture projects, including environmental, technological, social, economics, and administrative aspects. Management strategies offish, crustacean, mollusk and non-traditional species farming will be studied, both at the hatchery and grow-out levels.

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\(^1\) These course numbers replace previous existing course numbers of the MAF and MBF programs which changed to MES in the spring 2016.

\(^2\) When courses have two numbers e.g. 501 and 601 they are offered at both the undergraduate and graduate level.

\(^3\) Semester represents the most common schedule and is subject to change.

\(^4\) Frequency represents the most common practice and is subject to change. Special Topic courses are temporary courses that may be offered only once or twice.
MES 513/613 Aquaculture Management II (3 credits) SPRING, ANNUAL
This course is a complement to Aquaculture Management I (MAF 512) and will examine advanced aquaculture management techniques and strategies with emphasis on commercial operations. Prerequisite: MAF 512 or permission of the instructor.

MES 516/616 Ocean Policy and Development and analysis (3 credits) FALL, ANNUAL
Ocean policy development and analysis issues such as: offshore oil drilling, fisheries resource conflicts, marine mammal protection, ocean dumping and incineration, multiple use conflicts in marine protected areas, pollution from land based sources and oil spill contingency planning.

MES 517/617 Legal Environment And Business Planning in Aquaculture (3 credits) FALL, ANNUAL
This course examines the substantive legal problems concerning Aquaculture and the Coastal zone. Legal aspects of aquaculture in developing and developed countries. Complexity of legal problems and effects of these problems on aquaculture success. Legal and regulatory constraints.

MES 518/618 Coastal Zone Management (3 credits) SPRING, ANNUAL
Development of a framework for formulation and assessment of coastal zone policy. Analysis of issues and conflicts in coastal zone management (CZM), such as: zoning and planning, coastal and beach protection, ecosystem protection, the federal flood insurance program, adaptations to sea level rise, coastal pollution from land-based sources, and tourism impacts.

MES 519 Aquaculture Management III (3 credits)
Fieldwork. Practical, hands-on experience is provided during a 2-week fieldtrip, where students visit and spend time working in hatcheries, farms and processing plants.

MES 520/620 Environmental Law (3 credits) FALL, ANNUAL
An introductory course focusing on environmental problems. Includes study of regulatory legislation, the common law and administrative law. Topics covered include toxic substances, air and water pollution, and habitat and species protection.

MES 525/625 Fisheries Socioeconomic and Management (3 credits) FALL, ANNUAL
This course will survey commercial fisheries, recreational fisheries and aquaculture from a perspective of socioeconomic as it affects management. During the first half of the semester, we will examine the unique attributes of the fishing industry, including the interaction between the harvest and the consequences of special institutional and legal conditions prevalent in fisheries. During the second half, we will study socioeconomic consequences of fishery policy, application of fishery management will be simulated/developed through readings, classroom discussion, and case studies exercises.

MES 526/626 Management of underwater cultural resources (3 credits) FALL, ANNUAL
Submerged archaeological sites as exhaustible resources analogous in many respects to non-renewable natural resources. Policies and procedures for their protection or mitigation will be surveyed, using as examples the statutes and regulations of foreign states, the federal government, and US states.

MES 530/630 Port Operations and Policy (3 credits) SPRING, ANNUAL
The course will include: Introduction to ports, ports geography; port operations, port administration, Federal port policy; free ports/free zones, port investment/tariffs, port marketing, Coastal Zone Management and ports, case studies, CZM; fostering economic development.

MES 545/645 Marine Population Assessment Surveys & Analysis (3 credits) SPRING, ANNUAL
Resource surveys aim to directly estimate abundance and population structure of species and marine communities. The course includes experimental sampling concepts and designs, instrumentation, survey implementation and statistical methods and models to directly assess size-structured exploited populations and non-target species (e.g. sea turtles, marine mammals, etc.) in marine ecosystem. Data from various surveys carried out in the past will be used in laboratory exercises. Comparative analyses of survey designs and results from an ample literature on the subject matter are included.

MES 546/646 Marine Population Biology Processes & Modeling (3 credits) SPRING, ANNUAL
Biological characteristics and anthropogenic effects affecting marine population dynamics are explained with the aim of understanding their interactive dynamics. Students will learn conceptual aspects and estimation methods for the main population parameters and processes such as growth, survival, reproduction and feeding. Emphasis is on data requirements and statistical validation of the data and model fitting such that students will develop an ability to integrate and summarize complex biological knowledge under a set of well-defined protocols.
MES 660 Introduction to Marine Geographic Information Systems (3 credits) FALL and SPRING, ANNUAL
Marine Geographic Information Systems are emerging as distinct subset of GIS, due to fundamental differences between terrestrial and underwater spatial information. Approximately the first half of the course will be a detailed consideration of basic GIS method and theory, and the second half will concentrate on aspects of marine data acquisition and manipulation in the GIS context. The course is independent of particular software programs.

