

# BIOLOGY, MS

## Program Description

The Master of Science in Biology is designed for graduate students who wish to become knowledgeable leaders and professionals with an in-depth education and specialized skills in the field of biology. This program promotes competency in the application of scientific methods of investigation to studies in biology with an emphasis on urban and coastal issues. Students develop a sense of creative independence that will allow them to practice in and contribute to a variety of professions and fields of scholarship.

### Fast Track Biology BS to Biology MS

The university allows the opportunity for high-achieving undergraduate students to count a select number of graduate credits toward their undergraduate degree and thereby obtain a graduate degree at an accelerated pace. Students interested in the Fast Track in Biology should see the undergraduate catalog.

### Fast Track Biomedical Sciences BS to Biology MS

The university allows the opportunity for high-achieving undergraduate students to count a select number of graduate credits toward their undergraduate degree and thereby obtain a graduate degree at an accelerated pace. Students interested in the Fast Track in Biomedical Sciences should see the undergraduate catalog.

## Student Learning Outcomes

Students will:

- Exhibit a basic mastery of essential and emerging knowledge and techniques in the field of biology, and in-depth mastery in the concepts and methods of their specific area of study.
- Work closely with their graduate advisory committee members to develop an academic plan that provides the student with chances to use the scientific method, is grounded in the principles of Biology, and includes experiences that are appropriate for each student's chosen career path.
- 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 a 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.

## Graduate Credit From Other Disciplines

Graduate students in the Master of Science in Biology program may take courses from other disciplines in the College of Science such as BIMS, CHEM, ESCI, GISC, GSEN, MARB, FAMA, MATH, and CMSS with approval from the student's graduate advisor/advisory committee. Up to nine semester credit hours of graduate courses from other colleges at Texas A&M University-Corpus Christi may be included as part of a degree plan with approval from the student's graduate advisory committee.

## For Additional Information

**Website:** <https://sci.tamucc.edu/departments/life-sciences/biology/index.html> (<https://sci.tamucc.edu/departments/life-sciences/biology/>)

### Campus Address:

Tidal Hall, Room 310  
Phone (361) 825-2754

### Mailing Address:

Graduate Biology Program, Unit 5800  
College of Science

Texas A&M University-Corpus Christi  
6300 Ocean Drive  
Corpus Christi, Texas 78412-5800

## Admission Requirements

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
- Summer Sessions - February 1

To be considered for admission to the MS Program in Biology, an applicant should consult the Admissions (<http://catalog.tamucc.edu/graduate/admissions/>) section of this catalog for university requirements for admission. Applicants must provide the following: a completed application form; application fee; official transcripts of all college and university coursework; an essay (not more than 1000 words) describing educational and career goals, and interests as they relate to program faculty (see <https://www.tamucc.edu/science/roster.php?program=lsci>); a list of the program faculty members contacted; and three letters of recommendation from people familiar with their potential for graduate studies. **Students must contact potential advisors prior to and during the application process to discuss research opportunities in faculty member labs. A faculty member must be willing to serve as the chair of the applicant's Graduate Advisory Committee and the applicant must include a summary of their discussions with faculty members in their essay. Applicants who do not have a faculty member willing to serve as their committee chair will not be admitted to the program.** Additional requirements exist for international students, including TOEFL or IELTS scores from the ETS taken within the last two years for students from countries where English is not the native language, and an approved foreign transcript evaluation that includes a course-by-course comparison (refer to the Admission section of this catalog). No criterion is weighted more heavily than any other criterion. A campus visit including personal interviews with prospective faculty mentors is recommended. Incomplete applications are not considered. Applications received or completed after the deadline for admission during one semester may be considered for admission in the following semester at the applicant's request. Applicants will be notified of the outcome of their application by email.

Teaching Assistantships, graduate research assistantships or fellowships may be available to graduate students admitted as degree-seeking students who maintain full time graduate student status (9 hours/fall and spring semesters, and 3 hours/summer). The completed Teaching Assistant Application (see the Graduate Education website) 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 the following academic year. 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 MS Biology Graduate Coordinator to determine courses in which they can enroll and expect to apply to the MS Biology degree, should they be admitted to the program. Students must earn a grade of "B" or better in courses taken prior to admission to the program for the courses apply to the plan of study.

## Academic Preparation

Degree candidates in biology are expected to enter the program with competencies that are equivalent to those required of Texas A&M University-Corpus Christi undergraduate biology majors as described in the biology section of the undergraduate catalog. Therefore, a degree candidate who lacks adequate academic preparation may be required by his or her Graduate Advisory Committee to complete undergraduate course work prior to the completion of the MS degree. Such course work (4000-sequence or lower) will be regarded as foundation or prerequisite work and will not count as credit towards the total required for completion of the degree.

