FISHERIES AND MARICULTURE, MS

Program Description
The Fisheries and Mariculture Program offers an M.S. degree with a choice of emphasis in either fisheries or mariculture. Our students enjoy a low student-faculty ratio and opportunities to study ecologically and commercially important Gulf of Mexico and Texas species. Students entering the program have the opportunity to receive financial support from assistantships, fellowships, or scholarships awarded by the university and by private and public agencies. Returning Peace Corps volunteers who have completed their assignment are eligible for the Paul D. Coverdell Fellowship.

Faculty members supervise student research on topics such as fisheries ecology, larval physiology, habitat restoration, aquatic animal culture, diseases, and nutrition. Students may conduct their research at university facilities and in the surrounding aquatic environments, as well as nearby partner institutions, including the Texas A&M AgriLife Mariculture Research Facility, Texas Parks and Wildlife Department Marine Development Center fish hatchery, and Texas State Aquarium.

Our students acquire the cutting edge science and technological skills necessary for positions in public and private sectors of the fisheries and mariculture industries, as well as undertaking research allowing them to pursue further studies at the Ph.D level. Student research topics are as varied as FAMA faculty expertise and have included fish culture for stock enhancement, ocean acidification, algae biofuels, use of biofloc in the culture of Pacific white shrimp, disease, and relative value of estuarine habitats for finfish and crustaceans. Faculty and student researchers use an array of quantitative research tools including molecular techniques, statistical analysis and GIS, as well as traditional field sampling methods.

Student Learning Outcomes
Students will:

• Exhibit their mastery of the subject knowledge and skills in the field of fisheries or mariculture.
• Demonstrate the ability to collect data, to organize and interpret data in the context of the relevant literature, and then to accurately describe their findings (orally and in writing).
• Develop an advanced skill set and record of contributions to the discipline such that they can continue in academia or secure employment in federal, state, or local agencies, in private companies, or in non-governmental organizations where they can apply the skills and knowledge acquired in the program.

For Additional Information
Website: http://fama.tamucc.edu
Campus Address: Tidal Hall, Room 309
phone (361) 825-2754
Mailing Address: Fisheries and Mariculture Program, Unit 5800
College of Science and Engineering
Texas A&M University – Corpus Christi

Admission Requirements
Individuals seeking admission to the Fisheries and Mariculture (FAMA) Program should apply through the Office of Recruitment and Admissions. In addition to the basic university requirements, the Fisheries and Mariculture Program requires that applications from potential students include an essay explaining the student’s educational and career goals, three letters of evaluation from people familiar with their potential for graduate studies, transcripts of all previous undergraduate/graduate work, and Graduate Record Examination (GRE) scores that are not more than five (5) years old. Applicants must include a list of the TAMU-CC faculty members they contacted concerning mentorship prior to application submission. Although most faculty members in the Department of Life Sciences can mentor a FAMA student, the Fisheries and Mariculture Program Coordinator can provide a current list of faculty actively involved in the FAMA Program and a description of their research. Additional requirements exist for international students. These include TOEFL or IELTS scores from ETS taken within the last two (2) years for students from countries where English is not the native language and a course-by-course foreign transcript evaluation through an approved service (refer to the Admissions section of this catalog). All relevant supplemental materials (such as publications or resumes that include information about relevant experiences) that are submitted with the application will be considered. Send application documents to the Office of Recruitment and Admissions. A campus visit, including personal interviews with prospective faculty mentors, is highly recommended. Persons seeking admission to the M.S. Program in Fisheries and Mariculture should first contact program faculty and identify a faculty member willing to serve as the graduate advisor. Applicants will not be admitted to the program without a graduate advisor.

Completed applications must be received by the Office of Recruitment and Admissions by the specified priority deadlines:

• Fall Semester: February 1
• Spring Semester: August 1

Incomplete applications are not considered. The applicant will be notified of acceptance or rejection by letter.

Teaching assistantships and graduate research assistantships may be available to admitted degree-seeking students who maintain full-time graduate student status (9 hours/fall and spring semester, and 3 hours/summer). The completed Teaching Assistant Application (http://gradcollege.tamucc.edu/funding/assistantships.html) and all other materials requested for evaluation should be submitted to the office indicated on that form. For full consideration, the deadline for submitting applications is February 1 for fall semester and August 1 for spring semester. Faculty members conducting funded research projects often hire qualified graduate students as Research Assistants. Students will need to contact faculty members in their field of interest for information on these opportunities.

