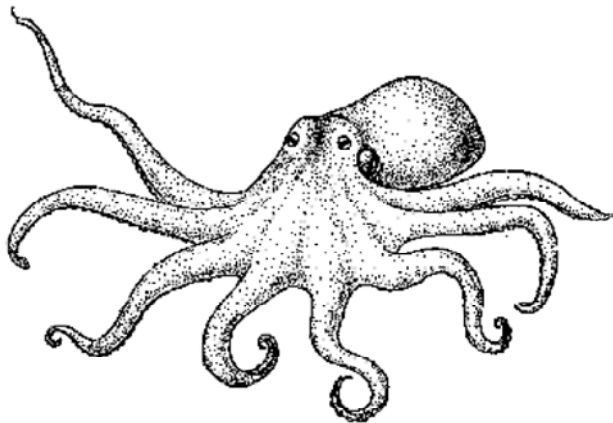


COLLEGE *of*  
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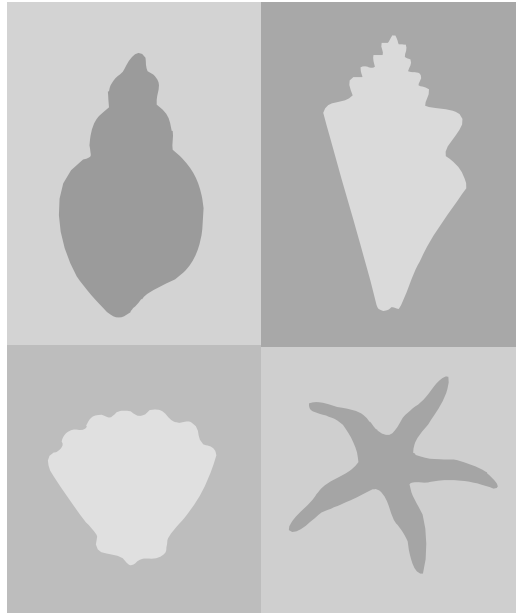
GRADUATE PROGRAM IN  
MARINE BIOLOGY

# Student Handbook



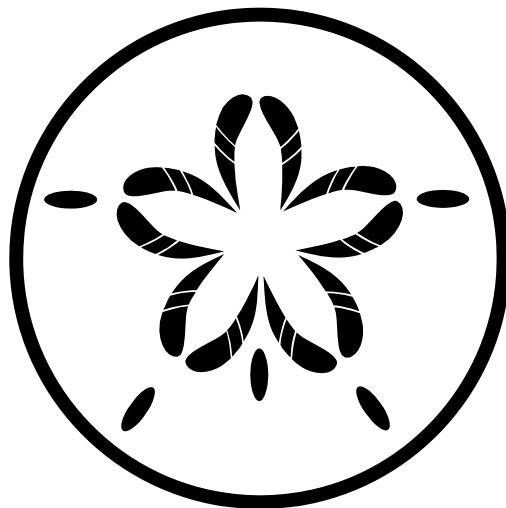
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# Overview



## ***The Graduate School – College of Charleston Graduate Program in Marine Biology***

Program of Study	<p>The Graduate School – College of Charleston offers a cooperative graduate program leading to a Master of Science degree in marine biology. The program specifically seeks to provide knowledge and skills that will allow graduates to pursue further graduate study and/or successfully pursue professional employment in the marine sciences fields. Students in the program have the opportunity to be in daily contact with individuals involved in virtually the entire spectrum of research in coastal ocean and estuarine systems, from molecules to ecosystems. The Graduate School benefits from its close associations with other academic and research institutions including The Citadel, The Marine Resources Research Institute of the South Carolina Wildlife and Marine Resources Department and the associated Waddell Mariculture Center, the Medical University of South Carolina and its Marine Biomedicine and Environmental Science Program, and the Charleston Laboratory of the National Marine Fisheries Service. Faculty and staff at these institutions actively serve as members of the Marine Biology Graduate Faculty, working closely with the students. The broad scope of the interests of the graduate faculty and the facilities provide students with a wide variety of research and training opportunities in such areas as aquaculture, fisheries, fisheries management, ichthyology, immunology of marine organisms, marine biomedical sciences, marine biotechnology, marine ecology, marine environmental sciences, marine toxicology, molecular biology, ornithology, oceanography, physiology, physiological ecology, resource management, and systematics.</p>
Research Facilities	<p>The George D. Grice Marine Laboratory (GML) houses the main research and educational activities of the Graduate Program in Marine Biology. The location of the Grice Lab near the mouth of Charleston Harbor provides an ideal setting for research and study. Here research vessels and small boats provide the student with immediate access to the relatively unspoiled and biologically rich South Carolina coast.</p> <p>The Grice Marine Lab is located at Fort Johnson on James Island, across the harbor from the College's main campus in historic downtown Charleston. GML is a part of a larger community at Fort Johnson including laboratories of the South Carolina Marine Resources Research Institute, the Marine Biomedical and Environmental Sciences Program of the Medical University of South Carolina, and the Southeastern Laboratory of the National Marine Fisheries Service. A limited amount of dormitory space is available at the Grice Lab. The College's main downtown campus supports the Graduate Program in Marine Biology with the Addlestone Library, a modern Academic Computing Center, and a Science Center housing the departments of Biology, Chemistry, Geology, and Physics. The Medical University of</p>

South Carolina, situated downtown within blocks of the College, houses	<p>numerous teaching and research laboratories and offers graduate courses in several ancillary areas.</p> <p>The program has available teaching assistantships, research assistantships, summer assistantships, and several scholarships. Students that are working on an assistantship are eligible to apply for an out-of-state tuition abatement.</p>
Financial Aid	<p>Tuition per semester for in state students or students on an abatement is \$3708 in 2010-2011. Students pay \$412 per credit hour plus any additional fees.</p>
Cost of Study	<p>A limited number of dormitory rooms are available at the Grice Marine Laboratory during the academic year for \$1601 per semester, but off-campus housing in Charleston is abundant. The cost of housing, food, and moderate extras totals approximately \$550 per month for a single graduate student.</p>
Cost of Living	<p>There is an average enrollment of about 50 graduate students in the marine biology program; most of these students receive financial assistance in the form of teaching assistantships or research assistantships.</p>
Student Group	<p>The College is located in the heart of one of America's most historic cities. Charleston and the surrounding areas offer many interesting and attractive places to visit, including numerous old homes and buildings, three internationally acclaimed gardens, Fort Sumter, Cape Romain Wildlife refuge, Francis Marion National Forest, and the well-known and undeveloped Sea Islands. The city also offers a wide variety of cultural and sporting activities. Regional points of interest include the Appalachian Mountains and Atlanta, both about 5 hours away, and Savannah, Georgia, Hilton Head Island and the popular Myrtle Beach area are all about 2 hours away.</p>
Location	<p>The College of Charleston, SC was founded in 1770 as the first municipal college in the United States. In 1970, the College of Charleston became part of the South Carolina state college system. In 1992 the graduate programs of the College of Charleston were reorganized as the University of Charleston, SC. In 2002 it was renamed The Graduate School – College of Charleston.</p>
The University	<p>Prospective graduate students should apply by February 1 for admission the following September or by November 1 to be admitted for January enrollment. Applicants must take the Graduate Record Examinations General Test and submit complete transcripts and three letters of recommendation. The Graduate Record Examination Subject Test in biology is optional.</p>
Applying	

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## *History of Fort Johnson*

Fort Johnson, later to be associated indelibly in the minds of colonial South Carolinians with liberty, was named in honor of a determined and aggressive English aristocrat. Sir Nathaniel Johnson was governor of the colony during one of its many times of tribulation in the proprietary period. War impended between the British and the Spanish, whose powerful fortress at St. Augustine seemed to menace the very existence of the Carolinas. Accordingly, in order to make the harbor more secure against expected enemy invasions, Governor Johnson ordered the erection of a strong point on the exposed neck of land which projected into Charles Town harbor and thereby dominated it. The year was 1704, Fort Johnson's history since that time has been as continuous and traceable, if not as striking and dramatic, as that of Fort Sumter.

The fort was strengthened in 1759, when it appeared that a climax in the Anglo-French rivalry for North America was in the making. The fort saw no action, however, in this bitter controversy with the French.

