Biological Science Degree Programs

The two programs offered in the biological sciences represent a joint effort between two constituent institutions of the University of System of Maryland: FSU and the Appalachian Laboratory (AL), Center for Environmental Science. Each program is distinct, yet they have similar structure and basic degree requirements and involve many of the same faculty and resources. Accordingly, the two degree programs adhere to a common set of regulations and requirements, which are listed below.

Criteria and Procedure for Regular Admission

Basic admission procedures and requirements are in the "Graduate Study at FSU" section of this catalog. The following are additional requirements and procedures for the two programs in the biological sciences:

1. You must have completed a baccalaureate degree from an accredited college or university with an undergraduate grade point average of at least 3.0 on a 4.0 scale. Official scores on the Graduate Record Examination (General Test) must be submitted by the Educational Testing Service directly to the Office of Graduate Services. If you have not earned at least a 3.0 GPA, you must submit a minimum score 300 (V+Q) on the General Test of the Graduate Record Examination which must have been taken within five years of the application deadline. Scores below the above criteria will be considered individually.

2. You must submit a resume, summary of educational goals and research interests, and three professional references . References will be identified by students as part of the electronic application process. Students applying by paper will be required to use forms supplied by the Office of Graduate Services as part of your application for graduate study.

3. All application materials must be received by March 1 for the fall semester and November 1 for the spring semester. A screening committee composed of Biology faculty will determine if your undergraduate background satisfies admission criteria for the individual programs (see the following pages). Some students may be required to take undergraduate courses to meet deficiencies. These courses cannot be counted toward the 36 credit hours for degree requirements.

4. Before you can be admitted to either of the MS programs in the biological sciences, you must have secured a major professor from the graduate faculty of AL or Biology. Applicants should initiate correspondence with faculty members in Biology or AL prior to the formal process of completing an application. Early contact with the faculty is very important. A list of current faculty members and their research interests and areas of expertise is available from the graduate program coordinator

A change in major professors is permissible.

Transfer/Proficiency Credit

1. If you have successfully completed (grade of B or better) graduate courses at another accredited institution, you may apply for transfer credit for up to nine credits in one of these programs. If, upon faculty assessment, the courses are deemed essentially comparable to courses in one of these programs, you will be awarded credit toward completion of your degree. All courses considered for transfer credit must meet the graduate transfer credit policy requirements, including the six-year limit.

2. Proficiency credit/credit by exam are not options in these two programs.

Procedural Sequence and Requirements for Degree Candidates

You must complete steps 1-5 (below) during your first year. Step 7 represents the final major requirement of the degree. There is a deadline of April 15 for students entering in fall, and Nov. 15 for students entering in spring for the Master's Committee selection, for oral examinations, plan of study and submission of the thesis proposal. Notifications and submissions are to be made to the graduate program coordinator and Office of Graduate Services. If you are unable to meet the deadlines, an appeal with a revised timeline from your major professor must be submitted to the graduate program coordinator for review and approval by the Graduate Committee.

1. Select Master's Committee

With assistance of your major professor, you must select a Master's Committee. The Master's Committee must consist of your major professor plus at least two other members, one of whom must be a faculty member of FSU. Individuals from other institutions or agencies may serve on the committee, but they must be acceptable as adjunct faculty at AL or the Biology Department.

2. Take Oral Qualifying Examination

Your Master's Committee will give you an oral qualifying exam. This tests your general knowledge of the biological sciences and your proposed area of specialization. This exam is primarily a diagnostic test to help your committee develop a program of study that will strengthen your understanding of the concepts in areas where you have shown weakness. In the event of substandard performance in all areas, a retest must be taken within 6 months of the first exam. Failure of the second examination or failure to retake the exam within 6 months will result in your termination from the MS program.

3. Develop Plan of Study

After successful completion of the oral qualifying exam, you and your committee will develop a plan of study that is a list of the courses you will take. The plan of study must be approved unanimously and signed by the members of your Master's Committee.

Your plan of study will address four areas:

a. Undergraduate deficiencies, as determined by the Screening Committee (see special admission criteria in the appropriate field)

b. Core courses (see program description in the appropriate field) and any substitutions of core courses

c. Elective courses

d. Any additional requirements that your Master's Committee identifies

Subsequent changes to the plan of study must be submitted to the graduate program coordinator with the appropriate authorization. A single course change in an elective course requires only the approval of your major professor, but any subsequent changes require approval by a majority of your Master's Committee.

The following special requirements apply to the selection of courses:

a. At least 15 credit hours must be at the 600 level or above.

b. During your first fall semester, you should register for BIOL 600 (Methods of Research in Biological Sciences) and, for Wildlife/Fisheries Biology, MATH 680 (Research Statistics) or a suitable statistics course.

c. No more than 6 credits of Special Topics (BIOL 650) and 3 credits of Individual Research (BIOL 699) may be counted as elective courses. Thesis (BIOL 710) credits may not be counted as elective course credits.

d. No more than 12 credits of Thesis (BIOL 710) may be counted toward the degree.