MES 661 Introduction to Marine Geographic Information Systems (1 credit) Fall and SPRING, ANNUAL
This course introduces students to the basic methods and techniques in Marine Geographic Information Systems. It will be taught with hands-on laboratory exercises following the evolution of Marine Geographic Information Systems, from basic cartography to topological and network modeling to internet access and application. The course will concentrate on the use of ARCVIEW GIS including it extensions.

MES 562/662 Intermediate Spatial Analysis. (3 credits) SPRING, ANNUAL
Course provides a general survey of available quantitative methods for spatial analysis using Geographic Information Systems (GIS). Although GIS has been widely used for mapping and database management, this course is focused on the functionality of GIS as an effective tool for modeling and analyzing complex spatial relationships. Quantitative methods suitable for analyzing different features types are discussed. Applications for such methods are also presented.

MES 564/664 Citizen & Participatory Science (3 credits) FALL, ANNUAL
The Citizen and Participatory Science course will focus on preparing students for designing and implementing citizen and participatory science projects aimed at addressing questions and problems around specific environmental issues. As social networks grow, open data comes online and mobile technologies proliferate and advance, the opportunity to tap into eager and interested citizens to collect data for research and documentation purposes is quickly rising. This program will look at history of citizen science, which is over 100 years old, and will analyze current and past projects. Students will be exposed to how citizen science projects are designed and implemented and how they can be best leveraged to gain useful data for research. Guest lecturers will be invited for virtual and in-person presentations. A key component of the course will be for students to design a citizen science project using best practices. These projects can provide the baseline for launching real projects with organizations interested in applying citizen science to their work. The course will look at both technology driven projects as well as low-tech projects to expose students to the range of work being done in this rapidly evolving area.

MES 565/665 Exploration Technology and Media (3 credits) SPRING, ANNUAL
This course is designed to give an overview and broad working knowledge of some of the major tools and technologies used for doing exploratory fieldwork. Examples include but are not limited to mobile technologies, mapping, photography and video, ROV and UAV (drone) technologies.

MES 670 Conservation and Management of Marine Mammals (3 credits) FALL, ANNUAL
This course emphasizes on the notion that proper conservation and management of large marine vertebrates (i.e., marine mammals, sea turtles, sharks and rays) require the understanding and integration of some important aspects of the (comparative) biology and ecology of these groups of animals with the multifaceted nature (e.g., social, economical, ethical and cultural dimensions) of these concerns.

MES 571/671 Marine Conservation Biology (3 credits) FALL, ANNUAL
Until now, fisheries management has used a species-specific approach to conservation, focusing attention on economically important species that people consume. There has been some research on charismatic mega-fauna, particularly whales, seabirds and sea turtles. To this day, fishery biologists are concerned mainly with assessing stocks of commercially harvested species to maintain biomass production, rather than maintaining and restoring biological integrity: species composition, habitat structure and ecosystem function. It is only in the past few years that a new biodiversity-focused, ecosystem-based, multidisciplinary scientific approach to marine conservation has emerged. This new paradigm is known as Marine Conservation Biology.

MES 573/673 Marine Conservation Outreach (3 credits) SPRING, ANNUAL
This course will explore the concepts, theories and practices of creating and evaluating effective Marine Conservation Outreach. The course will cover the project life cycle from planning to implementation to evaluating effectiveness.

MES 574/674 Gold and Glory: Ethics of Exploration (3 credits) FALL, ANNUAL
This course will address changes in motivation and approaches to exploration with a focus on risk perception, physiological limitations, and social-cultural context, including how past colonial legacy is still influencing perceptions of the current generation of scientists, explorers, and the groups they interact with. Assignments will include critical readings of source materials and case studies of particular expeditions.
MES 576/676 Exploration Science Field Studies (3 credits) SPRING, SPECIAL TOPICS
This course takes theoretical concepts and methodological skills gained in the classroom and take them into the field in challenging environments, including blue water, terrestrial, and desert areas. Students will focus on science and media project as the outcome of the fieldwork.

MES 577/677 Management and Conservation of Marine Ecosystems (3 credits) SPRING, ANNUAL
In this course students will learn how fisheries management works to achieve these objectives. The primary focus will be on how fisheries interact with marine ecosystems, including how particular fisheries management measures influence fishing mortality rates. Nevertheless, the ecosystem-based approach to fisheries management requires seeing fisheries as integrated systems, so it will also be necessary to discuss social, economic and legal aspects of fisheries management.

MES 578/678 Making, Marketing & Distributing Fresh & Frozen Seafood (3 credits) SPRING, SPECIAL TOPICS
All students In the aquaculture track, learn technologies and gain experience about how to develop projects and grow seafood. However, the last and most important stage of the entire process is how to market and sell the product. This course provides the knowledge required to develop a plan to market and sell the production. The most qualified professionals to sell aquaculture seafood products are those who know most about it. This course will provide the basic training in what market seeks and how to discover it, who the buyers are and how to find them, the basics of plant management, processing and packaging, as well as how best to market and distribute their product. Students will learn how to form alliances with those who would supply them with such services, thus streamlining costs, enhancing communications and ensuring a maximum return of the investment made.

