

## PHYSIOLOGY

## PSL

Department of Physiology  
College of Natural Science**250 Introductory Physiology**

Fall, Spring. 4(4-0) R: Not open to students in the Physiology major. Not open to students with credit in PSL 310.

Function, regulation and integration of organs and organ systems of higher animals emphasizing human physiology.

**310 Physiology for Pre-Health Professionals**

Fall. 4(4-0) P: BS 161 or BS 181H or LB 145 or ANTR 350 Not open to students with credit in PSL 250 or PSL 431 or PSL 432.

Fundamental concepts of human physiology with an emphasis on physiology related to health careers.

**410 Computational Problem Solving in Physiology**

Fall, Spring, Summer. 3(3-0) P: PSL 431 RB: PSL 432 R: Open to juniors or seniors.

Quantitative analysis of physiological data: mathematical models, curve fitting, data analysis and interpretation. Problem solving involving exponential and logistic growth. Cerebral blood flow, convective cooling, oxygen consumption, thermoregulation, other applications.

**420 Membrane Biophysics: An Introduction (W)**

Summer. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: CEM 252 and PHY 231 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major or approval of department.

Biophysical and chemical aspects of biomembranes. Experimental model membrane systems including planar lipid bilayers and liposomes. Biotechnological applications of lipid bilayer sensors.

**421 Adult and Embryonic Stem Cells (W)**

Spring of even years. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Topics in the physiology, cell biology, genetics, and developmental potential of adult and embryonic stem cells.

**425 Physiological Biophysics**

Fall. 3(3-0) P: PSL 250 or PSL 310 or PSL 431 RB: College Algebra, Differential Calculus

The quantitative physical phenomena underlying kinetics and equilibria of physiological processes.

**429 Biomedical Imaging Methods**

Fall of even years. 3(3-0) P: (CEM 142 or CEM 152 or CEM 182H or LB 172) and (PHY 184 or PHY 184B or PHY 232 or PHY 294H or LB 274) RB: A course in physiology or gross anatomy.

Overview of biomedical imaging techniques from theory to application, with emphasis on health care and research.

**431 Human Physiology I**

Fall. 4(4-0) P: (BS 161 or BS 181H or LB 145) and (CEM 142 or CEM 152 or CEM 182H or LB 172) RB: BS 162 or BS 182H or LB 144 R: Open to juniors or seniors.

Molecular basis of physiological control systems, physiology of excitable cells, autonomic nervous system, function and regulation of cardiovascular and respiratory systems.

**432 Human Physiology II**

Spring. 4(4-0) P: (BS 161 or BS 181H or LB 145) and (CEM 142 or CEM 152 or CEM 182H or LB 172) and PSL 431 RB: BS 162 or BS 182H or LB 144 R: Open to juniors or seniors.

Continuation of PSL 431. Function and regulation of the digestive, endocrine, renal, and reproductive systems. Integration of physiological responses.

**438 Topics in the Biology and Cellular Physiology of Cancer (W)**

Fall, Spring. 2(2-0) P: (BS 161 or BS 181H or LB 145) and (PSL 431 and completion of Tier I writing requirement) RB: BMB 461 and BMB 462 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Topics in the biology and physiology of cancer, selected from areas such as regulation of the cell cycle, oncogenes and tumor suppressors, cancer cell signal transduction, tumor progression and metastasis, and cancer genetics and genomics.

**439 Special Topics in Physiology (W)**

Fall. 2(2-0) A student may earn a maximum of 4 credits in all enrollments for this course. P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Lyman Briggs Physiology Coordinate Major or in the Physiology major.

Special topics in physiology, focusing on the process of biomedical discovery, alternative medicine, autoimmunity, or other selected topics of interest related to careers in health care or biomedical research.

**440 Topics in Cell Physiology (W)**

Spring. 2(2-0) A student may earn a maximum of 4 credits in all enrollments for this course. P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Selected topics in mammalian cell physiology related to cell energetics and metabolism, molecular and cellular biology, cell growth and differentiation, or molecular physiology and functional genomics.

**441 Topics in Endocrinology (W)**

Fall. 2(2-0) P: (PSL 431 and PSL 432) and completion of Tier I writing requirement R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Selected topics on the role of hormones in the regulation of growth, metabolism, differentiation, and physiological homeostasis.

