Physiology and Biophysics

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Administration:
Head of the Department: R. John Solaro
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Program Codes:
20FS1584MS (MS)
20FS1584PHD (PhD)

The Department of Physiology and Biophysics offers work leading to the Master of Science or Doctor of Philosophy degrees, and participates in the Medical Scientist Training Program (see the Medical Scientist Training Program (http://catalog.uic.edu/gcat/colleges-schools/medicine/ mstp) section for more information). Interdepartmental concentrations in Cardiovascular Science and in Neuroscience are available to doctoral students. The department is oriented toward the study of mammalian physiology. Students are initially immersed in an integrated curriculum and later they complete specialized training in an area of physiology of their choice: Cardiovascular Physiology and Metabolism, Cytoskeleton and Vascular Biology, Gastrointestinal Physiology, Neurosciences, Reproductive and Endocrine Sciences, Signal Transduction and Gene Regulation, Smooth and Skeletal Muscle Physiology. All areas focus on the integrative aspects of physiology, studying gene expression to the whole organism.

Admission and Degree Requirements

- MS in Physiology and Biophysics (http://catalog.uic.edu/gcat/colleges-schools/medicine/phyb/ms)
- PhD in Physiology and Biophysics (http://catalog.uic.edu/gcat/colleges-schools/medicine/phyb/phd)

Physiology and Biophysics Courses

PHYB 502. Physiology of Reproduction. 2 hours.
The purpose of this course is to enable students to acquire a detailed and up-to-date understanding of the Biology of Reproduction at both the physiological and molecular levels.

PHYB 516. Physiology and Biochemistry of Muscle Contraction. 2 hours.
Structure and function of myosin, actin, tropomyosin, troponin, and the sarcoplasmic reticulum; control, energetics, and mechanism of muscle contraction; gene expression.

PHYB 518. Cardiovascular Pathophysiology. 3 hours.
Focuses on pathogenesis and fundamental mechanisms of impaired cardiac performance due to systemic and cardiac disease. Function and pathology of diseased heart in relation to normal healthy states and therapeutic interventions. Course Information: Prerequisite(s): GCLS 500 and either GCLS 501 or GCLS 502 or GCLS 503; or consent of the course coordinator.

PHYB 523. Exercise Biology in Health and Disease. 3 hours.
Interrelationships between exercise and various pathological conditions. Current research focusing on molecular and cellular mechanisms in healthy and diseased states. Course Information: Same as KN 523. Prerequisite(s): Consent of the instructor.

PHYB 530. Stem Cells. 2 hours.
Discussion of stem cell development into different cell types that may offer a renewable source of replacement cells to treat diseases, conditions, and disabilities. Cells from adult tissue, fetal tissue, and embryonic sources are discussed. Course Information: Recommended background: Knowledge of cell biology.

PHYB 540. Ion Channels: Structure, Function, Pharmacology and Pathology. 2 hours.
The concept of ion channels is treated from the perspectives of their molecular structures and functions. Modulation, pathological conditions (channelopathies), and pharmacological intervention will also be treated. Course Information: Same as PCOL 540. Recommended background: One undergraduate course in biochemistry and one in physiology, or consent of the instructor.

PHYB 551. Human Physiology I. 5 hours.
Lectures and conferences in human physiology. Emphasis is on cellular, nerve-muscle, cardiovascular, respiratory and renal physiology. Course Information: Prerequisite(s): Mathematics, undergraduate physics, and organic chemistry; or consent of instructor. Recommended background: Course work in biological sciences. Class Schedule Information: To be properly registered, students must enroll in one Conference and one Lecture.

PHYB 552. Translational and Applied Physiology. 3 hours.
Continuation of GCLS 500 Physiology. Advanced physiological concepts emphasizing interactions of different organs and systems under normal and abnormal conditions. Review of compensatory mechanisms and clinical applications of physiology. Course Information: Prerequisite(s): GCLS 500. Recommended background: Course work in biological sciences.