## Program Requirements

Each Master of Science degree candidate must complete a minimum of 36 graduate semester credit hours. Undergraduate courses (4000-sequence or lower) are regarded as foundation work and will not count toward the total. A student may request approval for transfer of a maximum of 9 semester credit hours of graduate courses from other colleges or universities to a Master of Science in Biology degree plan.

After admission to the graduate program, the student's graduate advisor will guide them in all matters relating to degree requirements and procedures until the Graduate Advisory Committee is formed. By the end of the first semester of graduate study the student, in consultation with their graduate advisor, will select the remaining members of the Graduate Advisory Committee. This committee will advise the student in all matters pertaining to graduate requirements and procedures. A student's Graduate Advisory Committee must consist of a minimum of three members, at least two of whom must be members of the graduate faculty in the Department of Life Sciences. Additional committee members must be members of the graduate faculty at Texas A&M University-Corpus Christi or an adjunct graduate faculty member in the Department of Life Sciences. The Chair of a student's Graduate Advisory Committee must be a member of the graduate faculty in the Department of Life Sciences. The student and all members must mutually agree to the size and composition of the Graduate Advisory Committee. The committee will recommend a Degree Plan for the student that will then be submitted to the Dean of the College of Science for approval.

There are two plans for obtaining the Master's Degree in Biology: the Professional (Non-Thesis) Plan and the Thesis Plan.

### Professional (Non-Thesis) Plan

The Professional (non-thesis) Master's Degree is designed to provide a broad understanding of biology. The curriculum will especially benefit those individuals in professional employment who seek advancement or additional training to enhance their knowledge and skills. The student is required to write a professional paper based on work done in BIOL 5397 Directed Research (3 sch). The paper will be on a topic approved by the student's Graduate Advisory Committee and will demonstrate the

student's ability in organization, data collection, and scientific writing. Graduate students are encouraged to present their research at a scientific meeting (other than their graduate seminar) prior to graduation.

### Thesis Plan

The thesis Master's Degree requires a thesis based upon original research. The research must include a review of relevant literature, a description of the results from original research on a topic approved by the Graduate Advisory Committee, statistical analysis when appropriate, and an appropriate discussion of the results. The research must be conducted during the period that the student is enrolled at Texas A&M University-Corpus Christi. Graduate students are expected to present their research at a scientific meeting (other than their graduate seminar) prior to graduation.

### Additional Information

Thesis students may change to the Professional (Non-Thesis) Plan at any time with the approval of the Graduate Advisory Committee.

The thesis and professional paper must follow format requirements as established in the Graduate Education Master's Student Handbook and the Department of Life Sciences Graduate Handbook, and must be approved and signed by the members of the student's Graduate Advisory Committee.

Code	Title	Hours
<b>Core Courses</b>		
BIOL 5102	Graduate Defense Seminar	1
MATH 6315	Statistical Methods in Research I	3
<b>Professional or Thesis Plan</b>		
Select one of the following Plans:		32
<i>Professional (Non-Thesis) Plan</i>		
BIOL 5397	Directed Research	
Select 29 hours of Advanced Electives <sup>1</sup>		
<i>Thesis Plan</i>		
BIOL 5392	Thesis Proposal	
BIOL 5393	Thesis Research	
BIOL 5394	Thesis Submission	
Select 23 hours of Advanced Electives <sup>1,2</sup>		
<b>Total Hours</b>		<b>36</b>

<sup>1</sup>

The advanced electives must be approved by the student's Graduate Advisory Committee in order to be counted for credit towards the graduate degree.

<sup>2</sup>

Up to 6 hours of BIOL 5940 Project Research (1-9 sch) may be applied to MS Biology Thesis degree plan requirements.

### Emphasis in Biomedical Sciences

Students who are interested in using the MS in Biology as preparation for professional schools (medical, dental, pharmacy, veterinary, optometry, translational medicine, or forensic science doctoral programs) may choose the MS in Biology with an emphasis in Biomedical Sciences. This emphasis is available in both thesis and professional plans and required coursework and numbers of credit hours are the same for students choosing the Biomedical Emphasis. The difference for these students is that they must demonstrate that the selection of electives provides a coherent graduate program focused on areas or topics related

to the biomedical sciences. The designated electives (a minimum of two courses from the list of suggested electives below) must be approved by the student's advisory committee. No 4000- level courses from the student's undergraduate program that were stacked with a 5000- or 6000-level course can be used to fulfill this requirement. The topic for the student's thesis or professional paper must be approved by the student's advisory committee. The inclusion of an internship as part of the student's thesis or professional paper is permissible if approved by the student's graduate committee.