4. Submit Plan of Study

The approved Plan of Study form will be forwarded by your major professor to the graduate program coordinator.

5. Submit an Approved Thesis Proposal

A copy of your written thesis proposal (see Graduate Student Handbook for details) must be signed by all members of your Master's Committee and forwarded to the graduate program coordinator. The thesis proposal must be distributed to your Master's Committee at least 1 week prior to the meeting where that committee will consider approval of your proposal.

6. Apply for Degree Candidacy

See below for details.

7. Write and Defend Thesis

Complete an original thesis, give an oral presentation of the thesis and then defend the thesis in a final oral thesis defense. See below for details.

8. Continuous Registration

Register for at least 1 credit hour of BIOL 710 during the intended semester of graduation. If degree requirements are not completed during the semester of initial application for graduation, the student must continue to register each semester until graduation occurs. A student seeking August graduation must register in the first summer session. A student failing to register for a semester will automatically be dropped from the program, and to graduate must reapply for admission. Students who are readmitted will register for an appropriate number of semester credits as determined by departmental policy and implemented by the graduate program coordinator.

Degree Candidacy

FSU regards degree candidacy as an important element of the master's degree programs in the biological sciences. The purpose of degree candidacy is to provide a formal mechanism whereby your academic performance and progress are evaluated. Forms for application to degree candidacy are available through your graduate program coordinator.

To be admitted to degree candidacy, you must have:

1. Completed steps 1-5 above

2. Completed any deficiency courses identified by the Screening Committee

3.Completed 12 hours of graduate course work (maintaining at least a 3.0 GPA)

Thesis

A major part of the degree programs in the biological sciences is the research associated with your project. The thesis is reflected in 6 credit hours minimum of Thesis (BIOL 710), although the effort expended on the thesis research may substantially exceed that typically expended on 6 credit hours of standard course work. Specific information regarding the proposal, thesis preparation, binding and distribution can be found in the Graduate Student Handbook available from the graduate program coordinator.

You must present a public seminar on your thesis research, after you have written the thesis. After the presentation, you must defend the thesis orally, which entails responding to questions from your Master's Committee concerning your thesis research. It is the responsibility of you and your major professor to notify the graduate program coordinator as to the time and place of your public seminar at least 10 working days before this event.

Master of Science: Applied Ecology & Conservation Biology

The Master of Science in Applied Ecology & Conservation Biology program enables students to gain scientific training in addressing conservation issues, especially those pertaining to the persistence of native populations and communities in a changing environment, landscape fragmentation, conservation/development conflicts, watershed assessment and integrated resource management. The program addresses both domestic and international issues, since the need of professionals is broad-based and global. FSU has inter-institutional agreements with universities and national agencies in African and Central American countries that facilitate the international dimensions of this program.

The conservation biology track addresses both local and global problems associated with conflicts between human development and conservation of biodiversity. It is designed to prepare students for professions that require specialized training directed at maintaining biodiversity. The landscape and watershed ecology track addresses the effects of human activities and natural processes on terrestrial and aquatic ecosystems at multiple scales. Students completing this track will be prepared for professional careers in resource and watershed management and restoration. Both tracks prepare students for work with environmental consulting firms, national and international conservation organizations, and state and federal agencies. Graduates of our program also are well-prepared to pursue further graduate education.

For more information:
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Special Admission Criteria

A screening committee composed of AL and FSU biology faculty will examine your transcripts and determine if your course work meets the requirements listed below. Areas of deficiency will necessitate your taking undergraduate courses that will not be counted toward the 36 credit hours required for the degree program. You must have completed a baccalaureate degree from an accredited college or university. Your undergraduate training must have included 1 year of courses in general biology and general chemistry, and at least one semester of organic chemistry and statistics. One semester of genetics is required for the Conservation biology track and one semester of physical science is required for the landscape and watershed ecology track. Additionally, your transcripts must show that you have passed one course in at least three of these eight fields:

- Anatomy or Morphology
- Ecology
- Physiology
- Cellular or Molecular Biology
- Evolution or Systematics
- Natural Resource Management
- Developmental Biology
- Environmental or Earth Science

Program Curriculum

(at least 36 credits)

Core Courses (16-22 credit hours)

BIOL	641	Conservation Biology and Reserve Design	3 cr.
BIOL	643	Ethics, Economics & Politics in Conservation	2 cr.
BIOL	600	Methods of Research in Biological Sciences	2 cr.
BIOL	601	Laboratory Teaching Experience	2 cr.
BIOL	694	Graduate Seminar in Fish/Wild/AECB	1 cr.
BIOL	710	Thesis*	6-12 cr.