During the Stamp Act crisis the now venerable fort played its role. The populace of Charles Town was incensed at the arrival in the colony of the offensive stamps. Lt. Governor William Bull, fearing violence in the streets, sent the hated stamps to Fort Johnson for safekeeping. The colony was outraged by the Stamp Act legislation - legislation which was destined never to be enforced. The garrison at Fort Johnson was strengthened, and there the hated stamps were to remain until Parliament rescinded the Act.

Early in the Revolutionary War, Fort Johnson was seized by the rebellious colonials. Though the fort did not play a particularly important role in the military history of the revolution, this early skirmish is remembered because for the first time local provincial troops used a South Carolina flag. Before the battle Colonel William Moultrie had been authorized by the revolutionary government to design a flag to accompany his troops. He chose the dark blue color of his regiment's uniforms and placed upon this background of blue the silver crescent which decorated the soldier's hats. This was the flag that accompanied the victorious advance of the colonial troops. After the heroic resistance at the log fort across the harbor on Sullivan's Island, the palmetto was added to this handsome and unique state flag.

Throughout the rest of the 18th and 19th centuries the fort waxed or waned according to potential American involvement in foreign conflicts. Thus, the fort was strengthened before the War of 1812, but by 1830 the fort was again neglected and in a state verging on complete decay. Prior to the Civil War several permanent buildings were added. Fort Johnson is probably best remembered today as the place from which one signaling mortar shell was fired - a shell that opened the bombardment of Fort Sumter. The ultimate appeal had been made in the hitherto political conflict between North and South, for that one mortar shell symbolized the appeal to force.

In 1864 the fort saw its last military encounter when a group of

confederates beat back and captured a sizeable force of Union troops. In the following year the fort was evacuated. Slowly it fell into rack and ruin.

Early in the 20th Century the federal government took over the fort as the Quarantine Station for the Port of Charleston. Later it was again abandoned, and the property and buildings were allowed to fall into dilapidation. Finally, in 1954, the College of Charleston, acting with the then Medical College of South Carolina, secured title to the forty acre property. A building on the point (later occupied for a few years by the South Carolina Sea Grant Consortium offices) was used as a residence for the president of the Medical College. A couple of adjoining buildings served ancillary functions for the Medical College such as cadaver storage. The remainder of the property and buildings constituted the Fort Johnson Marine Biological Laboratory of the College of Charleston. Dr. Joseph Merkle, a marine microbiologist, was its first director. Ultimately the college's marine laboratory was renamed after Dr. George Grice, who was president of the College of Charleston when the laboratory began, and who was instrumental in establishing at the college what was apparently the first undergraduate marine biology program on the east coast. In 1962 Dr. Norman A. Chamberlain was named Laboratory Director.

When the College became a state institution in 1970, title to all of the College's property at Fort Johnson, except for the Grice Marine Laboratory building and a small amount of surrounding land, was deeded to the newly-established South Carolina Marine Resources

Division (SCMRD). The SCMRD, which moved from the Bears Bluff Laboratory (directed for many years by Dr. Robert Lunz) on Wadmalaw Island, began construction of its Fort Johnson laboratory in 1970. SCMRD moved into its administration building in 1971 under the direction of Dr. James A. Timmerman, Jr. (formerly Chair, Department of Biology, The Citadel). Dr. Edwin B. Joseph was named director in 1973, succeeded in turn by Dr. Paul A. Sandifer in 1984.

The new addition to the Grice Marine Laboratory was constructed to the rear of the older building in 1975. The new facilities provided more space for teaching, research and specimen collections. Several rooms in the old Grice lab building were converted into dormitory rooms as a consequence of the demolition of the old dormitory building at about the same time. In 1978 the Charleston Laboratory of the Southeastern Division of the National Marine Fisheries Service was established at Fort Johnson. This involved a transfer of programs and personnel from College Park, Maryland, to Charleston. The Charleston Higher Education Consortium Graduate Program in Marine Biology began when 6 to 8 students matriculated during the 1973-74 academic year. Although established as a consortial program, it was centered in the Department of Biology of the College of Charleston, with Dr. Norman A. Chamberlain as its first Program Director. In May, 1980, Dr. Paul A. Sandifer assumed the position of Program Director in addition to his duties at SCMRD. Concurrently the Marine Biology Program became more truly consortial with more faculty involvement from the Citadel, the Medical University of

South Carolina, and SCMRD. At that time the requirement that major advisors be College of Charleston faculty was eliminated.

In July 1982, Dr. Thomas Cheng of MUSC was named Director of the Graduate Program. He served until the summer of 1985. Dr. Charles K. Biernbaum of the College of Charleston served as Interim Director during the 1985-86 academic year while a search was made for a permanent director. Dr. Robert K. Johnson assumed the duties of Program Director in

August 1986, and served in this capacity until 1992. From 1992-93, Dr. Louis Burnett, current Director of the Grice Marine Lab served as Acting Program Director. In 1993, Dr. Richard C. Brusca came to the College of Charleston and was the Director of the Graduate Program in Marine Biology. Dr. David Owens arrived in Charleston to direct the program in 1999. In January 2007, Dr. Craig Plante assumed the duties of Program Director. As of Fall, 2009, the Program has over 100 faculty and more than 50 matriculated students.

## *Grice Marine Laboratory*

The George D. Grice Marine Laboratory, named in honor of the 14th president of the College, is located at Fort Johnson, on James Island, across Charleston Harbor from downtown Charleston. The facility houses classrooms, student laboratories, research laboratories, faculty offices, an aquarium room, and a research collection of marine invertebrates and fishes. It has combined its extensive marine science library holdings with the holdings of the Marine Resources Research Institute of the South Carolina Department of Natural Resources to form the Cooperative Marine Resources Library at Fort Johnson.

Undergraduate and graduate research and courses related to the marine environment are conducted at the Grice Laboratory. The graduate program in Marine Biology is headquartered at Grice. In addition to the College of Charleston facilities, the facilities of the Marine Resources Division of the South Carolina Department of Natural Resources, the Marine Biomedical and Environmental Sciences Program of the Medical University of South Carolina, the National Institute of Standards and Technology (NIST) and the National Oceanic and Atmospheric Administration/National Ocean Service (NOAA/NOS) are available to graduate students, staff, and visiting scientists for study and research purposes.

The Ft. Johnson property has historic associations dating back more than 200 years. Among the remains of fortifications dating from the Revolutionary War are a brick powder magazine and, from a later period, the foundations of a Martello tower. The opening rounds of the bombardment on Fort Sumter that began the Civil War were fired from these fortifications.

### MISSION STATEMENT

The Grice Marine Laboratory is a core facility in support of the undergraduate and the graduate teaching programs in the marine sciences at the College of Charleston, and in support of research in marine sciences conducted by faculty members and students. The mission of the laboratory is to provide an environment that:

1. Promotes the acquisition and the dissemination of knowledge about marine and coastal organisms, process, and environments, and marine and coastal environmental concerns and issues.
2. Supports the Bachelor of Science and Master of Science degrees in Marine Biology.
3. Encourages collaborative interdisciplinary marine research among academic departments as well as with other institutions and marine research facilities, particularly those in the Fort Johnson community.
4. Nurtures undergraduate, graduate, and post-graduate learning through formal and informal courses, lecture series, symposia, independent and collaborative research, and post-doctoral appointments and internships.
5. Fosters the intellectual development of marine scholars by providing diverse programs that strive for excellence in research and training.
6. Fulfills an important role in marine science education and research in the Lowcountry.
7. Supports existing and new marine-oriented programs, including interdisciplinary programs, as appropriate to the Laboratory.
8. Maintains a collection of marine biological specimens, curated with disciplinary-standard techniques, for use by faculty and students in research and teaching.

