

**Descriptions — Biomechanics
of
Courses**

865. Advanced Neurobiology

Winter. 3(3-0) **BPY 825**. Interdepartmental with the departments of Biophysics, Physiology, Psychology and Zoology.

Basic organization, structure and function of neural networks comprising sensory, motor, and autonomic systems including examples from invertebrates and vertebrates.

880. Athletic Medical Systems

(581.) Fall, Spring. 3(3-0) Bachelor's degree and involvement with secondary school athletics.

Health care systems for athletes in growth years. Physiological and psychological concepts applied to human development, training and care. Injury preventions, emergency medicine and rehabilitation stressed.

BIOMEDICAL ENGINEERING

BME

College of Engineering

**410. Electronic Instrumentation in
Biology and Medicine**

Fall. 4(4-0) **MTH 112, PHY 238** or approval of instructor.

Electronic components and circuits. Physiological measurements. Transduction of physiological events to electrical signals. Detection of physiological events by electrical impedance measurements. Ultrasonic techniques in biomedical systems. Biomedical applications of lasers.

411. Electric Theory of Nerves

Winter. 4(4-0) **MTH 215, PHY 288**.

Neurophysiology: basic organization, structure, function and electrical activity of neurons. Subthreshold membrane phenomena: Nemst-Planck equations, constant field membrane model, electrotonus. Membrane action potentials: voltage clamp experiments, Hodgkin-Huxley equations, computer simulation.

**424. Materials in Biomedical
Engineering**

Winter. 3(3-0) **PSL 331** or approval of department.

Basics of materials science. Biocompatibility of metals, polymers and ceramics. Internal and external prosthetic materials.

431. Biological Transport Mechanisms

Spring. 3(3-0) **MTH 215**.

Mechanisms which govern transport or momentum, heat and mass. Application to mathematical description of transport processes in biological systems and to solution of biomedical problems.

481. Tissue Biomechanics

Fall. 3(3-0) **ANT 316** or approval of department.

Fundamentals of continuum mechanics in relation to morphological classification of tissue. Mechanical properties of connective and muscle tissue.

BIOPHYSICS

BPY

**College of Human Medicine
College of Natural Science
College of Osteopathic Medicine**

**402. Introductory Biophysics:
Molecular and Thermal**

Winter. 3(3-0) One year organic chemistry or biochemistry; 1 year biology, **PHY 239, 259, MTH 113**, or approval of department.

Salient features of biophysics; principles and methods. Structure, function, and organization of biologic molecules; molecular biophysics; thermal biophysics; bioenergetics and photobiology.

**403. Introductory Biophysics:
Membranes and Electrical**

Spring. 3(3-0) One year organic chemistry or biochemistry, **PHY 239, 259; MTH 113** or approval of department.

Salient features of biophysics, principles and methods; radiation biophysics; membrane biophysics; bioelectric phenomena; neurobiology; and psychophysics.

IDC. Biological Membranes

For course description, see Interdisciplinary Courses.

480. Special Topics in Biophysics

Fall, Winter, Spring, Summer. 2 to 4 credits. Approval of department; 402 recommended.

Special topics within five areas of biophysics: structure-function correlation, neurobiophysics, membrane biophysics, molecular biophysics, or theoretical biophysics.

499. Independent Study

Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll for a maximum of 15 credits. Approval of department.

Undergraduate research under one of our faculty.

821. Molecular Biophysics

Winter. 5(3-4) Approval of department.

Theoretical/experimental methods for determination of electronic structure, excited states and spectroscopy of biological systems. Biological energy transfer. Quantum processes in photosynthesis. Exciton effects in photoreceptors and pigments. Conformational changes.

**822. Charge Transport and Solid
State Processes**

Winter of even-numbered years. 4(3-2) Approval of department.

Fundamental electrical properties, dielectric properties and photoconductivity effects and their relevance to the biological functioning of these molecules.

823. Radiation Biophysics

Spring of even-numbered years. 3(2-2) Approval of department.

Effects of various types of ionizing radiation and ultraviolet and visible light on proteins, nucleic acids, viruses and plant and animal cells. Damage and repair mechanisms at the molecular level.

824. Membrane Biophysics

Fall of even-numbered years. 4(3-2) Approval of department.

Membrane Biophysics will cover interfacial phenomena in biology and chemistry; structure and function, theoretical and experimental models for biological membranes; membrane biochemistry. Labs will emphasize bimolecular lipid membrane (BLM) techniques.

825. Basic Neurobiology

Winter of odd-numbered years. 4(3-2) Approval of department.

A comparative survey of fundamental principles of nervous organization will be undertaken in lectures. Laboratory will emphasize examination of prepared neuroanatomical material and a demonstration of important neurophysiological phenomena.

826. Cellular Biophysics

Spring. 4(3-2) Approval of department.

Basic cell structure and function at the molecular level. Emphasis will be on genetic and molecular controls of cellular systems.

**834. Membranes: Natural and
Artificial**

Spring of odd-numbered years. 2 to 3 credits. May re-enroll for a maximum of 3 credits. Approval of department.

Emphasis is placed on the biophysical and biochemical characterization of biological membranes and their theoretical and experimental models. Presentation and discussion by students and staff of recent advances in membrane research.

865. Advanced Neurobiology

Winter. 3(3-0) 825. Interdepartmental with the departments of Biomechanics, Physiology, Psychology and Zoology and administered by the Department of Biomechanics.

Basic organization, structure and function of neural networks comprising sensory, motor, and autonomic systems including examples from invertebrates and vertebrates.

880. Special Topics in Biophysics

Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 15 credits.

Special topics within the five subdivisions of biophysics: structure, organization and function of biological phenomena, sensory perception, and psychophysics and biomechanics.

885. Vertebrate Neural Systems I

Fall of odd-numbered years. 5(3-4) Approval of department: **ANT 815** and **BPY 825** recommended. Interdepartmental with the departments of Zoology, Physiology and Psychology and administered by the Department of Psychology.

Structure and function of major component systems of vertebrate brains, their evolution, ontogeny and comparative analysis in mammals, birds, reptiles, amphibians and fish. Interrelation of behavioral, anatomical and physiological studies.

886. Vertebrate Neural Systems II

Winter of even-numbered years. 5(3-4) **PSY 885**. Interdepartmental with the Psychology, Physiology and Zoology Departments and administered by the Zoology Department.

Continuation of 885. Major component systems of vertebrate brains, their evolution, ontogeny, and comparative analysis in mammals, birds, reptiles, amphibians and fish. Interrelation of behavioral, anatomical, and physiological studies.