Non-degree students may enroll in courses for which they have adequate academic preparation, but they may not apply more than nine credit hours of work taken in non-degree status to a graduate degree program. Non-degree students must consult with the Fisheries and Mariculture Program Coordinator to determine those courses in which they may enroll and those courses they may later apply to a Fisheries and Mariculture
degree, should they be admitted into the program. Students must earn a grade of "B" or better in each of the prescribed courses in order to have the courses apply to the plan of study.

Program Requirements

Academic Preparation
Students entering the Fisheries and Mariculture Program are expected to have a strong background in biological and physical sciences, with competencies equivalent to those required of Texas A&M University-Corpus Christi undergraduate biology majors (see the biology section of the undergraduate catalog). A student who lacks adequate academic preparation in a particular subject area, but who is otherwise well-qualified to enter the graduate program, may be required to complete appropriate leveling courses at the undergraduate level in addition to courses specified for the graduate degree. Such courses (4000-sequence or lower) do not count as credit towards the total required for completion of the graduate degree.

Coursework and Research
Courses and research for the graduate degrees are taken with the approval of the student's committee (or graduate advisor for Professional track students). Students must demonstrate that the selection of classes or research projects produces a coherent course of study focused on the student’s particular area of emphasis. Depending on the emphasis area, elective and specialized coursework selections may be chosen from biology, chemistry, coastal and marine system science, computer science, environmental science, geographic information science, geology, marine biology, mathematics, or other course offerings as approved by the student’s committee (or graduate advisor for Professional track students).

The Fisheries and Mariculture Program requires 36 semester hours of coursework. Classes or research projects designated as part of the specialized coursework requirement must receive the approval of a student’s committee (or graduate advisor for Professional track students).

In order to remain in good standing, as well as eligible for university funding such as scholarships and assistantships, the university requires graduate students to maintain a minimum grade point average of 3.0 ("B") on a 4.0 scale for all graduate work undertaken. Please note that TAMUCC calculates GPA based on all graduate coursework taken at TAMUCC and not just coursework in the degree program. Students should ensure they are knowledgeable about both overall GPA required for good standing as well as GPA in the program in which they are enrolled. Further information on GPA requirements, including scholastic probation, for graduate students may be found in the Master’s Student Handbook from the College of Graduate Studies website.

Format and Style of Theses and Professional Papers
The thesis and professional paper must follow format requirements established in the Fisheries and Mariculture Graduate Handbook and College of Graduate Studies Handbook (ProQuest submission) and must be approved and signed by the members of the student’s committee (or graduate advisor for Professional track students) and others as necessary. For more information, consult the College of Graduate Studies (https://gradschool.tamucc.edu/).

Once the thesis is completed and approved by the committee, the results of the research must be presented orally and publicly. The final defense/oral examination usually takes place immediately following the seminar. Professional track students will not be required to present a public graduate defense seminar at the conclusion of the program, but must have their professional paper approved by their graduate advisor and qualified member of the organization providing the internship, in combination with a final oral examination. Graduate students are expected to present their research at a scientific meeting (other than their graduate seminar) prior to graduation.

Upon approval by a student's committee (or graduate advisor for Professional track students), a copy of the thesis/professional paper and appropriate forms will be submitted as noted in the Fisheries and Mariculture Handbook and College of Graduate Studies Handbook (ProQuest submission).

Final Presentation and Examination
All students must successfully present a summary of their research or internship results and complete a comprehensive oral examination during their final semester. During their last semester, thesis students must enroll in FAMA 5102 Graduate Defense Seminar (1 sch). To successfully complete this requirement, thesis students must

1. present and defend their thesis research in front of an audience including his/her committee, peers, and other faculty, and
2. pass a final oral examination.

Professional track students are required to enroll in FAMA 5397 Professional Paper Submission (3 sch) during their final semester and must

1. present and defend their professional paper to their graduate advisor and qualified member of the organization providing the internship, and
2. pass a final oral examination.

This examination will be administered by the student’s graduate advisory committee (or graduate advisor and qualified member of the organization providing the internship) and will include topics related to:

1. all graduate coursework undertaken in the Fisheries and Mariculture Program,
2. the student’s internship or research project, and
3. broad concepts of fisheries or mariculture, including a familiarity with the literature and pertinent professional societies.

