

# Cell and Developmental Biology

## Degrees Offered

Doctor of Philosophy

## Program Admissions Requirements

*In addition to the general **Graduate School admission requirements**, this program has additional specific requirements.*

Entry to the Cell and Developmental Biology Graduate Program is through the **Interdisciplinary Program in Biomedical Sciences (IDP)**, the **Neurosciences Doctoral Program**, the **Medical Sciences Training Program**, and **Direct Admission**. After completion of the first-year curriculum or through the Medical Sciences Training Program following the second year of Medical School. The student elects to complete their dissertation work with faculty of the Cell and Developmental Biology Graduate Program. The student will then have the opportunity to continue graduate studies by selecting among a wide range of courses offered from the Graduate School as well as other programs affiliated with the Medical College. Courses to be taken are based on the student's interests and consultation with the student's advisor.

## Fields of Research

- Cellular and molecular mechanisms in developmental biology and neurobiology, which employ genetic approaches, including those in mice, zebrafish, stem cells, and invertebrate organisms.
- Development and diseases of the heart, liver, intestine, muscle and the nervous system.
- Mechanisms of pain.
- Biology of vision.
- Mechanisms of cell signaling.
- Mechanisms of regeneration.
- Neuronal homeostasis and neurodegeneration.

## Overall Course Requirements

The curriculum consists of a core of courses required by the Graduate Entry Programs, plus additional courses selected by the student. In addition, Readings and Research is taken annually. Attendance at the departmental sponsored presentations is considered a major part of the educational experience.

A requirement of this program is to fulfill two credits in Bioethics by completing Course (10222) Ethics and Integrity in Science and Course (10444) Research Ethics Discussion Series. For course descriptions of 10222 and 10444 see listing within the **Bioethics Program**.

### **Overall Courses**

**12206 Integrated Graduate Neuroscience.** *4 credits.*

(See listing within **Neurosciences Doctoral Program**).

**31207 Introduction to Neuroscience.** *2 credits.*

This course provides an introduction to the neurosciences. A brief but integrated overview of neuroanatomy, neurophysiology and neurochemistry will be provided. The course consists of both lectures and laboratory exercises..

**12221 Advanced Systems Neuroscience.** *3 credits.*

(See listing within **Neurosciences Doctoral Program**).

**31212 Developmental and Stem Cell Biology.** *3 credits.*

The offered course provides a detailed introduction to Developmental and Stem Cell Biology. The course uses a lecture-style format supplemented with paper discussions. The intent of the course is to provide a solid academic background in developmental biology to graduate students embarking upon research into cell differentiation and development.

**12237 Cellular and Molecular Neurobiology.** *3 credits.*

(See listing within **Neurosciences Doctoral Program**).

**31250 Advanced Cell Biology.** *3 credits.*

Lectures and readings in the renewal, differentiation, communication, adhesion, secretion, motility, gene activity, and mitochondrial dynamics of eukaryotic cells.

**31257 Biology of Vision.** *3 credits.*

This lecture/discussion course explores the functional organization and development of the visual system as revealed by the use of a variety of anatomical, cell biological, genetic, physiological and behavioral methods. It is designed for students who wish to gain a basic understanding of the biological basis for vision and to share in the excitement of the latest developments in this field. Topics include: Development of the eye and visual system, fundamental principles of regulated gene expression, the cell biology of the photoreceptors and retina, phototransduction and neural processing in the retina, functional architecture of retina and visual system, the anatomy, physiology and perceptual significance of parallel pathways.

**31295 Reading and Research.** *1-9 credit(s).*

Readings in recent literature including a supervised laboratory project.

**31298 Journal Club. Analysis and Communication of Scientific Data.** *1 credit.*

Critical reviews of current research topics.

**31299 Master's Thesis.** *6 credits.*

Laboratory research and literature survey as necessary for completion of a master's thesis.

**31399 Doctoral Dissertation.** *9 credits.*

Laboratory research and literature survey as necessary for completion of the doctoral dissertation.