

**Descriptions – Biomechanics
of
Courses**

- 601. Osteopathic Manipulative Medicine Clerkship**
Fall, Winter, Spring, Summer. 6 credits. May reenroll for a maximum of 12 credits. Grade P in all courses offered in terms 1 through 8.
Advanced training in the diagnosis of musculoskeletal dysfunctions and application of osteopathic manipulative techniques in patient care.
- 620. Directed Studies**
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 24 credits. Approval of department.
Individual or group work on special problems related to biomechanics, neuromusculoskeletal system primarily.
- 890. Independent Study**
Fall, Winter, Spring, Summer. 1 to 8 credits. May reenroll for a maximum of 32 credits. Approval of department.
Individual or group work related to biomechanics and/or neuromusculoskeletal system.

- 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.
- 499. Independent Study**
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 9 credits. Approval of instructor.
Individual reading and research under the supervision of a member of the Biomedical Engineering Committee.

- 804B. Neuroscience Laboratory II**
Spring. 4(2-4) PSY 804A. Interdepartmental with the departments of Physiology, Psychology, and Zoology. Administered by the Department of Psychology.
Continuation of BPY 804A.
- 821. Molecular Biophysics**
Winter of even-numbered years. 4(4-0) 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.
- 824. Membrane Biophysics**
Winter of odd-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 biomolecular lipid membrane (BLM) techniques.

**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 of odd-numbered years. 4(4-0) MTH 310; 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.
- 414. Clinical Instrumentation**
Winter of even-numbered years. 3(3-0) BME 410.
Ultrasound theory and applications in medicine. Photoelectric, piezoelectric and temperature transducers. Detection of physiological events by impedance measurements. Radiology and x-ray techniques. Isotopes and nuclear medicine. Lasers in medicine. Field trips required.
- 424. Materials in Biomedical Engineering**
Winter. 3(3-0) PSL 240 or PSL 431 or approval of department.
Basics of materials science. Biocompatibility of metals, polymers and ceramics. Internal and external prosthetic materials.

BIOPHYSICS BPY
**College of Human Medicine
College of Natural Science**

- 402. Introductory Biophysics: Molecular and Thermal**
Spring. 3(3-0) One year organic chemistry or biochemistry; 1 year biology, PHY 239, PHY 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**
Fall. 3(3-0) One year organic chemistry or biochemistry, PHY 239, PHY 259; MTH 113 or approval of department.
Salient features of biophysics, principles and methods; radiation biophysics; membrane biophysics; bioelectric phenomena; neurobiology; and psychophysics.
- 450. Introduction to the Nervous System**
Spring of even-numbered years. 3(3-0) B S 211, B S 212.
Nervous structure and function from protozoa (aneural) to mammals normal and abnormal innate and learned behavior in animals and humans from the cellular level to the intact organism; emergence of mind and consciousness.
- 499. Independent Study**
Fall, Winter, Spring, Summer. 1 to 5 credits. May reenroll for a maximum of 15 credits. Approval of department.
Undergraduate research under one of our faculty.
- 804A. Neuroscience Laboratory I**
Winter. 4(2-4) Approval of instructor. Interdepartmental with the departments of Physiology, Psychology, and Zoology. Administered by the Department of Psychology.
Development of skills in the methods, techniques and instrumentation necessary for research in a variety of areas concerned with neuroscience.

- 826. Cellular Biophysics**
Spring of odd-numbered years. 4(4-0) 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 reenroll 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.
- 850. Simpler Systems Approaches to Learning and Memory**
Winter of odd-numbered years. 4(4-0) BPY 450 or BPY 827.
Simpler invertebrate and vertebrate, nervous systems which have been or could be useful for electrophysiological and molecular approaches to learning and memory.
- 865. Advanced Neurobiology**
(BIM 865.) Spring. 4(4-0) BPY 827. Interdepartmental with the departments of Anatomy, Physiology, Psychology, and Zoology. Administered by the Department of Anatomy.
Basic organization structure and function of neural networks comprising sensory, motor, and autonomic systems including examples from invertebrates and vertebrates. Attendance at neuroscience seminar is required.
- 880. Special Topics in Biophysics**
Fall, Winter, Spring, Summer. Variable credit. May reenroll 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.
- 890. Readings in Biophysics**
Fall, Winter, Spring, Summer. 3 to 6 credits. Approval of department.
Reading course in special topics adapted to the individual preparation and needs of the student.