

The faculty of the Department of Biological Sciences is dedicated to providing students with a strong undergraduate education in the fundamental principles of biology, while offering opportunities for students to pursue specialized areas of interest.

## THE BIOLOGY PROGRAM

The biology major prepares students for future careers in basic life sciences research, teaching, medicine, dentistry, and allied health professions. Many graduates pursue advanced degrees in specialized areas such as biochemistry, physiology, immunology, entomology, microbiology, ecology, and environmental engineering.

The biology curriculum is designed to ensure that majors have a balanced background in cellular and molecular biology, organismal biology, and ecology. A wide variety of courses provides laboratory and field experiences which reinforce understanding of key concepts, foster appreciation for and working knowledge of the scientific method, teach experimental techniques and develop quantitative and analytical skills.



For more information about the programs offered by the department, please contact:

Dr. Andrew Dolby, Chair  
Department of Biological Sciences  
University of Mary Washington  
1301 College Avenue  
Fredericksburg, Virginia 22401  
540/654-1016  
[www.umw.edu/cas/biology](http://www.umw.edu/cas/biology)  
[umwbiology.org](http://umwbiology.org)

For an academic catalog and an application for admission, please contact:

The Office of Admissions  
University of Mary Washington  
1301 College Avenue • Fredericksburg, Virginia 22401  
540/654-2000 • 1-800-468-5614  
[www.umw.edu/admissions](http://www.umw.edu/admissions)



# BIOLOGY PROGRAM



where great minds get to work

## UNDERGRADUATE RESEARCH

Outstanding junior and senior biology majors have the opportunity to participate in the undergraduate research program. Working with a faculty mentor, the student explores the scientific literature, defines an original research problem, and utilizes the appropriate research and analytical techniques to investigate the problem. This work often results in presentations at scientific meetings. Research students who meet minimum requirements (3.0 overall GPA and a 3.25 average in biology) may pursue Honors in Biology by writing and defending a thesis on their research project. Financial support for student research is available. Any student, including freshmen and sophomores, may participate in faculty-sponsored research through the university's URES 197 program. URES students complete less intensive research tasks and submit end-of-project reports.

## THE SUMMER SCIENCE RESEARCH INSTITUTE

The University of Mary Washington Summer Science Research Institute allows UMW science majors to participate in a summer-long research project supervised by a faculty member. The institute runs concurrently with the summer sessions (mid-May through mid-July). Room, board, and a stipend are provided to participating students.

## INTERNSHIPS

The internship program offers students an opportunity to gain valuable career-related experience. Internship credits do not count towards the biology major, but many biology majors have taken advantage of this program to gain experience and to confirm their career objectives.

## EXPERIENTIAL LEARNING

The Biology service learning option (BIOL 000) provides majors the opportunity to satisfy the Experiential Learning general education requirement. Students apply knowledge and skills acquired in their formal courses to community service activities and reflect upon how such application has augmented their education. Students must complete 40 hours of service within 12 months of submitting a service-learning contract.

## FACULTY

The biology program's main strength is the quality and commitment of its faculty. Members of the biology faculty recognize the special professional insight demanded of them by serious college students and strive to meet this demand by actively engaging in professional research projects and evaluating and improving their teaching skills.

The faculty actively integrate their scientific research programs with classroom education to provide a robust undergraduate biology curriculum. You are invited to visit and discuss with department faculty your educational and career goals.

### Biological Sciences Faculty and their Research Interests:

**Dianne M. Baker, Ph.D.** (University of Washington), Assistant Professor. Regulation of neuroendocrine pathways mediating growth, development, and life history decisions in animals.

**Rosemary Barra, Ph.D.** (Rutgers University) William M. Anderson, Jr. Distinguished Chair of Biological Sciences and Professor. Biology of cancer. Effects of chemotherapy and immunotherapy on cell proliferation.



## Below is a list of published abstracts and poster and oral presentations representative of our students' work.

Abbatiello, B.N. and D.L. Zies. 2011. Changes in Gene Expression During IMCD3 Cell Differentiation. *FASEB Journal*. 25: 506.1.

Casim, M.F. and L.O. Lewis. 2010. Correlation of Chronic Diseases with the Presence of T. whipplei DNA in Saliva. *Southeastern Biology*. 57(3):384.