Students are responsible for scheduling the presentation and oral examination with their graduate advisory committees (or graduate advisor for Professional track students). A student failing to successfully complete the comprehensive oral examination may repeat it once by the end of the next long semester. A student failing the oral examination for the second time will be terminated from the program.

The Master of Science in Fisheries and Mariculture
The MS in Fisheries and Mariculture requires 36 semester hours of coursework. A student may request approval for transfer of a maximum of nine (9) semester credit hours of graduate courses from other colleges to a MS in Fisheries and Mariculture degree plan. Thesis students may change from Thesis to Professional option at any time with the approval of their graduate advisor. Specific option/degree requirements must be met.
Professional Option

The Professional track Master's Degree is designed to provide a broad understanding of fisheries or mariculture and is focused upon practical, hands-on experience in fisheries or mariculture techniques. The ultimate goal of this option is to provide students with the skills and techniques needed to improve their opportunity for employment within the industry. Students are required to undertake an extensive internship program with an approved agency, institution or commercial operation. The Professional track is substantially different from that of the Thesis option in that:

1. Professional track students will not need to form a graduate advisory committee upon acceptance to the Program. Instead, students will be supervised by a designated FAMA advisor (member of the faculty) and a qualified member of the organization providing the internship.
2. Professional track students will enter into an internship agreement with the sponsor to maintain a jointly-determined training schedule with specific objectives. These objectives will be in-line with hiring guidelines for the sponsoring entity and will be conducted as part of FAMA 5998 Internship (1-9 sch).
3. Upon completion of the internship, professional track students will be required to write a professional paper discussing a particular aspect of their training. This document should be designed for publication in a trade journal, agency bulletin, or similar publication. The topic and format of the document will be approved by the faculty advisor and agent of the sponsor.
4. Professional track students will not be required to present a public graduate defense seminar at the conclusion of their program.

To graduate under the Professional track degree plan, a student must complete a minimum of 36 graduate semester credit hours. Students must take FAMA 5370 Mariculture (3 sch) or FAMA 5328 Fisheries Ecology and Management (3 sch), depending on the track, MATH 6315 Statistical Methods in Research I (3 sch), and FAMA 5397 Professional Paper Submission (3 sch). Depending on the student's focus in fisheries or mariculture, either FAMA 5312 Mariculture Techniques (3 sch) or FAMA 5329 Fisheries Techniques (3 sch) is also required. The residual hours needed to complete the degree plan will be achieved via FAMA 5998 Internship (1-9 sch), which may range from 9-18 hrs (9 minimum), and other graded elective coursework. FAMA 5397 Professional Paper Submission (3 sch) should be taken in the last semester of the student's academic tenure.

Success in completion of the FAMA Professional track option will be determined by the following factors:

1. satisfactory completion of the internship in a timely manner;
2. assessment by the sponsor and faculty advisor;
3. quality of the professional paper; and
4. successful completion of the comprehensive oral examination.

Satisfactory completion of the internship will be determined jointly by the sponsor and academic advisor. Assessment will typically be in the form of a professional interview.

Mariculture Professional Option Degree Plan

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>FAMA 5312</td>
<td>Mariculture Techniques</td>
<td>3</td>
</tr>
<tr>
<td>FAMA 5370</td>
<td>Mariculture</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6315</td>
<td>Statistical Methods in Research I</td>
<td>3</td>
</tr>
</tbody>
</table>

Elective, specialized and topical coursework at the discretion of the graduate advisor.

Total Hours: 36

1. 0-8 semester hours that will then meet the minimum of at least 36 hours required to graduate with the M.S. Degree.
2. Elective, specialized or topical coursework must be approved by the student's Graduate Advisor in order to be counted for credit towards the graduate degree.

Fisheries Professional Option Degree Plan

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>FAMA 5315</td>
<td>Diseases and Parasites of Aquatic Organisms</td>
<td>3</td>
</tr>
<tr>
<td>FAMA 5397</td>
<td>Professional Paper Submission</td>
<td>3</td>
</tr>
<tr>
<td>FAMA 5421</td>
<td>Chemistry of Natural Waters</td>
<td>4</td>
</tr>
<tr>
<td>FAMA 5998</td>
<td>Internship (min. 9/max. 18 sem. hrs.)</td>
<td>9</td>
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</table>

Elective, specialized and topical coursework at the discretion of the graduate advisor.