PHYB 559. Methods in Experimental Physiology. 3 hours.
Primarily for students in physiology. Registration limited to eight. A laboratory course designed to acquaint students with advanced techniques and methodology in physiologic investigations. Course Information: Prerequisite(s): Enrollment in the M.S. or Ph.D. in Physiology and Biophysics program, and credit or concurrent registration in PHYB 401 or the equivalent; or consent of the instructor.

PHYB 585. Cell Biology. 4 hours.
Functional and structural organization of the cell with emphasis on the cellular basis of physiological activity. Course Information: Same as ANAT 585 and MIM 585.
PHYB 586. Cell Physiology. 3 hours.
Advanced functional and structural organization of the cell with emphasis on the cellular basis of physiological activity. Course Information: Prerequisite(s): PHYB 552 and GCLS 501 and GCLS 503; or consent of the instructor.

PHYB 590. Seminar in Cardiovascular Science. 1 hour.
Weekly seminars on advanced cardiovascular science topics by staff and invited speakers. Course Information: Satisfactory/Unsatisfactory grading only. Prerequisite(s): Consent from the course coordinator. Enrollment is open to students following completion of their first year of graduate studies.

PHYB 591. Departmental Seminar. 1 hour.
Weekly seminar by staff and invited speakers. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Required of all physiology and biophysics students each fall and spring semester while enrolled in the graduate program. Prerequisite(s): Graduate or professional standing.

PHYB 592. Experimental and Diagnostic Methods in Cardiovascular Science. 3 hours.
Establishes the fundamental physical basis between diagnostic and experimental procedures in the clinic and basic science laboratory, combined with some direct observation of methods used for experimental approaches. Course Information: Prerequisite(s): GCLS 500 and either GCLS 501 or GCLS 502 or GCLS 503; or consent of the course coordinator.

PHYB 594. Special Topics in Physiology and Biophysics. 1-4 hours.
Topics may include bioengineering, endocrinology, membrane biology, ion transport and its regulation, muscle physiology, neurophysiology, molecular neurobiology and others of current significance in physiology and biophysics. Course Information: May be repeated. Students may register in more than one section per term. Prerequisite(s): Consent of the instructor.

PHYB 595. Journal Club and Seminar in Physiology. 1 hour.
Student presentation and discussion of assigned topics of current importance in physiology and biophysics as well as related fields. Course Information: Satisfactory/Unsatisfactory grading only. Prerequisite(s): Consent of the instructor. Limited to degree candidates in physiology and biophysics.

PHYB 596. Independent Study. 1-4 hours.
Individual study guided by a faculty member. The format of the course, examination and grading to be established by the faculty member. Course Information: May be repeated. Students may register in more than one section per term. Prerequisite(s): Consent of the instructor.

PHYB 598. M.S. Thesis Research. 0-16 hours.
Thesis work under the supervision of a graduate adviser. Course Information: Satisfactory/Unsatisfactory grading only. Prerequisite(s): Graduate standing in physiology and biophysics.

PHYB 599. Ph.D. Thesis Research. 0-16 hours.
Thesis work under the supervision of a graduate adviser. Course Information: Satisfactory/Unsatisfactory grading only.

Graduate College Life Sciences Courses

GCLS 500. Physiology. 3 hours.
Lectures in human physiology. Emphasis is on an integrated approach to systems physiology. Course Information: Restricted to students enrolled in a graduate program offered through the College of Medicine or Pharmacy or Applied Health Sciences or in the departments of Bioengineering or Biological Sciences, or consent of the instructor. Prerequisite(s): Mathematics, undergraduate physics, organic chemistry, or consent of the instructor.

GCLS 501. Biochemistry. 3 hours.
Fundamental properties of biomacromolecules, the thermodynamics underlying basic biochemical processes and the properties of enzymes, including the kinetics of operation, and regulation, illustrated with important examples. Course Information: Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the departments of Bioengineering or Biological Sciences or consent of the instructor. Prerequisite(s): Recommended background: Coursework in organic and physical chemistry.