Hunt, D. and K.E. Loesser-Casey. 2010. Age-related Changes in Stem Cell Markers. *Virginia Journal of Science*, Vol. 61 (1&2):25.

Sine, J.L., Ayers, G.T., and D.M. Baker. 2011. The effect of atrazine on the thyroid axis in zebrafish. *FASEB Journal* 25: 537.1.

Shanks, K.B. and W. Wieland. 2010. A preliminary survey of the fishes of the upper Rappahannock River, Va. Post dam removal. *Southeastern Biology*. 57(3): 299.

Wang, B.A., Haynes, E.A., and T.M. Grana. 2011. Comparative development and evolutionary studies of new *Caenorhabditis* species in Virginia. *FASEB Journal*. 25: 535.3.

**Andrew Dolby, Ph.D.** (The Ohio State University), Associate Professor. Behavioral and physiological ecology and conservation biology of birds.

**Stephen W. Fuller, Ph.D.** (University of New Hampshire), Professor. Plant ecology and physiology.

**Stephen Gallik, Ph.D.** (The Pennsylvania State University), Professor. Cellular response to external mechanical stress. Regulation of intracellular tension development.

**Theresa M. Grana, Ph.D.** (University of North Carolina at Chapel Hill), Assistant Professor. Developmental patterning of nematodes. Bioinformatic and imaging studies of nematode diversity in Virginia.

**Alan B. Griffith, Ph.D.** (University of Maryland), Associate Professor. Plant ecology. Conservation biology of plants. Biodiversity issues.

**Joella C. Killian, Ph.D.** (North Carolina State University), Professor. Entomology. Invertebrate zoology. Water quality issues.

**Michael D. Killian, M.A.** (North Carolina State University), Senior Lecturer. Development of laboratory exercises for the undergraduate general biology laboratory.

**Lynn O. Lewis, Ph.D.** (Virginia Tech), Professor.

Developmental mechanisms of pathogenicity. Microbial physiology and ecology. Microbiology. Virology. Mechanisms of pathogenicity. Microbial physiology and ecology.

**Kathryn E. Loesser, Ph.D.** (Rutgers University), Professor.

Disease mechanisms in the cardiovascular system. The role of stem cells in cardiac repair.

**Deborah A. O'Dell, Ph.D.** (SUNY at Stony Brook), Associate Professor. Developmental mechanisms in the nervous system. Development of neural control of reproduction in honey bees.

**Abbie M. Tomba** (Auburn University), Assistant Professor. Parasite-host and predator-prey interactions in stream communities.

**Werner Wieland, Ph.D.** (Auburn University), Professor.

Natural history, systematics and evolution of fishes and lower vertebrates.

**Deborah L. Zies, Ph.D.** (University of Florida), Assistant Professor.

Molecular mechanisms involved in the transformation of normal cells to cancer cells.

## REQUIREMENTS FOR THE BIOLOGY MAJOR

Thirty-six (36) credits of biology are required to graduate with a B.S. in Biology. These must include Cellular Biology, Introduction to Ecology and Evolution, Genetics, one course in plant biology, one course with a field experience and a seminar. Organic chemistry, physics, and calculus are highly recommended as these courses are required for most post-baccalaureate programs.

To facilitate expeditious completion of their major programs, first-year students are asked to complete Biological Concepts I and II (BIOL 121 and 122) or Phage Hunters I and II (BIOL 125 and 126), and General Chemistry I and II (CHEM 111 and 112) in their freshman year.



## COURSE OFFERINGS IN BIOLOGY

Biological Concepts

Phage Hunters

Nutrition and Metabolism

Botany

Bioethics

History of Biology

The Research Process

Anatomy of the Chordates

Developmental Biology

Plant Ecology

Plant Physiology

Invertebrate Zoology

Animal Ecology

Entomology

Histology

Exercise Physiology

Cellular Biology

General Genetics

Environmental Physiology

Animal Physiology

Introduction to Ecology

and Evolution

Parasitology

Human Anatomy

Human Physiology

Animal Behavior

Neurobiology

Endocrinology

Microbiology

Tropical Ecology

Vertebrate Zoology

Biology of Fishes

Ornithology

Conservation Biology

Molecular Biology of the Gene

Bioinformatics

Virology

Physiological Adaptations

Biology of Cancer

Evolution

Immunology

Independent Research

Biology and Biochemistry

of Protein