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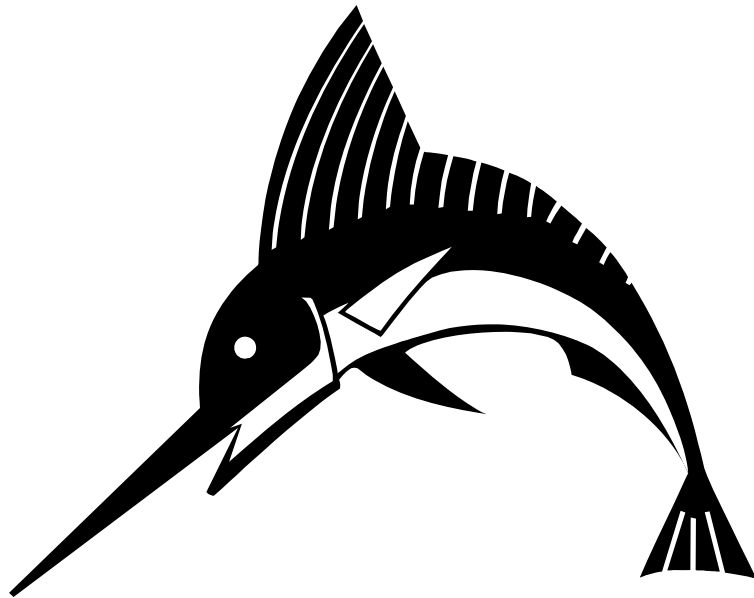
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- Frances M. Van Dolah (PhD)*, Medical University of South Carolina. Functional genomics of toxic dinoflagellates; effects of algal toxins on marine mammals and human consumers.  
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- Cheryl M. Woodley (PhD)*, Medical University of South Carolina. The application of biochemistry, molecular and cellular biology to understanding the effects of biotic and abiotic stressors on ecosystem health.  
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- David M. Wyanski (MS)*, College of William and Mary. Life history and taxonomy of marine fishes, fisheries biology.  
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- John D. Zardus (PhD)*, Northeastern University. Evolution and ecology of commensal barnacles.  
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- Anastasia M. Zimmerman (PhD)*, Washington State University. Molecular evolution of the vertebrate immune system; genome-wide analyses of innate and adaptive immune loci in fishes; use of the zebrafish as an immunological model.  
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# Policies and Guidelines



## *Academic Regulations & Policies of the Graduate Program in Marine Biology*

Below are the academic regulations of the Graduate Program in Marine Biology (GPMB), updated May 2002 subsequent to several minor changes and clarifications by the Graduate Faculty in Marine Biology during the 01/02 academic year. Additional information on graduate program requirements will be found in the College of Charleston's *Graduate Studies Bulletin*. Students in the GPMB are accountable to the general requirements of the College's Graduate Studies Office (see *Graduate Studies Bulletin*) as well as the GPMB requirements. Important curricular and GPMB deadlines are boldfaced below.

Deadlines for receipt of GPMB admissions applications are February 1 for the fall semester, and November 1 for the spring semester. The Program prefers to admit students in the fall, except in unusual circumstances. Admission requirements for the GPMB are detailed in the *Graduate Studies Bulletin*. Note: New students should go to the Graduate Studies Office at the College of Charleston's downtown campus to change their address of record to their local (South Carolina) address. Otherwise there may be confusion with grade reports and other important mailings.

### **1. Advising and Registration**

Advising and registration for graduate students is continuous. The Program Director is available, by appointment, to talk with students during most of the year, and during his absence another designated graduate faculty member is available. The Program Director advises students during their first two semesters in the graduate program, or until they have formally acquired an Advisor and Thesis Committee. New students are strongly encouraged to meet and talk with other students and faculty, especially during their first year in the Program. Registration is done through the Graduate Studies Office or online through Cougar Trail at <https://cougartrail.cofc.edu/>. At present, an out-of-state tuition abatement is available for students in the GPMB who have an assistantship.

### **2. Academic Advisor and Thesis Committee**

A list of the GPMB faculty, with their areas of interest, is included in this *Handbook* or can be found online at <http://www.cofc.edu/marine/facultylisttable.htm>. During a student's first two semesters in the Program, they are expected to talk with those faculty members whose areas of research interest seem similar to their own. This will aid in developing ideas for a Thesis Committee and research project. Students are introduced to many of the faculty in graduate seminars during the Fall and Spring (Biol. 620, 621) semesters.

**Students should select an Academic Advisor and Thesis Committee no later than the end of their second semester in the program.** This is when they will decide upon their specific thesis research area. The Advisor and Committee will aid them in making further curriculum and research decisions. The Thesis Committee must include an Advisor plus a minimum of three additional members (one must be a CofC member and one may be a non-GPMB faculty member or an "outside member"). The Thesis Committee must be approved by the Program Director (**GPMB Form 1**). Normally students would not change committee members during their tenure in the program. However, in the event that a change in membership of the Committee becomes necessary, the Program Director will act with the advice and consent of the student's Advisor and, if necessary, the Marine Biology Graduate Council.

The role of the Advisor (augmented by the Thesis Committee) is to assist the student with:

1. Selection of courses

2. Determination of the research subject, its scope and its limitations
3. Preparation of the thesis proposal
4. Direction of the thesis research
5. Preparation of the thesis

The roles of the student's Thesis Committee are:

1. To certify the successful completion of the oral comprehensive examination (majority approval required) **(GPMB Form 2)**
2. To certify the acceptance of the thesis proposal (unanimous approval required) **(GPMB Form 3)**
3. To advise upon and approve the program of study **(GPMB Form 4)**
4. To certify preliminary acceptance of the thesis (unanimous approval required) **(GPMB Form 5)**
5. To certify the successful defense of the thesis (majority approval required) **(GPMB Form 6)**

### **3. Comprehensive Oral Examination**

The following regulations for this exam were adopted by the GPMB Faculty:

- (1) **Students must take the comprehensive oral exam, no later than one month (7/1 or 3/1) after completion of their core courses.**
- (2) The oral examination is comprehensive in nature and meant to determine whether or not the student is conversant in the area of marine biology in the broad sense. The exam is not meant to focus specifically on the student's [possible] areas of research interest, but to test their grasp of biology in general and marine biology in particular. It is also meant to provide an interactive setting in which a student's Thesis Committee can assess areas of the student's strengths and weaknesses, test the student's ability to respond in an interactive oral mode, and give the student experience in this setting. It is the successful completion of this exam that formally admits the student to candidacy for the degree and qualifies the student to begin their thesis research.
- (3) The Examination Committee for a student's oral comprehensive exam shall be composed of the student's Thesis Committee plus another GPMB faculty member appointed by the Program Director who will (1) chair the examination, and (2) be chosen specifically with the intent of assuring that the Examination Committee is comprised of members with a broad range of disciplines in marine biology.
- (4) The Program Director has the option of appointing a second GPMB faculty member to the Examination Committee, should he/she feel it necessary to assure that the Committee is composed of a broad range of disciplinary interests in marine biology.
- (5) The exam shall last no less than one hour and no more than 1.5 hours and is open to all GPMB faculty. Questions from the GPMB faculty in the audience are encouraged, but it is the Chair's responsibility to assure that the student's Examination Committee has at least two rounds of questioning during the course of the examination.
- (6) A simple majority vote is necessary for the student to pass the exam. All members of the Examination Committee vote, including the chair.
- (7) There are several possible outcomes of the exam, and the Examination Committee may recommend to the Program Director that the student:
  - (a) Passed the exam

- (b) Passed the exam but with certain conditions (e.g. the student may be required to take some remedial course work, either for credit or audit, or may be required to undertake some remedial reading or study under the guidance of a specified committee member or other GPMB faculty)
  - (c) Failed the exam but should be allowed to repeat the exam within a specified time period
  - (d) Failed the exam and should be removed from the Program
- (8) Upon recommendation of the Examination Committee, students may retake the examination a second time. Normally a second failure will result in the recommendation that the student be removed from the Graduate Program. Under exceptional circumstances, and upon recommendation of the Examination Committee, a student may take the examination a third time.
- (9) The Examination Committee reports the results of each exam on **GPMB Form 2**, which is to be submitted to the GPMB office.

#### **4. Thesis Proposal and Plan of Study**

**After forming the Thesis Committee and passing the oral exam, students must present to their Committee a thesis proposal and plan of study.** The student's Advisor will assist in the format of the Thesis Proposal (**GPMB Form 3**), which should include a formal, written document reflecting an appropriate understanding of the subject material. The proposal should clearly describe the question(s) to be asked or hypotheses to be tested, the methods to be used, any anticipated problems that might be encountered, a preliminary literature review, expected results, and a well-defined time frame (calendar of events). The Thesis Proposal must be submitted no later than 90 days after completion of the core courses. A copy of both the form and the proposal must also be submitted to the GPMB office.

The purpose of the thesis proposal is to assist students in approaching their research in a clearly focused manner. The thesis proposal is not intended to restrict or limit students' freedom to pursue interesting avenues of their research question that may appear during the course of their work. If difficulties arise over the nature of a student's research project that cannot be resolved to the satisfaction of the student and his/her Thesis Committee, the student or his/her Advisor may appeal to the GPMB Director or the Marine Biology Graduate Council.