Total Hours: 36

1. 6-15 semester hours that will then meet the minimum of at least 36 hours required to graduate with the M.S. Degree.
2. Elective, specialized or topical coursework must be approved by the student's Graduate Advisor in order to be counted for credit towards the graduate degree.

Thesis Option

The thesis option for a Master's Degree requires a thesis based upon original research conducted during the period that the student is enrolled at Texas A&M University-Corpus Christi. The research must include a review of relevant literature, a description of the results from original research on a topic approved by the committee, statistical analysis as appropriate, and an appropriate discussion of the results. To graduate under the thesis degree plan, a student must complete a minimum of 36 graduate semester credit hours.

Four courses form the required research component of the degree for MS (thesis):

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tr>
<td>FAMA 5392</td>
<td>Thesis Proposal</td>
<td>3</td>
</tr>
<tr>
<td>FAMA 5393</td>
<td>Thesis Research</td>
<td>3</td>
</tr>
<tr>
<td>FAMA 5394</td>
<td>Thesis Submission</td>
<td>3</td>
</tr>
<tr>
<td>FAMA 5102</td>
<td>Graduate Defense Seminar</td>
<td>1</td>
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</table>

Total Hours: 36
Mariculture Thesis Option Degree Plan

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Mariculture Core Courses</strong></td>
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</tr>
<tr>
<td>FAMA 5312</td>
<td>Mariculture Techniques</td>
<td>3</td>
</tr>
<tr>
<td>FAMA 5370</td>
<td>Mariculture</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6315</td>
<td>Statistical Methods in Research I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Mariculture Thesis Option</strong></td>
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</tr>
<tr>
<td>FAMA 5102</td>
<td>Graduate Defense Seminar</td>
<td>1</td>
</tr>
<tr>
<td>FAMA 5392</td>
<td>Thesis Proposal</td>
<td>3</td>
</tr>
<tr>
<td>FAMA 5393</td>
<td>Thesis Research</td>
<td>3</td>
</tr>
<tr>
<td>FAMA 5394</td>
<td>Thesis Submission</td>
<td>3</td>
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<tr>
<td></td>
<td>Select one of the following:</td>
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<tr>
<td></td>
<td>MATH 6316</td>
<td>Statistical Methods Research II</td>
</tr>
<tr>
<td></td>
<td>CMSS 6323</td>
<td>Experimental Design</td>
</tr>
<tr>
<td></td>
<td>Elective, specialized and topical coursework at the discretion of the graduate advisor</td>
<td>14</td>
</tr>
</tbody>
</table>

Total Hours 36

1
14 semester hours that will then meet the minimum of at least 36 hours required to graduate with the M.S. Degree.

2
Elective, specialized or topical coursework must be approved by the student’s Graduate Advisor in order to be counted for credit towards the graduate degree.

3
Students may apply 6 hours of FAMA 5940 Project Research (1-9 sch) toward their degree with the approval of the committee.

Courses

FAMA 5102 Graduate Defense Seminar
1 Semester Credit Hour
Formal presentation of the research activities conducted for the MS degree. To be taken the final semester of resident graduate study.

FAMA 5312 Mariculture Techniques
3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)
The study and hands-on application of biological, mechanical, and other concepts required to develop the skills and techniques necessary for efficient operation and management of public and private aquaculture facilities.
Co-requisite: SMTE 0091.

FAMA 5314 Aquatic Animal Nutrition
3 Semester Credit Hours (3 Lecture Hours)
The study of current concepts in aquatic animal nutrition including nutrient sources and requirements, deficiency effects, ingestive/digestive/metabolic processes, formulation and processing of feeds, and practical feeding considerations for selected aquatic species.

FAMA 5315 Diseases and Parasites of Aquatic Organisms
3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)
Identification, epizootiology and control of viral, bacterial, fungal, parasitic and nutritional diseases of commercially cultured molluscs, crustaceans and fish.
Co-requisite: SMTE 0092.

FAMA 5322 Aquaculture Business Planning
3 Semester Credit Hours (3 Lecture Hours)
The application of economic and business principles to the development of commercial and developmental aquaculture projects in order to maximize efficiency of operation and profitability. Students are introduced to project concept, risk management, business planning, financing, aquaculture marketing and development of financial documents.

FAMA 5327 Marine Restoration Ecology
3 Semester Credit Hours (3 Lecture Hours)
Overview of the rapidly expanding practice of restoring degraded marine, estuarine, and coastal ecosystems. Teaching methods will include lectures, discussion, paper critiques, field visits, and restoration plans. Course will explore ecological theory as it applies to restoration, restoration planning and implementation strategies, and controversies surrounding the practice of restoration.

