

# *Programs of Study in Biological Sciences*

---

## **Biological Sciences Graduate Program**

The graduate programs in Biological Sciences and Microbiology offer the MS and PhD degrees. The Biological Sciences program offers specializations in:

- (1) Ecology and Evolutionary Biology
- (2) Cell and Developmental Biology
- (3) Comparative Organismal Biology

Each student's program of study is supervised by his or her advisory committee and is tailored to the student's needs and aspirations. The master's degree (MS) requires 30 hours of credit (24 hours coursework, 6 hours thesis (BIOSC or MICRO 891 research)). A nonthesis option (Biological Sciences MS program only) requires 36 hours of coursework and is recommended as continuing education for public school educators. Requirements for the doctoral (PhD) degree include 18 hours of dissertation research (BIOSC or MICRO 991); there is no specific coursework required. Rather, a course of study appropriate to each student is designed by the advisory committee in consultation with the student.

## *Ecology and Evolutionary Biology*

Scientists studying ecology and evolutionary biology address fundamental questions about the natural world such as: How do plants and animals interact with one another and with features of their environments? How do plants and animals adapt to differing environments? How do new species arise and how is biodiversity maintained? How do organisms function in different habitats? Why do organisms have particular forms and behaviors? What are the phylogenetic relationships among different groups of organisms? Principles and studies in ecology and evolutionary biology are at the forefront of environmental research today and have made important contributions to applied fields of biology such as biotechnology, conservation biology, environmental biology, and the health and agricultural sciences. New students beginning their studies in ecology and evolutionary biology must therefore learn theory and techniques from a broad range of biological disciplines including Animal Behavior, Biomechanics and Functional Morphology, Conservation Biology, Ecology, Evolution, Population Genetics and Phylogenetics. The department of Biological Sciences at Clemson University has a growing number of faculty with research interests in these areas who support graduate students in the Ecology and Evolutionary Biology emphasis area.

### *Cell and Developmental Biology:*

Scientists studying cell and developmental biology address fundamental questions about the functions of cells and mechanisms that determine the development of those functions such as: How do cells function? What are the molecular mechanisms governing the characteristics of cells? What determines the life span of a cell? How do cells cooperate during development and in the adult to form an organism? How do defects in cellular function lead to disease? Students in the program have the opportunity to pursue research in the areas of Cell and Developmental Biology. Faculty research in these areas spans the fields of molecular, cellular, and developmental biology, drawing from diverse experimental systems, including several medically relevant human pathogens. Research projects may focus on the ultrastructure of cells and organisms as well as the study of developmental regulation, signal transduction, structure and function of the cytoskeleton, cell-cell, cell-matrix and host-parasite interactions, vesicle trafficking, or lipid and membrane function. The department of Biological Sciences at Clemson University has a growing number of faculty with research interests in these areas who support graduate students in the Cell and Developmental Biology emphasis area.

### *Comparative Organismal Biology:*

Scientists studying comparative organismal biology address fundamental questions about form and function of plants and animals such as: How do changes in body shape improve design for more efficient locomotion? How do physiological changes in metabolism and respiration allow animals or plants to live in extreme environments such as deserts or Antarctic marine environments? How can morphological or genetic features of plants and animals be used in developing taxonomic groupings? Principles and studies in comparative organismal biology contribute to our understanding of anatomy, physiology, functional morphology and design. Research in these areas has made important contributions to science and technology in the health professions, bioengineering and design, and in the naming and cataloging of biodiversity. New students beginning their studies in comparative organismal biology must therefore learn theory and techniques from a broad range of biological disciplines including Comparative Anatomy, Comparative Systems Physiology, Biomechanics and Functional Morphology, Marine Biology, and Plant and Animal Taxonomy and Systematics. The department of Biological Sciences at Clemson University has a growing number of faculty with research interests in these areas who support graduate students in the Comparative Organismal Biology emphasis area.