The Plan of Study (**GPMB Form 4**) includes a list of all the courses the student intends to take (in some cases this may include remedial course work, or special courses appropriate to the student's field of interest as recommended by their Advisor or Thesis Committee). Final acceptance of the Thesis Proposal and Plan of Study requires the signatures of the Advisor and Committee members, and the Program Director. Successful completion of the Plan of Study is required by the Graduate Studies Office before they will certify graduation.

Students must not procrastinate in developing their thesis proposal and plan of study. These are very important steps in the program. Students encountering problems should talk with their Advisor or the Program Director as soon as possible.

#### **5. Course Work to Meet Degree Requirements**

To graduate, a minimum of 30 semester hours (units) is required. During the first year in the Program, students are required to take 6 core courses, as follows:

- Biol. 600 *Physiology and Cell Biology of Marine Organisms* (4)
- Biol. 601 *Ecology of Marine Organisms* (4)
- Biol. 610 *Physical Oceanography* (4)
- Biol. 611 *Biometry* (4)

- Biol. 620 *Graduate Core Seminar* (Fall) (1)  
Biol. 621 *Graduate Core Seminar* (Spring) (1)

Additionally, students must complete the following:

1. One unit of seminar (Biol. 650 *Seminar in Marine Biology*)
2. One course in organismal biology (4 units) from the following list:

Biol. 630 *Marine Invertebrate Zoology* (4)  
Biol. 631 *Biology of Crustacea* (4)  
Biol. 632 *Ichthyology* (4)  
Biol. 635 *Marine Botany* (4)

3. Three units of course work from the following list:

Biol. 502 *Special Topics* (1-4)  
Biol. 503 *Special Topics in Ecology* (1-4)  
Biol. 510 *Field Methods in Marine Ecology* (2)  
Biol. 640 *Applied and Environmental Microbiology* (4)  
Biol. 641 *Marine Parasitology* (4)  
Biol. 646 *Aquatic Toxicology* (3)  
Biol. 643 *Fisheries Science* (3)  
Biol. 644 *Aquaculture* (3)  
*Additional courses may apply*

4. Four units of thesis credit (Biol. 700 *Thesis* (1-4) is also required.
5. Attendance at the Fort Johnson Marine Science Seminar Series is expected of all students.

## 6. Course Descriptions

### Biol. 502 Special Topics (1-4)

Special studies designed to supplement regular offerings in the program or to investigate an additional, specific area of marine biological research. Recent Special Topics courses have included Coral Reef Biology, Biology of Deep-Sea Organisms, Experimental Marine Ecology, and Marine Biodiversity.

### Biol. 503 Special Topics in Ecology (1-4)

Investigation of advanced specific areas of ecology beyond General Ecology (BIOL 341). Examples of offerings may include marine microbial ecology, phytoplankton ecology, benthic ecology, community ecology and population ecology.

### Biol. 600 Physiology and Cell Biology of Marine Organisms (4)

A study of the regulatory mechanisms found in marine organisms especially as they relate to interactions between the organism and the environment. Mechanisms will be discussed at the organismal, organ-system, tissue, and cellular levels. Lectures, three hours per week; laboratory, three hours per week.

### Biol. 601 Ecology of Marine Organisms (4)

The study of living organisms in the marine environment - population and community ecology, reproduction and life histories, productivity, evolution and biogeography. A broad overview of

these elements is followed by detailed consideration of major coastal and oceanic ecosystems around the world. Lectures, three hours per week; laboratory, three hours per week.

**Biol. 610 Physical Oceanography (4)**

A study of the physics and chemistry of ocean and estuarine waters, circulation, waves and tides. Lecture and laboratory work emphasizes the interrelationships of physical, chemical, geological, and biological processes in the sea. Lectures, three hours per week; laboratory, three hours per week.

**Biol. 611 Biometry (4)**

A broad treatment of statistics concentrating on specific statistical techniques used in marine biological research. Topics covered include sampling procedures and analysis of distributions (binomial, poisson, and normal), hypothesis testing and estimation with emphasis on analysis of variance and experimental design (Latin-square, nested, randomized block, factorial), analysis of frequencies, regression, and correlation. Several nonparametric and multivariate methods which are pertinent to research in the marine biological science are discussed. Although course emphasis is oriented toward application of statistical techniques and not toward theory; a knowledge of mathematics through calculus is expected. Lectures, three hours per week; laboratory, one hour per week.

**Biol. 620, 621 Graduate Core Seminars (1)**

Seminars on contemporary topics in marine biology to acquaint students with the variety of disciplines and techniques available to scientists working in the marine environment. Designed especially to stimulate students new to the program to choose thesis topics. One hour per week.

**Biol. 630 Marine Invertebrate Zoology (4)**

A study of the functional morphology, life history, taxonomy, and other selected aspects of the biology of marine invertebrates. Lectures, three hours per week; laboratory, three hours per week.

**Biol. 631 Biology of Crustacea (4)**

A study of the biology of crustacean arthropods. Topics include evolution, taxonomy, functional morphology, physiology, embryology, ecology, behavior, commercial management, and aquaculture. Lectures, three hours per week; laboratory, three hours per week. Prerequisite: A course in invertebrate zoology.

**Biol. 632 Ichthyology (4)**

A study of the biology of fishes, emphasizing diversity and evolution, morphology, physiology, ecology, life histories, behavior, systematics and biogeography. Laboratory work will focus on groups important in the local fauna. Lectures, three hours per week; laboratory, three hours per week.

**Biol. 635 Marine Botany (4)**

Introduction to taxonomy, morphology, phylogeny, and ecology of marine plants. Major groups of planktonic and benthic algae and vascular plants from the coast of South Carolina are studied. Lectures, three hours per week; laboratory, three hours per week.

**Biol. 640 Applied and Environmental Microbiology (4)**

A lecture and laboratory study of the special applications of microbiology to domestic water and waste water and solid wastes, food and dairy products, and industrial processes. Includes microbial distribution and its role in various marine and freshwater, terrestrial, animal, and product environments. Lectures, three hours per week; laboratory, three hours per week.

**Biol. 641 Marine Parasitology (4)**

The morphology, life cycles, ecology, physiology, and pathogenic effects of animals parasitic in or on marine hosts are considered. The parasites to be studied include protozoa, helminths, arthropods, and other miscellaneous groups typical to the marine environment. The principles and practice of parasite taxonomy and evaluation, along with morphologic and physiologic studies, are emphasized in the laboratory. Lectures, three hours per week; laboratory, three hours per week.

**Biol. 643 Fisheries Science (3)**

A general introduction to methods of harvesting aquatic resources and collection and evaluation of biological data to effectively manage these resources. Topics include age and growth analysis; mortality, recruitment, and yield; production and early life history; stock assessment techniques; and detailed study of a certain important fisheries. Lectures, three hours per week.

**Biol. 644 Aquaculture (3)**

Principles and techniques of aquaculture, with emphasis on warm-water species which spend all or part of their lives in salt water. Status and potential of aquaculture, including detailed discussions of established and candidate species. Design and management of aquaculture systems. Importance of water quality, feeding and nutrition, diseases and predators, genetics and breeding, and economic considerations in aquaculture. Lectures, three hours per week.

**Biol. 645 Systematic Biology (3)**

An in-depth coverage of the principles of systematics with emphasis on reconstruction of relationships and evolutionary history of organisms. Topics include current theories of systematic and evolutionary biology, methods of phylogenetic systematics, and critical evaluation of phylogenetic hypotheses.

**Biol. 646 Aquatic Toxicology (3)**

An assessment of the effects of toxic substances on aquatic organisms and ecosystems. Topics include general principles of toxicology, fate and transport models, quantitative structure-activity relationships, single-species and community-level toxicity measures, regulatory issues, and career opportunities. Examples are drawn from marine, freshwater and brackish-water systems. Lectures, three hours per week.

**Biol. 650 Seminar in Marine Biology (1)**

A seminar covering various topics in marine biology, fisheries and aquaculture, marine biomedical science, and coastal ecology. Total semester hours in BIOL 650 is normally limited to 3. May not satisfy elective unit requirement.

**Biol. 690 Independent Study (1-4)**

An individual, directed study of issues or topics in an area of marine science. The topic and project outline must be approved by the thesis committee and the program director. Repeatable up to six semester hours toward graduation.

