

INDIANA UNIVERSITY

University Graduate School
2005-2006
Academic Bulletin

Graduate Office
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Cellular and Integrative Physiology

School of Medicine
Indianapolis

Chairperson

Professor Michael Sturek

Departmental E-mail

cellphys@iupui.edu

Departmental URL

www.iupui.edu/~medphys

Graduate Faculty

(An asterisk [*] denotes membership in the University Graduate School faculty with the endorsement to direct doctoral dissertations.)

Professors

Robert Bigsby* (Obstetrics), H. Glenn Bohlen*, Loren Field* (Medicine, Pediatrics), Janice Froehlich* (Medicine), Patricia J. Gallagher*, Susan J. Gunst*, Maureen Harrington* (Biochemistry), Brian Paul Herring*, Chiu Shuen Hui*, Gary Hutchins* (Radiology), Stephen A. Kempson, Keith L. March*, Richard Meiss* (Obstetrics), Marshall Montrose*, Sidney Ochs* (Emeritus), Kenneth R. Olson*, Fredrick M. Pavalko*, Ora Pescovitz* (Pediatrics), W. Eugene Roberts* (Dentistry), Carl Rothe* (Emeritus), Rex D. Stith, Michael S. Sturek, George A. Tanner*, Joseph Unthank* (Medicine), Frank A. Witzmann*

Associate Professors

David Patrick Basile, David R. Bell, Matthias A. Clauss*, Robert Considine (Medicine), Stephen F. Echtenkamp*, Lawrence Garetto* (Dentistry), Brian G. Kennedy, Robert E. Kingsley, Edward Mannix (Medicine), James A. Marrs (Medicine), C. Subah Packer*, Carolyn Patterson (Medicine), Daniel E. Peavy*, John F. Schaeffer

Associate Scientist

Richard N. Friedman

Assistant Professors

Jeffrey S. Elmendorf, Gabi Nindl, Deborah Thurmond* (Biochemistry)

Adjunct Assistant Professor

Bonnie Blazer-Yost* (Anatomy, Biology)

Director of Graduate Studies

Professor Patricia J Gallagher*, Medical Science Building 350D, (317) 278-2146, pgallag@iupui.edu

Master's Degree Graduate Advisor

Professor Patricia J Gallagher*, Medical Science Building 350D, (317) 278-2146, pgallag@iupui.edu

Degrees Offered

Master of Science and Doctor of Philosophy

Graduate training in the department reflects the modern view of physiology as an integrative science, utilizing information obtained from several different levels to gain a better understanding of organ system functions. State-of-the-art techniques are used to study physiological responses at the molecular, cellular, and whole-organ levels. The research interests of the faculty span cardiovascular physiology, cell growth and development, respiratory biology, cancer biology, and signal transduction mechanisms.

Special Departmental Requirements

(See also general University Graduate School requirements.)

Admission Requirements

Students should have a background in biology, chemistry, physics, and mathematics. Some minor deficiencies may be removed during the first year of graduate study. Graduate Record Examination scores on both the General Test and a Subject Test are required as a part of the application and are used as guidelines for admission together with GPA and letters of recommendation.

Master of Science Degree

Course Requirements

A total of 30 credits is required, including 16 credit hours of formal course work. Required courses include: F702 (1cr.), F710 (3 cr.), F711 (4 cr.), G818 (3 cr.), G504 (1 cr.), and B500 (3 cr.). A 1 credit elective completes the 16 credit hours of course work. In addition, 14 credits of research (F701) are required.

Thesis

Required

Final Examination

Oral defense of dissertation

Doctor of Philosophy Degree

Course Requirements

A total of 90 credit hours, including 30 credit hours of formal course work with a minimum of 20 credit hours in cellular and integrative physiology. Required courses include: F702 (1cr.), F710 (3 cr.), F711 (4 cr.), G818 (3 cr.), G504 (1 cr.), and B500 (3 cr.). Three 1 credit electives complete the 18 credit hours of course work for the major.

Minor

A minimum of 12 credit hours in courses (other than research) in one of the following fields: anatomy, biochemistry, microbiology, and immunology, pharmacology, medical genetics, neurobiology, life sciences, aging diabetes, imaging, bioinformatics, or cancer biology.

Qualifying Examination

Written and oral.

Final Examination

Oral defense of dissertation.

Other Provision

Participation in departmental teaching or teacher training is required.

Ph.D. Minor in Cellular and Integrative Physiology

Students outside the department desiring to obtain a doctoral minor in physiology must complete a minimum of 12 credit hours in physiology courses other than research (F701) and seminar (F702)

Courses

F503 Human Physiology (4 cr.) P: Introductory biology (K101, K103), and organic chemistry (C341, C342), and physics (P201, P202); or equivalent. Advanced course in human physiology designed for students with no prior exposure to the discipline. Emphasis on basic physiological mechanisms of control with regard to membrane, neural, endocrine, reproductive, muscle, cardiovascular, respiratory, gastrointestinal, renal, and multisystems physiology.

F613 Mammalian Physiology Lecture (5 cr.) Neurophysiology, physiology of muscular activity, respiration, circulation, gastrointestinal physiology, excretion, metabolism, and endocrinology. Emphasis on basic physiological mechanisms and control systems. See F614.

F650 Membrane Biophysics (3 cr.) Structure and function of special membranes; mitochondria, RBC, nerve, and muscle.

F701 Research in Physiology (cr. arr.)

F702 Seminar in Physiology (1 cr.) Literature reports and group discussion by students and staff.

F705 Molecular and Cellular Physiology (4 cr.) Emphasis is on the principles of cellular structure and function that underlie the physiological functions of many organ systems. Three fundamental topics will be discussed: cell structure, the organization of the cells to form tissues, and cell physiology. Modern techniques in cellular physiology will be covered through critical analysis of the primary research literature.

F710 Physiology of Membranes (2 cr.) P: consent of instructor. Structure and function of cell membranes. Kinetics and energetics of membrane transport. Regulation of intracellular ionic concentrations. Hormonal and pathophysiological modification of membrane function.

F711 Integrative Physiology: Cells to Systems (4 cr.) P: No formal prerequisites, background in basic biochemistry and cell biology or cell physiology is recommended. Introductory physiology course for graduate students covering fundamental concepts of cellular and integrative physiology of tissues and organ systems. Basic physiology of the neural, musculo-skeletal, cardiovascular, respiratory, renal, endocrine, and gastrointestinal systems are covered. At the end of the course, students should have a basic understanding of the physiologic functions of cells, tissues, and organ systems and should understand modern approaches for the measurement and interpretation of physiologic functions.

F725 Muscle Macromolecules and Contraction (2 cr.) Structure and function of various macromolecules involved in muscle contraction. The aspects covered include excitation-contraction coupling, regulation of myoplasmic free calcium level, the contractile machinery, and force generation. Comparison in skeletal, cardiac, and smooth muscles. Lectures and guided discussion of papers.

F780 Special Topics in Physiology (cr. arr.) Tutorial instruction in physiology.

GRAD G818 Integrative Cell Biology (3 cr.) This course provides broad understanding of ways in which cells are organized and integrated into tissues. Emphasis is on the function of cells in neural/neuroendocrine system, cardiopulmonary, renal, and immune systems and in cytomechanics. Modern approaches to the study of tissue function by analysis of cellular regulation will be emphasized.