MES 579/679 Decision Analysis: Natural Hazards & Catastrophes (3 credits) SPRING, SPECIAL TOPICS
This course addresses the behavioral factors—cognitive biases, heuristics, risk perception, social influences, and past experiences that together help explain why people tend to underprepare for potential natural and man-made disasters. Implications for science communication and public policy are emphasized.

MES 681 R Computing Environment for Biological & Ecosystem Sciences (3 credits) SPRING, SPECIAL TOPICS
Understanding and resolving problems of complex biological and physical processes in marine ecosystems require sophisticated numerical solutions and incorporations of large databases. Mastery of a computer language is compulsory in next generation problem solving. The R Computing Environment is a widely used computing language for resolving biophysical problems. Techniques in the R language are taught to develop means to assimilate and visualize multidimensional data, and provide a computational toolbox to investigate and solve large - scale quantitative problems in biological and marine ecosystem sciences.

MES 583/683 Biology, Ecology and Management of Mangroves (3 credits) SPRING, SPECIAL TOPICS
This course is intended to introduce students to mangrove ecosystems, one of the most productive, and biologically diverse, ecosystems in the world, and one of South Florida's key coastal ecosystems. The principal objective is to explain how our scientific understanding of mangrove ecosystems has been unfolding and how today they are considered paramount not only for their organic carbon contributions to coastal areas, but as protectors of the coast, mitigators of global climate change, reservoirs of biodiversity, and supporters of the livelihoods of millions of inhabitants throughout the world. The course will consist of lectures, class discussions, and presentations of student assignments. The lectures will follow an open seminar format in which all students are expected to actively participate in the discussion of the presented material. Two lectures will take place during field trips to local mangrove areas.

MES 590/690 Acoustic Measurement (3 credits) SPRING, ANNUAL
This is an introductory course on the theory, history and applications of acoustics to measure nekton, plankton and underwater habitat. It was designed for those students who wish to learn how to make quantitative measures of organisms and structure underwater. It is a prerequisite for MBF 690, Advance Measurement of Nekton, Plankton and Underwater Habitat, which focuses on data acquisition in the field and laboratory signal processing. This course is essential for students who need to make precise and accurate underwater measurements for their research.

MES 710 International Ocean Law and Governance (3 credits) SPRING, ANNUAL
This course analyzes how international and municipal law deals with navigation, pollution, fisheries, exploitation of natural resources, and other uses of the ocean. In addition to jurisdictional issues, sources of international law and scientific research in ocean areas are examined.

MES 713 Marine Population Dynamics (3 credits) FALL, ANNUAL
The concepts of stocks, sub-populations, and populations as biological systems in the marine environment. Quantitative studies of growth, mortality, recruitment, and abundance of marine populations are discussed. Data requirements, experimental design, sampling,
and mathematical procedures for estimating population parameters are included. Lecture and laboratory.

**MES 714 Population Modeling and Management** (3 credits) FALL, BI-ANNUAL
A synthesis of advanced mathematical and computer-intensive models to monitor, assess and manage responses of marine populations to exploitation and environmental changes. Exposition and development of quantitative modeling concepts and stock assessment techniques to include: (1) principles of resource management; (2) stock production models and surplus yield; (3) structured (age- & length-based) analytical yield models; (4) stock and recruitment models; (5) analytical modeling and parameter estimation; and, (6) dynamic structured assessments. Equilibrium and non-equilibrium approaches will be evaluated with respect to data assimilation and parameter estimation. Simulation modeling tools will be used to highlight and reinforce concepts in decision theory, adaptive control, and risk assessment. Specific population modeling and resource allocation case studies from regional, federal and international fishery management institutions will be illustrated.

**MES 715 Advanced Biometrics in Marine Science** (3 credits) FALL, BI-ANNUAL
An introduction to advanced multivariate statistical analysis of empirical observations with primary emphasis on applications in the assessment and interpretation of the dynamics of populations and communities in marine biology, fisheries, biomedical sciences, and biological oceanography. Advanced methods in generalized linear models, multiple and nonlinear regression model analysis, probability and estimation theory, multiple partial correlation, ANCOVA, generalized additive models, nonlinear optimization, and multivariate statistics (classification and ordination methods). Exploratory data analysis and modeling will be emphasized using the software: R Project for Statistical Computing, SAS and MATLAB.

**MES 720 Coastal Law** (3 credits) FALL, ANNUAL
This course examines the authority of different levels and agencies of government to make decisions affecting the coastal zone. It also explores the coastal problems of shoreline uses and development, uses of water areas and seabed, and the related questions of environmental protection.

**MES 790 Advanced Acoustics** (3 credits) FALL, ANNUAL
This is the second course in a series on the acoustic measurement of nekton, plankton and underwater habitat. It follows in the introductory course MES 690. In this course, we will focus more on the acquisition and processing of plankton, nekton and marine habitat data using sonar hydrophones. We will also spend time reviewing and discussing the classic papers that have been published on this topic. This class was designed for those students who wish to learn how to make quantitative measures of organisms and underwater habitat structure for their research.