FAMA 5328 Fisheries Ecology and Management
3 Semester Credit Hours (3 Lecture Hours)
Advanced study of theory and techniques in fisheries science including behavior of fisheries populations and applications to resource management with emphasis in tidal-influenced waters. Includes readings in the current literature and a research project.
FAMA 5329 Fisheries Techniques
3 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)
Designed to provide students with practical experience in the theory and application of traditional and modern fisheries sampling and management techniques with an emphasis on practical sampling design and data interpretation. This is a hands-on field and laboratory based course that will develop skills that are commonly used by fisheries scientists and sought by future employers.
Co-requisite: SMTE 0091.

FAMA 5332 Aquatic System Design
3 Semester Credit Hours (3 Lecture Hours)
The study of aquatic system engineering and design for aquaculture farms, hatcheries, recirculating systems and research facilities. Additional topics covered include aquaculture site selection criteria and use of computer-aided design software.

FAMA 5338 Applied Fisheries Statistics
3 Semester Credit Hours (3 Lecture Hours)
Data analysis is a critical component in fisheries research and management. Throughout this course, the students will learn to practice the series of data analysis and techniques that are relevant to fisheries science, with the aids of the personal computer software.

FAMA 5355 Public Aquarium and Animal Care Operations
3 Semester Credit Hours (3 Lecture Hours)
This course examines the unique requirements needed for aquariums and zoos to balance animal care and health with public display for general education and conservation research.
Co-requisite: SMTE 0091.

FAMA 5370 Mariculture
3 Semester Credit Hours (3 Lecture Hours)
Survey of physiological, behavioral, environmental and economic parameters governing the culture of selected aquatic species. Included are techniques and methods employed worldwide to produce various marine species.

FAMA 5392 Thesis Proposal
3 Semester Credit Hours
Thesis students must submit a completed proposal for their thesis project. A course section will be created for the student to enroll. Upon successful completion and submission of the proposal signed by the graduate committee of the student, students may then register for FAMA 5393 - Thesis Research.

FAMA 5393 Thesis Research
3 Semester Credit Hours
Implementation of the Thesis Proposal, and the production of a rough draft of the thesis submitted to the graduate committee of the student for initial editing and comment. A course section will be created for the student to enroll.
Prerequisite: FAMA 5392.

FAMA 5394 Thesis Submission
3 Semester Credit Hours
Completion of the final draft of the thesis, signed by the graduate committee of the student and ready for binding and distribution. A course section will be created for the student to enroll.
Prerequisite: FAMA 5392 and (FAMA 5393 or 5393*).
* May be taken concurrently.

FAMA 5397 Professional Paper Submission
3 Semester Credit Hours
Completion of the final draft of the professional paper (professional track students), signed by the graduate committee. A course section will be created for the student to enroll.
Prerequisite: FAMA 5998.

FAMA 5421 Chemistry of Natural Waters
4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)
The examination of water as an environmental medium and how it may be monitored and managed for maximizing the growth and survival of various aquatic species.
Prerequisite: CHEM 1411.
Co-requisite: SMTE 0093.

FAMA 5436 Marine Ecological Processes
4 Semester Credit Hours (4 Lecture Hours)
Advanced studies in structure and habitats of marine environments. Emphasis on factors influencing distribution of marine organisms, including field trips to areas along the Texas coast.
Prerequisite: BIOL 3428.
Co-requisite: SMTE 0091.

FAMA 5590 Special Topics
1-5 Semester Credit Hours (1-5 Lecture Hours)
In-depth study and discussion of selected topics relevant to mariculture or fisheries. May be repeated when topics vary.

FAMA 5596 Directed Independent Study
1-5 Semester Credit Hours (1-5 Lecture Hours)
Study in areas of mariculture or fisheries interest.

FAMA 5940 Project Research
1-9 Semester Credit Hours
Research related to the MS project. Students can only apply 6 hours of credit toward the MS degree in Fisheries and Mariculture with approval of the committee.

FAMA 5998 Internship
1-9 Semester Credit Hours
Professional Track students are required to undertake an extensive internship program with an approved agency, institution, or commercial operation to develop skills and techniques relating to fisheries science or the culture of aquatic species. Students will participate in internship activities at selected aquaculture or fisheries facilities.