Code	Title	Hours
<b>Suggested Electives</b>		
BIOL 5304	Virology	3
BIOL 5311	Cellular Bases of Behavior	3
BIOL 5340	Genomics, Proteomics and Bioinformatics	3
BIOL 5406	Immunology	4
BIMS 5311	Principles of Oncology	3
BIMS 5323	Neurosciences	3
BIMS 5327	Toxicology	3
BIMS 5374	Molecular Medical Microbiology	3
BIMS 5410	Cells and Tissues	4
BIMS 5439	Case Work Methods in Forensic Anthropology	4
BIMS 5590	Special Topics	1-5
BIMS 5396	Directed Independent Study	1-3
BIOL 5406	Immunology	4
BIOL 5439	Case Work Methods in Forensic Anthropology	4
BIOL 5590	Special Topics	5
MARB 6343	Oceans and Human Health	3

## Enrollment Requirements

All students are required to maintain continuous registration until completion of all requirements for graduation unless a specific leave of absence is granted in writing by the department. Students funded through scholarships, fellowships, and assistantships are required to maintain a minimum number of credit hours per semester (9 hours/ fall and spring semester, and 3 hours/summer). To meet enrollment requirements after completing all formal coursework on the degree plan, a student may register for BIOL 5940 Project Research (1-9 sch).

## Thesis Defense Seminar and Oral Examination

During the graduate student's final semester before graduation, the student must enroll in BIOL 5102 Graduate Defense Seminar (1 sch). To successfully complete this requirement, the student must

1. present and defend their thesis research in front of an audience including their Graduate Advisory Committee, peers, and other faculty, and
2. pass a final oral examination.

The student's Graduate Advisory Committee will administer the examination. It will cover topics related to the thesis research or professional paper as well as broad aspects of biology. The student is responsible for scheduling the examination with the faculty involved according to program guidelines. A student who fails the final oral examination may repeat it after a minimum of four months. If a student fails the second oral examination, the student will not be permitted to continue in the program.

## Graduate Courses

Graduate standing is required for enrollment in 5000- and 6000-level courses. Exceptions can be made for outstanding undergraduate students with the Dean's consent. For details, see "Graduate Study by Undergraduates" in the catalog chapter titled "Academic and Degree Requirements (<http://catalog.tamucc.edu/graduate/academic-degree-requirements/>)." Weekly lecture and laboratory hours associated with each course are designated by (lecture:lab) following the semester hours when appropriate. The number of laboratory hours shown is the number of formal, scheduled laboratory time. In most cases, additional laboratory time will be required to complete assigned work. Prerequisites for entry into a course are indicated, but may be waived with permission of the instructor.

Graduate Courses can be viewed in the Courses A (<https://catalog.tamucc.edu/content.php?catoid=25&navoid=1178>)-Z (<http://catalog.tamucc.edu/graduate/courses-az/>) section.

## Courses

### BIOL 5102 Graduate Defense Seminar

#### 1 Semester Credit Hour

Presentation of research conducted for MS degree. Should be taken the last semester of resident graduate study. Open only to MS Thesis and Non-thesis Degree Candidates in Biology. Students can enroll in any semester with the approval of their graduate advisory committee chair.

### BIOL 5304 Virology

#### 3 Semester Credit Hours (3 Lecture Hours)

Survey of bacteriophages and major pathogenic plant and animal viruses including Baltimore classification, viral replication, and emerging viral diseases. Emphasis on analysis and review of primary literature on viruses.

**Prerequisite:** BIOL 2416, 2421 and CHEM 3412.

### BIOL 5307 Fungal Biology & Ecology

#### 3 Semester Credit Hours (3 Lecture Hours)

Biology, classification, and ecology of the fungi. Applied aspects and current topics in mycology and mycological techniques. Offered odd Spring. Stacked with BIOL 4307.

### BIOL 5308 Biogeography

#### 3 Semester Credit Hours (3 Lecture Hours)

Selected reading, discussion and projects concerning the geographic distribution of plants and animals. Offered even Spring. Stacked with BIOL 4308.

### BIOL 5311 Cellular Bases of Behavior

#### 3 Semester Credit Hours (3 Lecture Hours)

Using vertebrate and invertebrate animal models, this graduate-level course explores how behaviors emerge from the activity of neural circuits and how experience modulates these circuits. Offered every Fall. Stacked with BIOL 4311.