*Enroll in the final credit hours of thesis in the semester in which you expect completed thesis to be approved.

Required for Conservation Biology Track

BIOL	640	Population and Conservation Genetics	3 cr.

Required for Landscape and Watershed Ecology Track

BIOL	632	Land Margin Interactions	4 cr.

Electives (12-18 credit hours)

At least 6 credit hours must be from departments other than Biology. Course names followed by (AL) indicate which courses are taught by faculty at the University of Maryland Center for Environmental Science's Appalachian Laboratory. All other courses are taught by FSU faculty.

Total credit hours: at least 36

Elective Options:

Biology

BIOL 502 Evolution

BIOL 506 Ornithology

BIOL 507 Biological Systematics

BIOL 510 Plant Diseases

BIOL 511 Invertebrate Zoology

BIOL 512 General Parasitology

BIOL 514 Quantitative Analysis of Vertebrate Populations

BIOL 517 Ichthyology

BIOL 520 Fish Management and Culture

BIOL 521 Sample Design & Analysis of Plant Communities

BIOL 522 Herpetology

BIOL 523 Mammalogy

BIOL 527 Comparative Anatomy

BIOL 530 Limnology

BIOL 535 Molecular Biology

BIOL 538 Biotechnology Laboratory

BIOL 539 Environmental Toxicology

BIOL 545 Immunology

BIOL 550 Ecology & Management of Wildlife Populations

BIOL 556 Advanced Microscopy

BIOL 609 Plant Ecology

BIOL 610 Animal Physiology

BIOL 612 Animal Ecology

BIOL 613 Plant Physiology

BIOL 621 Terrestrial Biogeochemistry (AL)

BIOL 622 Ecosystem Ecology (AL)

BIOL 623 Landscape Ecology (AL)

BIOL 625 Wildlife Habitat Ecology & Analysis (AL)

BIOL 631 Stream Ecology (AL)

BIOL 650 Special Topics in Fish/Wild/AECB

Geography

GEOG 506 Management and Conservation of Natural Resources

GEOG 513 Remote Sensing – Image Interpretation

GEOG 530 Surface Water Hydrology

GEOG 545 Biogeography

GEOG 572 Environmental Planning

GEOG 573 Environmental Law

Economics

ECON 511 Economics for Managers

Management

MGMT 542 Organizational Behavior

Mathematics

MATH 570 Mathematical Models & Applications

MATH 680 Research Statistics

English

ENGL 540 Literature of the Environment

In addition, the following courses taught at the Appalachian Laboratory through the Marine, Estuarine and Environmental Sciences (MEES) Program of the University of Maryland are available for students to take for credit:

498A Biometry (AL)

698M Landscape Analysis/Quantitative Ecology (AL)

698O Watershed Hydrology (AL)

698S Community Ecology (AL)

Master of Science: Wildlife/Fisheries Biology

The Wildlife/Fisheries Biology program is designed to prepare you for research and management positions within the public and private sectors. The program allows flexibility, yet offers courses necessary for certification with professional organizations such as The Wildlife Society and the American Fisheries Society.

Upon completion of the Wildlife/Fisheries Biology program, you will have achieved a general knowledge and competence in one or more of the following disciplines: aquaculture, aquatic ecology, terrestrial ecology, conservation biology, management techniques, population biology, evolutionary ecology, aquatic toxicology, habitat analysis, systematics and systems modeling.

Special Admission Criteria

A screening committee composed of AL and FSU Biology faculty will examine your transcripts and determine if your course work meets the requirements listed below. Areas of deficiency will necessitate your taking undergraduate courses that will not be counted toward the 36 credit hours required for the degree program.

You must have completed a baccalaureate degree from an accredited college or university. Your undergraduate training must have included 1 year of courses in general biology and general chemistry, one semester of calculus and at least one semester of organic chemistry and statistics. Additionally, your transcripts must show that you have passed one course in at least four of these eight fields of biology:

- Anatomy or Morphology
- Cellular or Molecular Biology
- Developmental Biology
- Ecology
- Evolution or Systematics
- Genetics
- Physiology
- Natural Resource Management

For more information:
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Program Curriculum

(at least 36 credits)

Core Courses (17-23 credit hours)

BIOL	514	Quantitative Analysis of Vertebrate Populations	3 cr.
BIOL	600	Methods of Research in Biological Sciences	2 cr.
BIOL	601	Laboratory Teaching Experience	2 cr.
BIOL	694	Graduate Seminar in Fish/Wild/AECB	1 cr.
MATH	680	Research Statistics	3 cr.
BIOL	710*	Thesis	6-12 cr.

*Enroll in the final credits of thesis in the semester in which you expect the completed thesis to be approved.

Elective Courses (13-19 credit hours)

At least 13 credit hours of graduate courses are to be selected with the approval of your advisor and committee members.

Total credit hours: at least 36