**442 Topics in Cardiovascular Physiology (W)**

Fall. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Selected topics in the physiology of the heart and cardiovascular system.

**443 Topics in Respiratory Physiology (W)**

Spring of odd years. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 and BMB 461 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Contemporary topics in lung airway, alveolar, and general respiratory physiology.

**445 Topics in Environmental Physiology (W)**

Spring of odd years. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Selected topic in environmental physiology with an emphasis on thermoregulation.

**446 Topics in Sensory Physiology (W)**

Spring of even years. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Selected topic in the functioning of the visual system, auditory system, or other sensory systems in health and disease.

**447 Topics in Brain Function (W)**

Summer. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Selected topics on structure and function of the mammalian brain.

**448 Topics in Gastrointestinal Physiology (W)**

Fall. 2(2-0) P: (PSL 431 and PSL 432) and completion of Tier I writing requirement R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Selected topics in the physiology of the digestive system.

**449 Topics in Neurophysiology and Neural Development (W)**

Fall. 2(2-0) P: (PSL 431) or completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Selected topics in neurophysiology, including development of the nervous system in invertebrate and vertebrate animals.

**450 Physiology in Health and Disease**

Fall. 3(3-0) P: (PSL 431 and PSL 432) and Completion of Tier I Writing Requirement R: Open to juniors or seniors in the Lyman Briggs Physiology Coordinate Major or in the Physiology major.

Advanced topics in normal and abnormal physiology. Chronic diseases, disease progression, and animal models of disease.

**475L Capstone Laboratory in Physiology**

Fall, Spring, Summer. 2(1-3) P: PSL 431 RB: PSL 432 R: Open to juniors or seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.

Laboratory exercises in animal and human physiology, including cardiovascular and respiratory function, nerve and muscle function, osmoregulation receptor-mediated regulation, neural and hormonal control.