### BIOL 5315 Animal Behavior

#### 3 Semester Credit Hours (3 Lecture Hours)

Adaptive aspects of animal behavior related to how and why behaviors develop, how behaviors affect fitness, and how behaviors evolve. Offered every Fall. Stacked with BIOL 4315

### BIOL 5319 Biology of Marine Mammals

#### 3 Semester Credit Hours (3 Lecture Hours)

Introduction to marine mammals, with a focus on their interactions with their biotic and abiotic environment. Offered every Fall. Stacked with BIOL 4319.

**BIOL 5334 Biology and Ecology of Coral Reefs****3 Semester Credit Hours (3 Lecture Hours)**

This course will introduce the biology of corals, describe the abiotic and biotic interactions among coral reef ecosystem inhabitants, identify the threats of climate change, and discuss the conservation and management of reefs for the future. Offered every Spring. Stacked with BIOL 4334.

**BIOL 5340 Genomics, Proteomics and Bioinformatics****3 Semester Credit Hours (3 Lecture Hours)**

Integrative biological study using genome-wide approaches and bioinformatics. The "-omics" technologies (Genomics, Proteomics, Metabolomics, etc) will be reviewed. Applications to understanding biological function in various biological disciplines will be emphasized. Offered every Fall. Stacked with BIOL 4340; Cross-listed with MARB 6342.

**BIOL 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. Offered during Summer. Stacked with BIOL 4355; Cross-listed with FAMA 5355.

**BIOL 5360 Computation for 21st Century Biologists****3 Semester Credit Hours (3 Lecture Hours)**

This course is designed to prepare students to use computational tools for bioinformatic applications in advanced courses and independent research projects. Students will be introduced to powerful open-source computing tools used in biological research for creation, organization, manipulation, processing, analysis, and archiving of "big data." While not a formal requirement, it is assumed that students have a firm command of basic algebra. Offered every Fall. Stacked with BIOL 4360; Cross-listed with MARB 6360.

**BIOL 5392 Thesis Proposal****3 Semester Credit Hours**

Thesis track students must complete a proposal for their thesis project. A proposal is considered complete when it is approved and signed by all members of the student's graduate advisory committee. Open only to thesis track students in the MS Biology program. Qualified students can enroll in any semester with the approval of their graduate advisory committee chair.

**BIOL 5393 Thesis Research****3 Semester Credit Hours**

Implementation of the Thesis Proposal, and the production of a rough draft of the thesis submitted for initial editing and comment. A course section will be created for the student to enroll. Students can enroll in any semester with the approval of their graduate advisory committee chair.

**Prerequisite:** BIOL 5392.

**BIOL 5394 Thesis Submission****3 Semester Credit Hours**

The final draft of the thesis is completed, approved by the graduate advisory committee, and is readied for distribution. Students can enroll in any semester with the approval of their graduate advisory committee chair.

**Prerequisite:** (BIOL 5392 and 5393).

**BIOL 5396 Directed Independent Study****1-3 Semester Credit Hours (1-3 Lecture Hours)**

Study in areas of current interest. Credit is not given for research on the thesis project. A total of six semester hours of Directed Independent Study may be counted toward the MS degree.

**BIOL 5397 Directed Research****3 Semester Credit Hours**

For students in the MS Biology Professional track. Field, laboratory, and/or library research that results in the production of the professional paper, its approval by the graduate advisory committee, and its final submission.

Students can enroll in any semester with the approval of their graduate advisory committee chair. This course must be successfully completed for the professional track student to complete the MS degree.

**BIOL 5406 Immunology****4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

An in-depth study of immunology. Emphasizes function and interaction of specific cells, cytokines, lymphokines, antibodies and molecules that are the essential components of the immune system. The course includes up-to-date coverage of both innate and adaptive immunity, and the immune system in health and disease. Offered every Spring. Stacked with BIOL 4406; Cross-listed with BIMS 4406.

**Prerequisite:** BIOL 2421.

**Co-requisite:** SMTE 0092.

**BIOL 5408 Microbial Ecology****4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

Relationships between microorganisms and their biotic and abiotic environments. Role of microorganisms in biogeochemical cycling. Methodology in microbial ecology. Biotechnological aspects. Offered every Fall. Stacked with BIOL 4408; Cross-listed with MARB 6408.

