

**\*211. General Biology**

Fall, Winter. 4(4-2) CEM 130 or high school chemistry. Not open to students with credit in LBC 140.

The structure and behavior of cells and their subunits, interactions of tissues, genetics, and the development, history and relations of organisms.

**\*212. General Biology**

Winter, Spring. 4(4-2) Not open to students with credit in LBC 141.

Continuation of 211.

**400. Biological Science for Teachers**

Fall, Winter, Spring, Summer. 3 to 4 credits. May re-enroll for a maximum of 12 credits. Teacher certification with science major or minor.

A course for in-service teachers, topics will be selected from actual classroom problems of the participants. Stress will be placed on field, laboratory and inquiry teaching.

**410. Biotic and Environmental Relationships**

Summer. 6 credits. 212 or approval of department. Given at W. K. Kellogg Biological Station.

Interrelationship of the terrestrial biota with its environment. Factors determining distribution and abundance. Interaction of organisms.

**413. Freshwater Ecology**

Summer. 6 credits. 212 or approval of department. Given at W. K. Kellogg Biological Station.

The ecology of freshwater ecosystems, their biotic structure, and the functional interrelationships of environmental variables regulating population dynamics, productivity and community structure. Extensive field investigations.

**420. Seminar in Recent Advances in Biological Science**

Fall, Winter, Spring, Summer. 3(3-0) May re-enroll for a maximum of 6 credits if different topic is taken. Approval of department.

A series of lectures by senior faculty of topics on the history, development, the most recent advances and the possible future and limits of the Biological Sciences.

**421. Seminar on Man, "The Human Organism"**

Fall, Winter, Spring, Summer. 3(3-0) Approval of department.

The importance of new discoveries in biology for our understanding of the human organism with emphasis from the fields of genetics, molecular biology, behavior, developmental biology, physiology, and ecology.

**499. Research**

Fall, Winter, Spring. 2 to 4 credits. May re-enroll for a maximum of 12 credits. Approval of director of biological science program and student's adviser.

Undergraduates are invited on an individual basis into research laboratories of faculty in biological departments of the college. After three terms of research, a presentation in thesis form is produced and defended.

**800. Problems in Biological Science**

Fall, Winter, Spring. Variable credit. B.S. degree in biological science.

**999. Research**

Fall, Winter, Spring. Variable credit. M.S. degree in biological science or equivalent. Research in some phase of biological science, data to form the basis for the thesis required for the doctoral degree in biological science.

\*For prerequisite purposes, the introductory biology sequence in Lyman Briggs College, LBC, 140, 141, 242, may be used instead of this sequence.

**BIOMECHANICS\***

**BME**

**College of Osteopathic Medicine**

**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. 4(4-0) MTH 215, PSL 331.

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. Introduction to Biophysics**

Spring. 5(5-0) PHY 259, MTH 113, 1 year organic chemistry and 1 year biology.

Salient features of biophysics, methods and principles. Structure and organization of biological materials, bioenergetics, radiation biophysics, bioelectric phenomena, biomechanics and psychophysics.

**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.

**804. Experimental Biophysics**

Fall of odd-numbered years. 3 credits. Approval of department.

Neuro-electric properties of cells, organs and animals, and methods of processing information in humans.

**821. Molecular Biophysics**

Fall of odd-numbered years. 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.

\*Established July 1, 1972.

**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.

**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 departments; ANT 815 and BPY 825 recommended. Interdepartmental with the Zoology, Physiology and Psychology Departments and administered by the Psychology Department.

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,