**Biol. 700 Thesis (1-4)**

Individual thesis research in marine biology. No more than 4 semester hours of thesis may be counted toward fulfilling the minimum degree requirements.

## **7. Grades**

Students whose overall GPA (grade-point average for all graduate-level courses combined) falls below 3.0 are automatically placed on academic probation. Failure to achieve an average of 3.0 in the next regular semester's work and to raise the cumulative GPA above 3.0 upon the completion of three additional courses or within two semesters of probation will lead to the student being dropped from the program. A grade of D is not available for graduate students; only A through C,

and F. Students receiving three grades below the grade of B or one grade of F in the program will be withdrawn from the College and will not be allowed to reapply for one calendar year. These rules override those stated in the graduate catalog.

## **8. Withdrawal from Courses**

Withdrawals from courses are discouraged and may be made only after consultation with the instructor, the student's Advisor, and the Program Director. The grade W indicates that the student withdrew from the course prior to the end of the fourth week of classes in the semester. No credit hours are recorded for the grade of W. Permission to withdraw will be granted only if continued enrollment in the course would be detrimental to the student's health or if extenuating circumstances prevent the student's continued enrollment. Withdrawal forms must be completed in the Registrar's Office before the end of the withdrawal period each semester. These dates are posted in each term's published *Schedule of Classes*.

## **9. Continuous Enrollment**

Student participation in the program must be continuous with the exception of summer semesters. Any student who wishes to break continuity for whatever reason must request (in a written letter to the Program Director), and have approved by the GPMB Council and the Graduate Dean, a leave of absence from the program. Any student who fails to maintain continuous enrollment will be considered a new applicant upon expression of interest to re-enter the Program.

## **10. Minimum/Maximum Enrollment Credit**

Graduate students are required to enroll in a minimum of 1 unit each semester they are in the Program. Failure to do so will result in being dropped from the Program. Students that are on Teaching or Research Assistantships are required to enroll in a minimum of 9 units/semester (registration in Biol. 900 is used to fulfill this non-course, continuing enrollment requirement). The maximum allowable load for which a graduate student may enroll in any given semester is 12 units; to exceed this requires permission of the Program Director and the Graduate Studies Office.

## **11. Teaching Assistantships**

The number of available teaching assistantships is limited, and the awarding of these contracts is competitive. Teaching Assistantships are normally limited to a maximum of 4 semesters. At this time, teaching assistants receive \$6,650 per semester.

## **12. Research Assistantships**

Research assistantships are highly competitive. Typically, they are awarded by specific graduate faculty with available funds from research grants or contracts. The best way for students to learn about these opportunities is to get to know the Program faculty, especially those whose labs are at Ft. Johnson (i.e. at the Grice Lab, the State Marine Resources Lab, and the National Ocean Service Lab). Students will be introduced to these labs and many of their research staff during their first year graduate seminars (Biol. 620, 621). Research Assistantships may range in amount, but will not pay less than \$6,200 per semester.

## **13. The Fort Johnson Marine Science Seminar Series**

Each year, a seminar committee at Fort Johnson arranges a series of seminars by scientists from local institutions and around the country. **All graduate students are required to attend these seminars - it is part of the GPMB curriculum.** Other seminars are also frequently given at the

College of Charleston's downtown campus, the Medical University of South Carolina, The Citadel, and other local area institutions. Students should try to take advantage of these other seminars as time allows; they are excellent opportunities to learn and to meet colleagues.

#### **14. Research and Thesis Preparation**

An overview of research and thesis preparation can be found on the Graduate School website at <http://gradschool.cofc.edu>, and students are encouraged to read it carefully. Several good books exist that also describe the research/thesis writing process, and writing in general, including:

Council of Biology Editors, Inc. 1978. *A Guide for Authors, Editors, and Publishers in the Biological Sciences*. American Institute of Biological Sciences. [The standard reference recommended by most graduate programs in biology; available from: American Institute of Biological Sciences, 1401 Wilson Blvd. Arlington, VA 22209]

Strunk, W. Jr. and E.B. White. 1979. *The Elements of Style, 3rd ed.* Macmillan Publishing Co., New York, NY.

Fielden, J.S. and R.E. Dulek. 1984. *What Do You Mean I Can't Write?* Prentice-Hall, Inc., Englewood Cliffs, NJ.

Johnson, E.D. 1991. *The Handbook of Good English*. Washington Square Press, New York, NY.

Ayers, D.M. 1972. *Bioscientific Terminology*. Words From Latin and Greek Stems. University of Arizona Press, Tucson, AZ. [A good primer in Latin and Greek]

## 15. The Thesis and Thesis Defense

- (1) **Students may not take their oral thesis defense until their Thesis Committee has read and pre-approved the thesis itself.** This pre-approval is to be indicated by the Committee on **GPMB Form 5**. (Preliminary Thesis Approval and Permission to Defend). Upon completion of the above requirements, students are eligible to request, with approval from their committee, a time and a place for the thesis defense. This oral defense will be scheduled and conducted by the Thesis Defense Chair (not a member of the student's Thesis Committee) who is approved by the Program Director in consultation with the Advisor. The defense must be scheduled and copies of your thesis must be in the main office of the Grice Lab and the Biology department office downtown at least two weeks prior to your oral defense. The oral thesis defense is the last main step before graduating. All other requirements must have already been met (e.g. course work, oral comprehensive exam, pre-approved thesis).

- (2) The thesis defense is not a process by which the thesis contents or writing are approved. It is a process by which the student is required to present an oral description of his/her research, and defend the content and quality of the work to the Thesis Committee and a general audience.

The thesis approval and the oral thesis defense are two separate steps required of the student. **GPMB Form No. 6** is the sign-off form for the defense. The signatory cover sheet of the thesis itself is the sign-off form for the thesis; however, this cover sheet is not to be signed until the student has successfully passed the defense.

- (3) Approval of the thesis defense is by simple majority. The chair of the thesis defense committee does not cast a vote (not even in the case of a tie vote). Approval of the thesis itself, by a student's Thesis Committee, must be unanimous.
- (4) The procedure for the thesis defense is as follows:
  - (a) Students may recommend to the Program Director a faculty member to chair their defense, or may request their Advisor or the Program Director to recommend a chair. The actual appointment of the chair is made by the Program Director. The chair of the thesis defense shall not be a member of the Thesis Committee, but will be a member of the GPMB faculty.
  - (b) The student's presentation (normally 20-30 minutes) is followed by a round of questions from the Thesis Committee and, time permitting, a round of questions from the general audience.
  - (c) Upon completion of this public portion of the thesis defense, the chair shall request that all persons except the student and the Thesis Committee leave the room, whereupon a second round of questioning by the Committee takes place.
  - (d) Upon completion of the Thesis Committee's second round of questioning, the student is excused and the Committee discusses the student's performance and votes pass/no pass.
- (5) In case of a failure, a written report specifying the area(s) of weakness and the timing of a reexamination, if appropriate, must be sent to the student and to the Program Director.
- (6) Upon successful completion of the defense, five signed copies of the thesis must be presented to the Dean of Graduate Studies of the University of Charleston. In addition, **GPMB Form No. 7** (exit form) must be signed and submitted to the Program Director and the student must also complete the exit interview with the Program Director. The Graduate School Office requires that the Thesis Release and Thesis Binding Transmittal forms be turned in with the copies of your

thesis to be bound. These forms must be submitted four weeks prior to the date on which the degree is to be awarded.

## **16. Application for Graduation**

Candidates for the degree must submit an Application for Graduation and application fee to the Graduate Studies Office by the date indicated on the academic calendar for the semester in which they expect to receive the degree. If a student subsequently fails to complete the requirements, the student must cancel the application at least two weeks before the end of the semester and must submit another application and fee in whatever semester they complete the requirements. The application and fee should be taken to the College of Charleston's Graduate Studies Office. If you plan to graduate during the summer, you must be enrolled in the semester you plan to graduate (Summer I or Summer II).

## **17. Fees**

All library books must be returned, all Ft. Johnson keys must be given to the Grice Lab Manager, all fees must be paid and **GPMB Form No. 7** (exit steps) must be fully signed and submitted before final grades and the degree will be awarded.

## **18. Honor System**

The basic philosophy of the Honor Tradition of the College of Charleston is as important to the Graduate Program as it is to the Undergraduate Program. A copy of the Honor Code is supplied to each student at registration. All regulations and procedures of the Honor System shall be respected and applied.

