

**Descriptions — Biomechanics
of
Courses**

890. Independent Study
Fall, Winter, Spring, Summer. 1 to 8 credits. May re-enroll for a maximum of 32 credits. Approval of department.
Individual or group work related to biomechanics and/or neuromusculoskeletal system.

**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: Nernst-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
Spring 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.

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 of odd-numbered years. 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
Spring. 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 departments of Psychology, Physiology and Zoology and administered by the Department of Zoology.
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.

890. Readings in Biophysics
Fall, Winter, Spring. 3 to 6 credits. Approval of department.

Reading course in special topics adapted to the individual preparation and needs of the student.

899. Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

922. Thermal Biophysics
Spring of odd-numbered years. 3(3-0) Approval of department.

Applications of thermodynamics and statistical mechanics to biology. Absolute theory of rate processes. Thermal denaturation of biomacromolecules. Thermal death of viruses, unicellular organisms and poikilotherms. Aging and death in mammals.

990. Biophysics Seminar
Fall, Winter, Spring, Summer. 1 credit. May re-enroll for a maximum of 3 credits. Approval of department.