GCLS 502. Molecular Biology. 3 hours.
Core molecular biology course covering basic principles of gene expression, genome replication and molecular interactions important to biological processes in prokaryotes and eukaryotes. Course Information: Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 503. Cell Biology. 3 hours.
Advanced course on fundamental aspects of cell biology; basic concepts will be integrated with key examples which span gene, protein, cell, and tissue function. Course Information: Credit is not given for GCLS 503 if the student has credit in BCHE 561 or ANAT 585 or MIM 585 or PHYB 585. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine, Pharmacy, or Applied Health or the departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 504. Research Methods I. 1-2 hours.
Lectures, demonstrations, and discussions concerned with principles and practical aspects of modern quantitative biochemical, molecular biological, physiological and biophysical methodology such as separation techniques and studies of biomembranes. Course Information: May be repeated. Students may register for more than one section per term. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 505. Research Methods II. 1-3 hours.
Lectures, demonstrations, and discussions concerned with principles and practical aspects of modern quantitative biochemical, molecular biological, physiological and biophysical methodology such as bioimaging and biochemical analysis. Course Information: May be repeated. Students may register for more than one section per term. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 506. GEMS Research Rotation. 2-5 hours.
Research rotation course in which first year students from the GEMS program will undertake research projects in laboratories affiliated with this program. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Animals used in instruction. Prerequisite(s): Open only to Ph.D. degree students.
GCLS 510. Integrative Biology. 3 hours.
Advanced level, intensive course addressing fundamental topics
of developmental biology, immunology, and cancer biology, with
concentration on thematic issues that integrate these subjects. Course
Information: Prerequisite(s): GCLS 501 and GCLS 502 and GCLS 503;
or demonstrated proficiency of the material covered in these courses.
Restricted to students enrolled in a graduate program offered through the
Colleges of Medicine or Pharmacy or the departments of Bioengineering
or Biological Sciences or consent of the instructor.

GCLS 511. Molecular Genetics. 3 hours.
Core molecular genetics course covering classical and molecular
principles of microbial and Mendelian genetics. Systems covered
include bacteria, bacteriophage, animal viruses, yeast, Drosophila,
mouse, and human. Course Information: Prerequisite(s): GCLS 501 and
GCLS 502 and GCLS 503; or demonstrated proficiency of the material
covered in these courses. Restricted to students enrolled in a graduate
program offered through the Colleges of Medicine or Pharmacy or the
departments of Bioengineering or Biological Sciences or consent of the
instructor.

GCLS 512. Pathobiology of Cancer. 3 hours.
Introduction to principles of carcinogenesis, tumor biology, and oncology,
including cancer epidemiology, molecular-cellular basis of cancer,
tumor progression, invasion and metastasis, and prevention, detection,
diagnosis, and therapy of cancer. Course Information: Same as
PATH 511. Prerequisite(s): Consent of the instructor. Recommended
background: Basic knowledge of molecular and cell biology is highly
recommended.

GCLS 515. Receptor Pharmacology and Cell Signaling. 3 hours.
Advanced course on cell-surface and nuclear receptors and mechanisms
of signaling through receptors. Provides an overview of receptor theory,
hands-on data analysis and lectures and discussions on various signaling
mechanisms. Course Information: Credit is not given for GCLS 515 if
the student has credit in PCOL 505 or PHYB 505. Prerequisite(s): GCLS
501 or approval of the department. Restricted to students enrolled in a
graduate program offered through the Colleges of Medicine or Pharmacy
or the departments of Bioengineering or Biological Sciences or consent of
the instructor.

GCLS 594. Special Topics in Life Sciences. 1-4 hours.
Systematic study of advanced selected topics in life sciences from
an interdisciplinary approach. Course Information: May be repeated.
Students may register in more than one section per term. Prerequisite(s):
Consent of the instructor.