## **19. Time Limit Requirements**

All work credited toward the M.S. in Marine Biology must be completed within four years from the date of a student's initial enrollment in graduate courses, regardless of classification at the time of initial enrollment. Extension beyond the four year period must be approved in writing by the GPMB Council and the College of Charleston Dean of Graduate Studies.

## **20. Student Grievance Procedures**

Disputes, although rare, may arise between members of the program, students, and faculty, over both academic and non-academic matters. While many issues can be resolved at the personal level between the parties, a formal procedure is available for the resolution of disputes which cannot. A description of this procedure is available in the office of the Program Director.

## **21. Sources of Funds for Support of Research and Scholarly Studies**

Students are encouraged to apply for extramural funding, and the Graduate Program in Marine Biology office can inform you of extramural funding opportunities - see the Program Director or Administrative Assistant to review the options. Limited funds are available through the Slocum-Lunz Foundation; requests must be submitted by April 1 for consideration for funding the following year. In addition, Deep Water Fellowships (Joanna Foundation Fellowships) are usually made annually to students already in the Program. Deep Water Fellowships are competitive and application periods, when open, are announced by the Program Director. Presidential Research Awards are granted for recruitment of top candidates. These are awarded

for two consecutive summers. South Carolina residents can apply for funding through the South Carolina Agricultural Society Scholarship. Any students interested in Marine Genomics can apply for the Marine Genomics Scholarship. This scholarship can be awarded for up to two consecutive years. Graduate Teaching Assistantships are awarded competitively and are available for up to four semesters (with appropriate academic record and performance). A number of Graduate Research Assistantships are available through individual Program faculty. Students are strongly encouraged to present their research results at professional scientific meetings, and the Program Director will make every attempt to assist students in attending at least one such meeting during their tenure in the Program. Requests for financial assistance to present a talk/poster at a meeting should be made directly to the Program Director and should be accompanied by a detailed travel and expense budget.

## *Marine Resources Library*

The Marine Resources Library began in 1972 serving the research staff of the newly established Marine Resources Division of the South Carolina Wildlife and Marine Resources Department (now the South Carolina Department of Natural Resources) located at the Marine Resources Center at Fort Johnson on James Island, South Carolina. In 1977, the Marine Resources Division merged its library holdings with those of the College of Charleston's Grice Marine Laboratory that was also located at Fort Johnson. In August 1996, the library holdings of NOAA Fisheries/Charleston Laboratory, now NOAA/NOS/Coastal Center for Environmental Health and Biomolecular Research Charleston, located at Fort Johnson, were merged into the Marine Resources Library. The College of Charleston, the South Carolina Department of Natural Resources Marine Resources Division, and the NOAA National Ocean Service provide financial support for the Marine Resources Library.

The library's collection now includes 25,300 monographic titles, 9,700 bound periodicals, 450 journal subscriptions, and 42,000 reprints. The collection's strengths include marine biology, marine ecology, fisheries science, ichthyology, invertebrate zoology, toxicology, marine forensics, biotechnology, ecotoxicology, phycology, and biochemistry. The library provides resources and services to the staff, faculty, and students of the three supporting institutions.

### **Staffed Library Hours:**

Monday - Friday: 8:30 AM - 5:00 PM \*

Saturday: CLOSED

Sunday: CLOSED

\*The Marine Resources Library observes the College of Charleston's [holiday schedule](#).

**Access:** Marine biology graduate students have access to the Marine Resources Library (MRL) twenty-four hours a day, seven days a week. Access to the library after regular business hours is with the access card issued to the graduate student during orientation.

**Circulation:** The Marine Resources Library circulates books to the students, faculty, and staff who present a valid ID from the College of Charleston, NOAA/NOS/CCEHBR Charleston, SCDNR Marine Resources Division, Charleston Southern University, The Citadel, MUSC, or Trident Technical College. Books may be renewed two times. Patrons may check their accounts and renew books on the Web version of the library catalog using their College of Charleston ID number.

**Interlibrary Loan:** The Marine Resources Library places interlibrary loan (ILL) requests for the students, faculty, and staff of NOAA/NOS/CCEHBR Charleston, SCDNR Marine Resources Division, and the College of Charleston's graduate program in marine biology. For additional information on ILL read our Interlibrary Loan Policy at <http://www.mrl.cofc.edu/illindex2.html>.

**Reference:** Although the Marine Resources Library does not have a "Reference Desk", the librarian is always available to offer reference assistance to library users.

Additional information on the Marine Resources Library (MRL) is available on MRL's Web page at <http://mrl.cofc.edu>.

### **Library Staff:**

Helen Ivy, Librarian: (843) 953-9370

Maggie Applegate, Interlibrary Loan Lending and Journals: (843) 953-9372

Sarah Houston, Interlibrary Loan Borrowing and Cataloging: (843) 953-9373



## *Marine Biology Graduate Student Association*

The Marine Biology Graduate Student Association (MBGSA) is an organization of marine biology graduate students and a faculty advisor. MBGSA is organized by a written constitution which is always posted on the MBGSA bulletin board at the Grice Marine Laboratory. The constitution lists the responsibilities of each of the four MBGSA officers: president, vice-president, secretary, and treasurer.

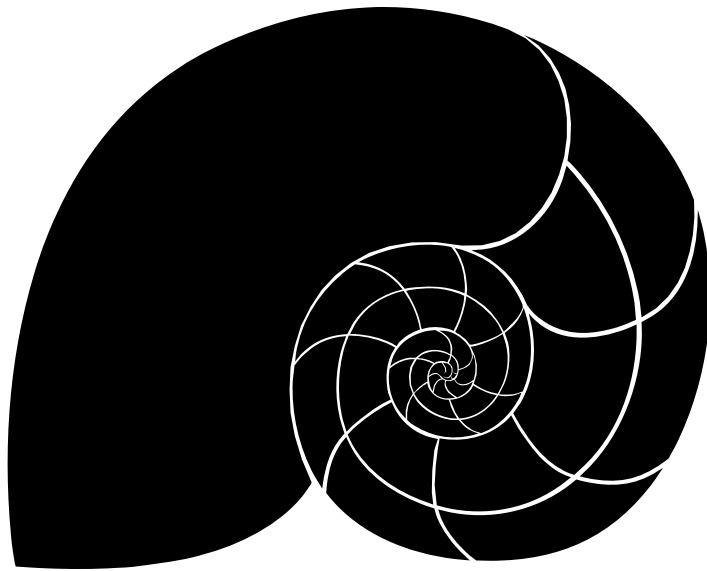
MBGSA has two main functions. First, it provides an organized unit for graduate student communication and involvement both within the Graduate Program in Marine Biology and between the GPMB and other organizations with which we are associated: the student faculty relations committee, judicial committee, curriculum committee, library committee, the Fort Johnson Marine Science Seminar Series committee, and faculty search committees.

Secondly, MBGSA conducts fundraisers in order to assist dues paying members with travel funds to scientific meetings and to organize social functions within the GPMB. There are five committees composed solely of graduate students to meet these goals: the fundraising committee, T-shirt committee, social committee, diving committee, and photo directory committee.





# Forms



*GPMB Form 1. Thesis Committee and Major Advisor*

*The Graduate School – College of Charleston*

Date \_\_\_\_\_

To the Director of the Graduate Program:

I wish to request that the following persons be appointed as my advisory committee. Each of them has agreed to serve in this capacity and have signed below next to their printed name.

\_\_\_\_\_ Major Advisor

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Student's printed and signed name

Approved: \_\_\_\_\_ Program Director

**IT IS THE STUDENT'S RESPONSIBILITY TO SEE THAT THE ORIGINAL COPY OF THIS FORM IS ON FILE IN THE GPMB OFFICE**

*GPMB Form 2. Comprehensive Oral Exam*  
*The Graduate School – College of Charleston*

Date \_\_\_\_\_

To the Dean of Graduate Studies:

This committee has given \_\_\_\_\_ an oral comprehensive examination for the degree of Master of Science in Marine Biology. The following is the recommendation of the committee.

