

## Biology

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Graduate Program Coordinator

Minimum prerequisites for admission to the graduate program in biology are: 16 semester hours of biology beyond freshman biology, one semester of organic chemistry, one semester of physics, one semester of calculus, GPA above 3.0, and a sum of the GRE verbal and quantitative sections above 1000.

A student desiring a Master of Science in biology will need to complete 32 semester hours of graduate work. A minimum of 26 hours will be biology; the remaining hours may include cognate courses (e.g., in education, psychology, or computer science) approved by the graduate coordinator. Of the total 32 hours, sixteen hours must be classroom courses (i.e., non-independent study) and twelve hours must be taken at the 600 level. The graduate coordinator must approve the entire course of study.

The student must pass a comprehensive oral exam covering any aspect of biology, with an emphasis on the graduate classes taken by the student and the student's field of study. The oral comprehensive exam must be passed during the semester immediately following completion of 24 graduate semester hours. Oral comprehensive exams will be offered during a one-week period in each of the spring and fall semesters.

All biology graduate students must complete an independent research thesis and enroll in six hours of thesis (BIO 699). In the student's first year, a committee of three members of the graduate faculty (including the thesis advisor) will be chosen in consultation with the graduate coordinator. A majority of committee members must be from the faculty of the department of Biology at Bradley University. This committee will advise the student in his or her thesis research. Within three semesters following enrollment in the graduate program (or prior to completion of 18 semester hours), the student must submit a thesis proposal to his or her thesis committee. The student will be permitted to enroll in BIO 699 (thesis) only upon written acceptance of the proposal by the thesis committee. Upon completion of the thesis, a student will present a departmental seminar.

The student must then successfully defend the thesis to the committee members. Full-time students should anticipate requiring a minimum of four semesters for completion of the biology graduate program.

## Course Descriptions

### **BIO 501 Biology of Fishes** 3 hrs.

Fishes: organ-system structure and function, ecology, embryology, behavior, and economic importance. Prerequisites: 6 hours college-level biology.

### **BIO 502 Biometry** 3 hrs.

Principles of biological measurement. Topics include the nature of data, sampling, experimental design, and statistical analysis. Prerequisites: C or better in BIO 223, or six hours of college biology.

### **BIO 506 Advanced Microbiology** 3 hrs.

Comprehensive analysis of selected topics of current interest in bacteriology, immunology, and virology: genetic engineering, plasmid research, bactericidal and bacteriostatic agents, complement system, viruses, tumor formation, and cancer. Prerequisites: one semester of laboratory bacteriology; organic chemistry; or consent of instructor.

### **BIO 509 Human Genetics** 3 hrs.

Genetic theory and methodology applied to humans. Prerequisites: C or better in BIO 224.

### **BIO 510 Population and Evolutionary Ecology** 3 hrs.

Emphasis on structure, growth patterns, and interactions of populations; relationship to evolutionary theory. Prerequisites: MTH 115; one semester of environmental biology or consent of instructor.

### **BIO 519 Comparative Animal Behavior** 3 hrs.

Animal communication, social behavior, and evolution of behavior. Comparisons of a wide variety of vertebrates and invertebrates. Prerequisites: 6 hours of college level biology or zoology.

### **BIO 525 Advanced Physiology** 3 hrs.

Detailed study of the structure and function of animals; special reference to the human body; theories and methods of investigation mostly at organ system level; adaptational strategies to special conditions. Prerequisite: one semester of physiology or consent of instructor.

### **BIO 530 Plant Systematics** 3 hrs.

Evolution, classification, and characteristics of various flowering plant families. Prerequisites: 6 hours college-level biology.

### **BIO 545 Biophysics** 3 hrs.

Applications of physics principles and methods of investigation of biological systems. Emphasis on physical environmental effects on biological systems. Cross listed as PHY 545. Prerequisites: PHY 108 or 201; senior standing; or consent of instructor. PHY 345 recommended.

### **BIO 561 Natural History of Vertebrates** 3 hrs.

Vertebrates as integrated organisms: emphasis on activities and interaction with environment under natural conditions. Field work on local fauna. Introduction to classification. Prerequisite: 6 hours of college-level biology or zoology.

### **BIO 563 Advanced Plant Ecology** 3 hrs.

Physiological and growth responses of plants to environmental stresses, and consequences to the structure and function of communities and ecosystems. Prerequisites: 6 hours college-level biology.

### **BIO 564 Advanced Molecular Biology** 3 hrs.

Selected topics in molecular biology. Emphasis on proteins and nucleic acids. Prerequisites: C or better in BIO 224.

### **BIO 565 Aquatic Ecology** 3 hrs.

Emphasis on survival and dispersion of natural aquatic populations as related to environmental degradation in lakes, rivers, and streams. Prerequisites: 6 hours college-level biology or zoology.

### **BIO 566 Advanced Biochemistry** 3 hrs.

Quantitative aspects of all areas of biochemistry. Emphasis on metabolism. Prerequisite: one semester of biochemistry or physical chemistry, or consent of instructor.

### **BIO 568 Cellular and Molecular Immunology** 3 hrs.

Interaction between antigen presenting cells, B lymphocytes, and T lymphocytes to mount immune responses. Molecules responsible for immune interactions. Methods to study cell and molecular interactions in immunity. Prerequisites: BIO 564 or equivalent.

### **BIO 570 Seminar** 1-3 hrs.

Selected topics in biological sciences. May be repeated under different topics for a maximum of 6 hours credit. Prerequisites: 3.0 grade point average in student's major; senior or graduate standing; consent of instructor.

### **BIO 575 Special Graduate Topics in Biology** 2-3 hrs.

Selected graduate-level coursework in biology. May be repeated under different topics for a total of 6 credit hours. Prerequisites: 3.0 grade point average in graduate-level biology program; or consent of instructor.

### **BIO 580 Readings** 1-3 hrs.

Individual assignments of relevant topics in biological sciences. Prerequisites: 3.0 grade point average in student's major; senior or graduate standing; consent of instructor.

### **BIO 585 Research** 1-6 hrs.

Individual research for qualified students in special areas of biology. Prerequisites: 3.0 grade point average in student's major; senior or graduate standing; consent of instructor.

### **BIO 681 Readings** 1-6 hrs.

Readings in an area of interest to the student. Prerequisites: graduate standing and consent of instructor.

**BIO 683 Research**

**1-6 hrs.**

Research in an area of interest to the student. Prerequisites: graduate standing and consent of advisor.

**BIO 699 Thesis**

**1-6 hrs.**

Research and thesis preparation. Repeatable for up to 6 hours credit. A student can receive no more than a total of 6 hours credit in BIO 699 or CHM 699 or PHY 699. Prerequisite: consent of program coordinator.