**Co-requisite:** SMTE 0092.

**BIOL 5410 Mammalogy****4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

The course is designed for graduate students in biology wanting to acquire a more detailed working knowledge and appreciation of mammalian diversity in structure, function, ethology, and ecology. Knowledge and skills acquired in this course will be useful to field and laboratory studies in ecology, evolution, animal behavior, biogeography, wildlife management, and related disciplines. Offered even Fall. Stacked with BIOL 4410.

**Co-requisite:** SMTE 0091.

**BIOL 5413 Entomology****4 Semester Credit Hours (4 Lecture Hours)**

A survey of insects and their kin including natural history, classification, phylogeny, ecology, behavior, development, and physiology. Offered even Spring. Stacked with BIOL 4413.

**Co-requisite:** SMTE 0091.

**BIOL 5415 Biology of Estuarine Organisms****4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

Systematics, distribution, and ecology of estuarine macrofauna. Required field trip. Individual study required. Offered every Spring. Stacked with BIOL 4444.

**Co-requisite:** SMTE 0091.

**BIOL 5425 Ornithology****4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

The course is designed for graduate students in biology wanting to acquire a more detailed working knowledge and appreciation of avian diversity in structure, function, ethology, and ecology. Knowledge and skills acquired in this course will be useful to field and laboratory studies in ecology, evolution, animal behavior, biogeography, wildlife management, and related disciplines. Offered odd Fall. Stacked with BIOL 4425.

**Co-requisite:** SMTE 0091.

**BIOL 5427 Coastal Ecology of Texas****4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

Study of the ecology and environmental issues of the Texas coast. Includes field trips along the entire Texas coastline.

**Co-requisite:** SMTE 0091.

**BIOL 5429 Marine Botany****4 Semester Credit Hours (4 Lecture Hours)**

Marine plants are a diverse group that includes unicellular algae, seaweeds, seagrasses, salt marshes, and mangrove forests. The goal is to present taxonomic, physiological, chemical, and ecological aspects of marine plants, their adaptations, and how abiotic and biotic factors interact in their communities. The use of recent journals and original scientific research will allow the student to evaluate anthropogenic effects to these communities and develop methods of restoration and management. Offered every Fall. Stacked with BIOL 4429.

**Co-requisite:** SMTE 0091.

**BIOL 5430 Marine Plankton****4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

Investigation of the systematics, distribution, and ecology of marine plankton. Offered odd Spring. Stacked with BIOL 4430; Cross-listed with MARB 6430.

**Co-requisite:** SMTE 0091.

**BIOL 5432 Ichthyology****4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

The study of fish encompassing species diversity, natural history, and evolutionary and ecological relationships of fishes. This course will consist of four major parts: (1) Evolution, (2) Systematics, (3) Biology, and (4) Ecology of fish. Laboratory identification of marine and freshwater fishes from the University archives and collected during field excursions. Offered every Fall. Stacked with BIOL 4432; Cross-listed with MARB 6432

**Co-requisite:** SMTE 0091.

**BIOL 5439 Case Work Methods in Forensic Anthropology****4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

This course combines the study of human bones (osteology) with hands-on examination of disarticulated skeletal remains using established and validated forensic anthropological methods to develop the demographic profile of the living individual, including assessment of trauma and pathological conditions. Offered every Spring. Stacked with BIOL 4439; Cross-listed with BIMS 4439.

**Prerequisite:** BIOL 2401.

**Co-requisite:** SMTE 0092.

**BIOL 5442 Herpetology****4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

Systematics, ecology, and behavior of amphibians and reptiles providing a global perspective on the biology of amphibians and reptiles. Offered odd Spring. Stacked with BIOL 4442.

**Co-requisite:** SMTE 0091.

**BIOL 5590 Special Topics****5 Semester Credit Hours (5 Lecture Hours)**

An advanced study of a biological topic. May be repeated with full credit in another area of biology. Topics vary by semester.

**BIOL 5609 Field and Sampling Techniques****6 Semester Credit Hours (3 Lecture Hours, 6 Lab Hours)**

Systematics, ecology, and behavior of amphibians and reptiles providing a global perspective on the biology of amphibians and reptiles. Offered odd Spring. Stacked with BIOL 4442.

**Co-requisite:** SMTE 0091.

**BIOL 5940 Project Research****1-9 Semester Credit Hours (1-9 Lecture Hours)**

Research related to the MS project. Open only to degree candidates in biology with consent of the graduate advisor. This course may be repeated as needed but a maximum of 4 hours can be applied to the MS degree in biology. Course is taken as credit/non-credit. Students can enroll in any semester with the approval of their graduate advisory committee chair.