Examining Committee:

Chair \_\_\_\_\_

Advisor \_\_\_\_\_

Committee Members \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Program Director \_\_\_\_\_

**IT IS THE EXAM CHAIR'S RESPONSIBILITY TO SEE THAT THE ORIGINAL OF THIS FORM IS FILED IN THE GPMB OFFICE**

*GPMB Form 3. Thesis Proposal*

*The Graduate School – College of Charleston*

THESIS PROPOSAL

Date \_\_\_\_\_

Name \_\_\_\_\_

Proposed Thesis Title \_\_\_\_\_

Summary of Thesis Proposal:

1. Does the proposal involve research on human subjects (incl. surveys)?  Yes  No
2. If yes, status of the IRB request  Submitted  Approved
3. Does the proposal involve research with live vertebrate animal subjects?  Yes  No
4. If yes, status of the IACUC request  Submitted  Approved

Approved by:

Advisor \_\_\_\_\_

Committee Members \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Program Director \_\_\_\_\_

**IT IS THE STUDENT'S RESPONSIBILITY TO SEE THAT THE ORIGINAL  
FORM AND A COPY OF THE PROPOSAL ARE ON FILE IN THE GPMB  
OFFICE**

***GPMB Form 4. Plan of Study***  
***The Graduate School – College of Charleston***

Date \_\_\_\_\_

Student's name \_\_\_\_\_ Social Security No. \_\_\_\_\_

Address \_\_\_\_\_

Admission status \_\_\_\_\_ Matriculation Date \_\_\_\_\_

Any Conditions with Respect to Admission \_\_\_\_\_

Dept. & Course No.    Title of Course                      Sem. Hrs.    Yr. & Sem. taken    Grade Recv'd

**CORE COURSES:**

Biol. 600	Physiology & Cell Biology of Marine Organisms	4
Biol. 601	Population Biology & Ecology of Marine Organisms	4
Biol. 610	Physical Oceanography	4
Biol. 611	Biometry	4
Biol. 620	Graduate Seminar	1
Biol. 621	Graduate Seminar	1

**ELECTIVES:**

Organismal Biology (1 course required):

Elective Courses (3 semester hours required):

**SEMINAR:**

Biol. 650	Seminar in Marine Biology	1
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**THESIS:**

Biol. 700    Thesis (4 thesis hours required):

(MUST TOTAL 30 SEMESTER HOURS)

Plan of Study Approval:

\_\_\_\_\_  
 Advisor  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**IT IS THE STUDENT'S RESPONSIBILITY TO SEE THAT THE ORIGINAL COPY OF THIS FORM IS ON FILE IN THE GPMB OFFICE**

*GPMB Form 5. Preliminary Thesis Approval and Permission to Defend*

*The Graduate School – College of Charleston*

Date \_\_\_\_\_

To the Director of the Graduate Program in Marine Biology:

This committee has examined the thesis draft of \_\_\_\_\_ and finds no substantial problems with it. We therefore approve the scheduling of the thesis defense for this student.

Recommendations and comments, if necessary:

Examining Committee:

\_\_\_\_\_  
Advisor  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IT IS THE STUDENT'S RESPONSIBILITY TO SEE THAT THE ORIGINAL COPY OF THIS FORM IS ON FILE IN THE GPMB OFFICE**

*GPMB Form 6. Thesis Defense*

*The Graduate School – College of Charleston*

Date \_\_\_\_\_

To the Dean of Graduate Studies:

This committee has given \_\_\_\_\_ a thesis examination for the degree of Master of Science in Marine Biology.

The original and four (4) complete and signed copies of the unbound thesis, plus five (5) copies of the abstract of a thesis, \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

are being forwarded to you.

Recommendations and comments [use back of sheet if necessary]:

Examining Committee:

Chair \_\_\_\_\_

Advisor \_\_\_\_\_

Committee Members \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Program Director \_\_\_\_\_

**IT IS THE STUDENT'S RESPONSIBILITY TO SEE THAT THE ORIGINAL COPY OF THIS FORM IS ON FILE IN THE GPMB OFFICE**

*GPMB Form 7. Final Graduation Checklist (EXIT STEPS)*

*The Graduate School – College of Charleston*

Dear graduate: Please see that this form is signed and turned in prior to your departure from the Grice Marine Lab and the College of Charleston. **The Graduate Studies Office will not certify your graduation until this signatory list is completed.** Thanks very much for your cooperation, and congratulations!

Student's Name \_\_\_\_\_

1. Return all Grice Laboratory keys to Grice Main Office  
\_\_\_\_\_ GML Office Staff Date \_\_\_\_\_
2. Return all capital equipment you have checked out from the Grice Lab  
\_\_\_\_\_ Sarah Prior Date \_\_\_\_\_
3. Return all CofC and MRRI Library materials and pay any library fines to Marine Resources Library  
\_\_\_\_\_ Helen Ivy Date \_\_\_\_\_
4. Return Ft. Johnson security gate card key to Grice Main Office  
\_\_\_\_\_ GMLOffice Staff Date \_\_\_\_\_
5. Return keys to offices/labs in Marine Resources Research Institute  
\_\_\_\_\_ Rachel Dicker Date \_\_\_\_\_
6. Complete exit interview with Program Director  
\_\_\_\_\_ Craig Plante Date \_\_\_\_\_

Note: Your certification for graduation will not be approved until this checklist has been turned in. Return this form to GPMB the Director (Dr. Craig Plante) or Administrative Assistant (Shelly Brew).

In addition, you must:

- (a) Successfully defend your thesis in an oral presentation/defense administered by your thesis committee and chaired by a non-committee GPMB faculty member. The defense chair and all committee members must sign the thesis exam form for submission to the Graduate Studies Office. A majority of your thesis committee must vote to pass you on the thesis defense.
- (b) Submit the original and four copies of the final approved thesis, with signed signatory cover page, thesis release, and thesis binding transmittal forms to the Office of Graduate Studies. Any required re-writing of the thesis should be completed before the signatory page is signed; the signatory page should be submitted with the five thesis copies. Final thesis approval requires unanimous approval of your thesis committee.
- (c) Submit your Application for Graduation to the Graduate Studies Office by the dates indicated on the academic calendar for the semester in which you expect to receive the degree. Graduation fees are paid at the Graduate Studies Office (no bill for this fee will be sent).





# Faculty and Student Contributions



### *Scholarly Contributions*

- 1 Chamberlain, N. A. 1963. Fort Johnson Marine Biological Laboratory, College of Charleston. *American Zoologist*, Vol. 3, No. 3, pp. 274-275.
- 2 Chamberlain, N. A. 1965. Environmental control of metamorphosis in meroplanktonic marine Crustacea. *Bulletin of the South Carolina Academy of Science*, Vol. 27, p.49.
- 3 Harrison, J. R. 1965. A population of Desmognathus fuscus (Urodela: Plethodontidae) in the coastal plain of Georgia. *Bulletin of the South Carolina Academy of Science*, Vol. 27, p. 49.
- 4 Harrison, J. R. 1966. Recent records of Ambystoma tigrinum (Green) in the lower coastal plain of South Carolina. *Bulletin of the South Carolina Academy of Science*, Vol. 28, p. 34.
- 5 Harrison, J. R. 1967. Observations on the life history, ecology and distribution of Desmognathus aeneus aeneus Brown and Bishop. *The American Midland Naturalist*, Vol. 77, No. 2, pp. 356-370.
- 6 Tilley, S. G. and J. R. Harrison. 1969. Notes on the distribution of the pygmy salamander, Desmognathus wrighti King. *Herpetologica*, Vol. 25, No. 3, pp. 178-180.
- 7 Harrison, J. R. 1969. A population of Plethodon dorsalis Cope in South Carolina. *Journal of Herpetology*, Vol. 3, No. 3-4, p. 195.
- 8 Harrison, J. R. 1970. The northern cricket frog, Acris crepitans Baird, in the lower coastal plain in South Carolina. *Bulletin of the South Carolina Academy of Science*, Vol. 32, p. 39.
- 9 Anderson, W. D., Jr. 1970. Revision of the genus Symphysanodon (Pisces: Lutjanidae) with descriptions of four new species. *U.S. Fish and Wildlife Service Fishery Bulletin*, Vol. 68, No. 2, pp. 325-346.
- 10 Anderson, W. D., Jr., R. K. Dias, and D. M. Cupka. 1971. A survey of the ichthyofauna of the surf zone off Folly Beach, South Carolina. *Bulletin of the South Carolina Academy of Science*, Vol. 33, pp. 40-41.
- 11 Anderson, W. D., Jr. 1971. Review of INVESTIGATIONS ON THE GRAY SNAPPER, LUTJANUS GRISEUS, by Walter A. Starck, II and Robert E. Schroeder. *Copeia*, 1971, No. 4, p. 764.
- 12 McKinney, J. F. and N. A. Chamberlain. 1971. The distribution of the decapod crustacea of North Inlet, Georgetown County, South Carolina. *Bulletin of the South Carolina Academy of Science*, Vol. 33, p. 37.
- 13 Freeman, H. W., B. Stender, and W. Frampton. 1971. Studies on the ecology and distribution of the estuarial fishes in the North Inlet area, Georgetown County, South Carolina. *Bulletin of the South Carolina Academy of Science*, Vol. 33, p. 36.
- 14 Sawyer, R. T. 1971. The phylogenetic development of brooding behavior in the Hirudinea. *Hydrobiologia*, Vol. 37, No. 2, pp. 197-204.
- 15 Sawyer, R. T. 1971. Erpobdellid leeches as new hosts for the nematomorph, Gordius sp. *The Journal of Parasitology*, Vol. 57, No. 2, p. 285.

