

M.A. DEGREE PROGRAMS IN BIOLOGY

These Master of Arts programs offer advanced instruction and research in many areas of biology. These programs include lectures, colloquia, seminars, and may include laboratory work, and/or fieldwork. Thesis research may be conducted in one of the department's laboratories, where faculty and students carry out research in cell, molecular, developmental, and behavioral biology.

MATRICULATION REQUIREMENTS

Applicants must offer adequate preparation in the following, with a grade point average of 3.00 or higher: a minimum of eight credits of introductory biology; an appropriate general physics course; two terms of organic chemistry; and a minimum of two advanced courses selected from the following areas of study: botany, zoology, microbiology, biochemistry, cell biology, anatomy, ecology, evolution, general physiology, or genetics. Candidates must submit two letters of recommendation and a personal statement.

DEGREE REQUIREMENTS

Thirty (30) credits are required for the degree. Students must complete at least 21 credits in courses in the Biology Department.

Students may fulfill requirements for the M.A. through either Plan A or Plan B below.

Plan A: Research thesis based degree:

This degree is designed to prepare students for a research career; to prepare students to move on to the Ph.D. or to prepare students for a research-based technical career.

Required courses:

- BIOL 7991G
- BIOL 7100G
- BIOL 7150G

Plus a minimum of **THREE** courses from the

following list:

- BIOL 7005
- BIOL 7141G
- BIOL 7503X
- BIOL 7007G
- **OR** additional courses approved by the graduate deputy

Students must submit a research thesis and give an oral presentation acceptable to the department. No more than **two** credits in BIOL 7910G may be counted toward the degree. With permission of the deputy chairperson, the remaining credits required for the degree may be in courses in another science department.

Plan B: Library thesis based degree:

This degree is designed for students with education or pre-professional career plans. This option is designed to prepare students for non-research-based careers.

Required Courses:

- BIOL 7991G
- BIOL 7100G

Plus a minimum of **TWO** courses from the following list:

- BIOL 7005
- BIOL 7141G
- BIOL 7503X
- BIOL 7007G
- **OR** additional courses approved by the graduate deputy

Students must submit a library thesis acceptable to the department. No more than **two** credits of BIOL 7910G may be counted toward the degree. Students may not use BIOL 7922 towards the degree. With permission of the deputy chairperson, the remaining credits required for the degree may be in courses in another science department.

Graduate Courses

BIOL 7005 Genetics

60 hours; 4 credits

Prokaryotic and eukaryotic genetics, organization of DNA, replication repair, mutagenesis, recombination, control of gene expression, genetic engineering and molecular techniques.

BIOL 7007G: Molecular and Macroevolution

45 hours; 3 Credits

Readings and commentary in molecular evolution and macroevolution. Exploration of the relationship between mutations and gene duplications with diversification, discussion of how natural selection leads to adaptation. Weekly written commentaries, and a major research project with oral presentation.

BIOL 7010T, 7020 Modern Concepts in Biology I, II

60 hours each term; 4 credits each term

Significant contemporary concepts in biology. These courses may be taken more than once, with the permission of the chairman or graduate deputy. Recent topics include Applied Microbiology, Genomics and Host-Parasite Interactions.

BIOL 7013X Principles of Immunology

45 hours; 3 credits

Innate and adaptive immunity with emphasis on the cellular and molecular mechanisms of immunity. Immune responses to viral, bacterial, fungal and protozoan pathogens, allergic hypersensitivity responses and autoimmune diseases.

BIOL 7027G Model Systems in Biology

30 hours; 2 credits

Introduction to a selection of biological systems used in research. Exploration of how and why different systems are used to solve biological problems, the advantages of selected systems to solve specific problems, and how Biology faculty use these systems in their research.

BIOL 7080G Journal Club

15 hours; 1 credit

Student presentation of current research papers.

BIOL 7100G Molecular Biology

75 hours; 5 credits

Structure and function of biomolecules; enzyme mechanisms; replication, transcription, translation; regulation of macromolecular biosynthesis; energy transformations.

BIOL 7110X Biotechnology of Algae

2 hours lecture, 1 hour discussion section; 3 credits
Phylogeny, evolution, habitats, growth cycles, and genetic engineering of algae; biosynthetic pathways of algal products and their metabolic regulation; interdisciplinary topics including designing bioreactors, nutritional value of natural products from algae; economic aspects of patent and management of companies.

BIOL U7141G Cell Biology

60 hours lecture and conference; 4 credits
Intensive study of major areas of cell biology; integration of cellular ultrastructure; metabolism; transmission of cellular information.

Biol 7150G: Cell and Molecular Biology Techniques – Lab

60 hours lab, 15 hours recitation; 3 credits
Experiments designed for cell and molecular biology with a strong emphasis on modern lab techniques including molecular cloning and DNA recombination.

BIOL U7160X Cells in Culture – Lab

60 hours laboratory, 15 hours recitation; 3 credits
A mixed-format course on the use of cells in culture.

BIOL 7180G Cancer Biology

45 hours; 3 credits

The fundamental principles of the molecular and cellular biology of cancer cells. The role of growth factors, oncogenes, tumor suppressor genes, angiogenesis and signal transduction mechanisms in tumor formation. Maintenance of genomic integrity and tumorigenesis.

BIOL U7321X Applied Microbiology

30 hours; 2 credits

Applied methods in microbiology.

BIOL U7503X Developmental Biology

60 hours; 4 credits

Embryonic development of both invertebrates and vertebrates. Topics include transformation of a fertilized egg to a young animal, cell differentiation, formation of different organs/tissues, signal transduction during development, molecular bases of behavior and human neural disease models.

BIOL U7910G Colloquium

15 hours; ½ credit

Discussion of recent contributions and research in progress in biology.

BIOL U7921G Advanced Study

30 hours; 2 credits

Research with a faculty member. May only be taken once. Students may begin their research by taking Advanced Study before proceeding to take Thesis Research.

BIOL U7922G Advanced Study

60 hours; 4 credits

Research with a faculty member. May be taken only once and is open only to students in Plan A.

BIOL U7931G , U7932G & U7933G Seminar in Special Topics

15, 30 or 45 hours each term; 1, 2 or 3 credits each term
Topical discussion of recent contributions in biology. Course content varies from term to term. Recent topics include Virology and Behavioral Neuroendocrinology.

BIOL U7951X Research Topics in Biology

45 hours; 3 credits

Lecture in selected areas of modern biology.

BIOL 7991G Thesis Research

45 hours; 2 credits

Research for master's thesis, supervised by a faculty member.

BIOL 7992G Thesis Research

45 hours; 2 credits

Research for master's thesis, supervised by a faculty member.



BIOLOGY MASTERS DEGREES



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