

## ***Concentration in***

# **Genetics and Genomics**

Genetics is the study of genes, genetic variation, and heredity, which all have at their core nucleic acid sequences. The field of genetics examines how genetic information is transmitted from parent to offspring or from cell to cell, and the term genetics also broadly encompasses the use of mutant organisms to assign biological functions to DNA sequences. With advances in DNA sequencing methods, genome-wide analyses have become common. Genomics studies include investigations of the structure and evolution of entire genomes and the simultaneous examination of the role of each gene of an organism's genome in a particular biological process or response, e.g., identifying all of the genes that are activated in response to infection with a particular pathogen. Because all biological processes are carried out by the products of genes, genetics is relevant to every life form on Earth, and sequencing technologies are driving a growing role for genetics in research and in human society, e.g., in the identification of linkage between genes and disease risk.

The Genetics and Genomics concentration provides preparation for graduate study in many areas of biological science, as well as professional study in medical school or other post-graduate programs. Graduates with a BS degree may pursue careers in medicine, genetic counseling, biotechnology, bioinformatics, forensics, or work as technicians in university, hospital, government, or industrial research laboratories.

### **GENERAL BIOLOGY COURSE REQUIREMENTS FOR THE BIOLOGY BS DEGREE**

- 1. BIOL 2000 Molecules and Cells**
- 2. BIOL 2010 Ecology and Evolution**
- 3. BIOL 2040 Investigations in Molecular Cell Biology**
- 4. Category A: Genetics and Genomics. Choose one course from the following**
  - BIOL 3050 Genetics
  - BIOL 3150 Introduction to Genomics
  - BIOL 3060 Introduction to Genetics (summer only)
- 5. Category B: Physiology and Organismal Biology. Choose one course from the following**
  - BIOL 3030 Introduction to Physiology
  - BIOL 3210 Plant Biology
  - BIOL 4110 Ornithology
  - BIOL 4330 Human Physiology
  - BIOL 4450 Behavioral Ecology
- 6. One Advanced Experience course (see current listing on the Biology Checklist)**

### **ADDITIONAL COURSE REQUIREMENTS TO COMPLETE A CONCENTRATION IN GENETICS AND GENOMICS**

- 1. BIOL3050 Genetics (*also applied to Category A above*)**

- 2. Choose FIVE courses from the following list:**

BIOL 3150 Introduction to Genomics

BIOL 2300 Biostatistics

BIOL 4200 Introduction to Bioinformatics

BIOL 4220 Research in Molecular Cell Biology

BIOL 4250 Population Genetics

BIOL 4400 Molecular Biology

BIOL 4802 Research in Evolutionary Genomics

BIOL 4870 Research in Molecular Genetics

BIOL 5060 Recombinant DNA Technology

BIOL 5430 Genomics and Personalized Medicine

BIOL 5700 Biology of the Nucleus

**See the following faculty for advice about course selection and/or post-graduate research in this concentration:**

Peter Clote

Ismael Ben Fofana

Vicki Losick

Babak Momeni

Jeff DaCosta

Charlie Hoffman

Michelle Meyer

Rebecca Dunn

Welkin Johnson

Tim van Opijnen