## Physiology—PSL

- 480 Special Problems in Physiology**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 8 credits in all enrollments for this course. RB: (PSL 431 and PSL 432) and completion of Tier I Writing requirement R: Open to undergraduate students in the Physiology major. Approval of department.  
Independent study under the supervision of a faculty member.
- 483 Environmental Physiology (W)**  
Spring. 4(4-0) Interdepartmental with Zoology. Administered by Zoology. P: ((BS 161 or LB 145 or BS 181H) and completion of Tier I writing requirement) and (BS 162 or LB 144 or BS 182H) and (CEM 141 or CEM 151 or CEM 181H or LB 171)  
Aspects of physiology important to the environmental relations of vertebrates and invertebrates: energetics, thermal relations, osmotic-ionic relations, and exercise physiology.
- 490 Independent Research in Physiology**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 8 credits in all enrollments for this course. RB: PSL 431 and PSL 432 R: Open to undergraduate students in the Physiology major. Approval of department.  
Supervised laboratory research in physiology under the direction of a faculty member.
- 513 Animal Physiology for Veterinarians**  
Spring. 4(4-0) R: Open to graduate-professional students in the College of Veterinary Medicine.  
Physiology of the neural, cardiovascular, renal, respiratory, digestive, endocrine, and reproductive systems, and thermoregulation.
- 534 Cell Biology and Physiology I**  
Fall. 3 credits. Interdepartmental with Human Anatomy and Biochemistry and Molecular Biology. Administered by Physiology. R: Open only to graduate-professional students in the College of Human Medicine or College of Osteopathic Medicine.  
Modern concepts of cell biology as a basis for understanding the physiology of human tissues and organ systems in health and disease.
- 535 Cell Biology and Physiology II**  
Spring. 4 credits. Interdepartmental with Human Anatomy and Biochemistry and Molecular Biology. Administered by Physiology. R: Open only to graduate-professional students in the College of Human Medicine or the College of Osteopathic Medicine.  
Modern concepts of cell biology as a basis for understanding the physiology of human tissues and organ systems in health and disease. Continuation of PSL 534.
- 536 Basic Principles of Cell Biology and Physiology**  
Fall. 3(2-2) Interdepartmental with Human Anatomy and Biochemistry and Molecular Biology. Administered by Physiology. R: Open to graduate-professional students in the College of Osteopathic Medicine.  
Modern concepts of cell biology as a basis for understanding the structure (histology) and function (physiology) of human tissues in health and disease.
- 537 Basic Principles of Pathology**  
Fall. 1(1-0) R: Open to graduate-professional students in the College of Osteopathic Medicine.  
Basic principles of general pathology, with emphasis on principles of cellular adaptations, cell injury, inflammation, tissue repair, hemodynamic disorders, and neoplasia.
- 552 Medical Neuroscience**  
Spring. 4(3-2) Interdepartmental with Human Anatomy and Neurology and Ophthalmology and Radiology. Administered by Neurology and Ophthalmology. R: Open only to graduate-professional students in the Colleges of Human Medicine and Osteopathic Medicine. SA: ANT 552  
Correlation of normal structure and function of the human nervous system with clinical testing, classical lesions, and common diseases.
- 611 Research Problems in Physiology Clerkship**  
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: (PSL 511) and Completion of Semester 5 in the graduate professional program in the College of Veterinary Medicine.  
Individual work on a research problem.
- 806 Strategies in Neuroscience Research**  
Fall, Spring. 3(0-9) Interdepartmental with Neuroscience and Pharmacology and Toxicology and Physical Medicine and Rehabilitation and Psychology and Radiology. Administered by Neuroscience. RB: PHM 827 R: Open to doctoral students in the Neuroscience major.  
Methods and underlying principles of neuroscience research.
- 813 Molecular Mechanism of Human Disease and Targeted Therapies**  
Fall. 3(3-0)  
Mechanisms and pathways underlying human disease and therapeutic strategies.
- 825 Cell Structure and Function**  
Spring. 3(3-0) Interdepartmental with Biochemistry and Molecular Biology and Microbiology and Molecular Genetics. Administered by Biochemistry and Molecular Biology. RB: BMB 401 or BMB 461. SA: BCH 825  
Molecular basis of structure and function. Cell properties: reproduction, dynamic organization, integration, programmed and integrative information transfer. Original investigations in all five kingdoms.
- 827 Physiology and Pharmacology of Excitable Cells**  
Fall. 4(4-0) Interdepartmental with Neuroscience and Pharmacology and Toxicology and Zoology. Administered by Pharmacology and Toxicology. RB: PSL 431 or PSL 432 or BMB 401 or BMB 461 or ZOL 402  
Function of neurons and muscle at the cellular level: membrane biophysics and potentials, synaptic transmission, sensory nervous system function.
- 828 Cellular and Integrative Physiology I**  
Spring. 3(3-0)  
Cellular physiology as basis for understanding integrative functions of various body systems, including nervous, cardiovascular, respiratory, urinary, muscle and kidney.
- 829 Cellular and Integrative Physiology II**  
Fall. 3(3-0) RB: PSL 828  
Cellular physiology as basis for understanding functions of various body systems including blood, blood cells, endocrine, reproductive and gastrointestinal.
- 839 Systems Neuroscience**  
Spring. 4(4-0) Interdepartmental with Human Anatomy and Neuroscience and Pharmacology and Toxicology and Psychology and Zoology. Administered by Neuroscience. R: Open only to graduate students in the Colleges of Human Medicine, Osteopathic Medicine, Agriculture and Natural Resources, Natural Science, Social Science, and Veterinary Medicine. SA: ANT 839  
Anatomy, pharmacology, and physiology of multicellular neural systems. Sensory, motor, autonomic, and chemo-regulatory systems in vertebrate brains.
- 899 Master's Thesis Research**  
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open to masters students in the Physiology major.  
Master's thesis research.
- 901 Investigating the Lung**  
Fall of even years. 2(2-0) Interdepartmental with Large Animal Clinical Sciences and Pathobiology and Diagnostic Investigation. Administered by Large Animal Clinical Sciences. R: Open to graduate students.  
Integrative biology of the lung. Structure and function. Molecular, cellular, and organ responses to injury.
- 910 Cellular and Molecular Physiology**  
Fall. 4(4-0) RB: BMB 802; PSL 432 or PSL 501 or PSL 511; one calculus course. R: Open to graduate students in the Department of Pharmacology and Toxicology.  
Readings in cell physiology and physiological aspects of molecular biology.
- 950 Topics in Physiology**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.  
Classical and modern concepts in selected areas of physiology.
- 980 Problems in Physiology**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of department.  
Individual research problems in physiology.
- 999 Doctoral Dissertation Research**  
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 120 credits in all enrollments for this course. R: Open to graduate students in the Physiology major.  
Doctoral dissertation research.