- 16 Sawyer, R. T. 1971. The rediscovery of the bi-annulate leech, Oligobdella biannulata (Moore, 1900), in the mountain streams of South Carolina (Annelida: Hirudinea). Association of Southeastern Biologists Bulletin, Vol. 18, No. 2, p. 54.
- 17 Sawyer, R. T. 1972. A new species of "tentacled" marine fish leech parasitic on Notothenia from the subantarctic Marion and Crozet Islands. Hydrobiologia, Vol. 40, pp. 345-354.
- 18 Sawyer, R. T. 1972. North American freshwater leeches, exclusive of the Piscicolidae, with a key to all species. Illinois Biological Monographs No 46, Univ. of Illinois Press, Urbana, Ill., 154 pp., 37 figs.
- 19 Sawyer, R. T. 1973. The rediscovery of Glossiphonia swampina (Bosc, 1802) in the coastal plain of South Carolina (Annelida: Hirudinea). The Journal of the Elisha Mitchell Scientific Society, Vol. 89, Nos. 1 & 2, pp. 4-5.
- 20 Sawyer, R. T. and K. Dierst-Davies. In press. Observations on the physiology and phylogeny of colour change in freshwater and marine leeches.
- 21 Anderson, W. D., Jr. 1972. Notes on western Atlantic lutjanid fishes of the genera Pristipomoides and Etelis. Copeia, 1972, No. 2, pp. 359-362.
- 22 Sawyer, R. T. and N. A. Chamberlain. 1972. A new species of marine leech (Annelida: Hirudinea) from South Carolina, parasitic on the Atlantic menhaden, Brevoortia tyrannus. The Biological Bulletin, Vol 142, No. 3, pp. 470-479.
- 23 Sawyer, R. T. and K. A. Pass. 1972. The occurrence of Macrobdella decora (Say, 1824) (Annelida: Hirudinea) in the Appalachian Mountains of Georgia and South Carolina. The Journal of the Elisha Mitchell Scientific Society, Vol. 88, No. 1, pp. 34-35.
- 24 Dias, R. K., J. K. Dias, and W. D. Anderson, Jr. 1972. Relationships of lengths (standard, fork, and total) and lengths to weight in the red porgy, Pagrus sedecim (Perciformes, Sparidae), caught off South Carolina. Transactions of the American Fisheries Society, Vol. 101, No. 3, pp. 503-506.
- 25 Anderson, W. D., Jr., D. K. Caldwell, J. F. McKinney, and C. H. Farmer. 1972. Morphological and ecological data on the priacanthid fish Cookeolus boops in the western North Atlantic. Copeia, 1972, No. 4, pp. 884-885.
- 26 Sawyer, R. T. and K. Dierst-Davies. 1972. Some factors which influence physiological color change in leeches and observations on the evolution of the response (Annelida: Hirudinea). Association of Southeastern Biologists Bulletin, Vol. 19, No. 2, p. 97.
- 27 Anderson, W. D., Jr., and D. M. Cupka. 1973. Records of the ocean sunfish, Mola mola, from the beaches of South Carolina and adjacent waters. Chesapeake Science, Vol. 14, No. 4, pp. 295-298.
- 28 Sawyer, R. T. and D. L. Hammond. 1973. Observations on the marine leech Calliobdella carolinensis (Hirudinea: Piscicolidae), epizootic on the Atlantic menhaden. The Biological Bulletin, Vol. 145, pp. 373-388.
- 29 Sawyer, R. T. 1972. Observations on the marine leeches of South Carolina (Annelida: Hirudinea). Bulletin of the South Carolina Academy of Science, Vol. 34, p. 103.
- 30 Cohen, M. N. and R. T. Sawyer. 1972. Notes on a marine oligochaete (Annelida: Oligochaeta) from Ft. Johnson, South Carolina. Bulletin on the South Carolina Academy of Science, Vol. 34, p. 103.

- 31 Daniels, B. A. and R. T. Sawyer. 1973. Host-parasite relationship of the fish leech Illinobdella moorei Meyer and the white catfish Ictalurus catus (Linnaeus). Association of Southeastern Biologists Bulletin, Vol. 20, p. 48.
- 32 Sawyer, R. T. 1973. Bloodsucking freshwater leeches: Observations on control. Journal of Economic Entomology, Vol. 66, No. 2, p. 537.
- 33 Anderson, W. D., Jr., and P. Fourmanoir. 1975. The status of Erythrobussothen gracilis, a percoid fish. Copeia, 1975, No. 1, pp. 181-182.
- 34 Anderson, W. D., Jr., J. F. McKinney, and W. A. Roumillat. 1975. Review of the scorpaenid genus Idiastion. Copeia, 1975, No. 4, pp. 780-782.
- 35 Anderson, W. D., Jr., J. F. McKinney, and W. A. Roumillat. 1975. Range extensions for, and an abnormality in, scorpaenid fishes collected off the Carolinas. Florida Scientist, Vol. 38, No. 3, pp. 171-173.
- 36 Anderson, W. D., Jr., and W. F. Smith-Vaniz. 1976. Sexual dimorphism in the jawfish Opistognathus melachasme. Copeia, 1976, No. 1, pp. 202-204.
- 37 Anderson, W. D., Jr., J. K. Dias, R. K. Dias, D. M. Cupka, and N. A. Chamberlain. 1977. The macrofauna of the surf zone off Folly Beach, South Carolina. NOAA Technical Report NMFS SSRF-704: i-iv + 1-23.
- 38 Anderson, W. D., Jr., P. K. Talwar, and G. D. Johnson. 1977. A replacement name for Tangia Chan (Pisces: Perciformes: Lutjanidae) with redescription of the genus and type-species. Proceedings of the Biological Society of Washington, Vol. 89, No. 44, pp. 509-518.
- 39 Anderson, W. D., Jr., H. T. Kami, and G. D. Johnson. 1977. A new genus of Pacific Etelinae (Pisces: Lutjanidae) with redescription of the type-species. Proceedings of the Biological Society of Washington, Vol. 90, No. 1, pp. 89-98.
- 40 Maddox, M. B. and J. J. Manzi. 1976. The effects of algal supplements on static system culture of Macrobrachium rosenbergii (De Man) larvae. Proceedings Seventh Annual Workshop World Mariculture Society, pp. 677-698.
- 41 Anderson, W. D., Jr. 1977. Review of CARL L. HUBBS HONORARY ISSUE (Bulletin of the Southern California Academy of Sciences, Vol. 75, No.2). Copeia, 1977, No. 2, pp. 408-409.
- 42 Anderson, W. D., Jr. 1978. Review of FISHES OF THE WORLD, by Joseph S. Nelson. Copeia, 1978, No. 1, pp. 191-192.
- 43 Manzi, J. J. and M. B. Maddox. 1976. Algal supplement enhancement of static and recirculating system culture of Macrobrachium rosenbergii larvae. Helgoländer wiss. Meeresunters., Vol. 28, pp. 447-455.
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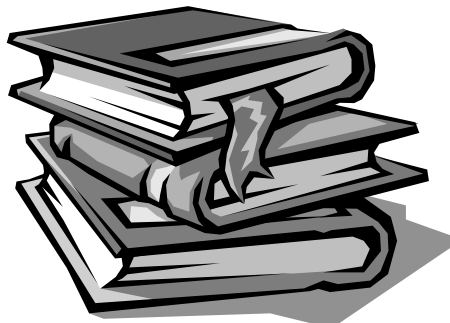
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