

**Descriptions — Biological Science  
of  
Courses**

**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.

**BIOMECHANICS\* BIM**

**College of Osteopathic Medicine**

**580. Introduction to Athletic Medicine**  
Fall, Winter. 3(3-0) Approval of department.

Health care of student athlete. Examination and evaluation of physical training sequences for high school athletes. Analyze functional role of musculoskeletal systems; illustrated in various high school sports.

**581. Health Care Delivery For Athletes**

Fall, Spring. 3(3-0) Bachelor's degree and involvement with secondary school athletics. Physical training—the role of the athletic trainer in health care delivery. Encompasses all inter-scholastic sports. Injury prevention and treatment rehabilitation stressed.

**620. Directed Studies**

Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for a maximum of 24 credits. Approval of department. Individual or group work on special problems related to biomechanics, neuromusculoskeletal system primarily.

**865. Advanced Neurobiology**

Winter of odd-numbered years. 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.

**BIOMEDICAL ENGINEERING BME**

**College of Engineering**

**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.

\*Established July 1, 1972.

**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**

**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.

**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**

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.

**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 of odd-numbered years. 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 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, 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.

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

## BOTANY AND PLANT PATHOLOGY BOT

College of Agriculture and Natural Resources  
College of Natural Science

**IDC. Resource Ecology and Man**  
For course description, see Interdisciplinary Courses.

**201. Plants and Man**  
(304.) Winter, Spring. 3(3-0)

The relevance of plants to modern society with emphasis on those plants which supply drugs, food, fuel and oxygen, and those which have historical or esthetic importance.

**205. Plant Biology**  
Winter. 3(3-0) High school chemistry and high school algebra.

An introduction to plant science for students seeking a general knowledge of the principles of plant biology as well as for prospective plant science majors.

**301. Introductory Plant Physiology**  
Fall, Spring. 4(2-4) CEM 131 or 141; 161; B S 211 and introductory organic chemistry recommended.

General principles of plant physiology relating plant function to structure.

**302. Introductory Morphology**  
Fall, Winter. 4(2-4) B S 212 or approval of department.

Structures and life cycles of representative plant groups showing progressive evolutionary developments.

**318. Introductory Plant Systematics**  
Spring. 4(2-3) 302 or B S 212 or approval of department.

Plant diversity with emphasis on identification, classification, nomenclature, and evolutionary relationships of vascular plants.

**335. Fossil Plants, Their History and Paleocology**

Spring. 3(3-0) One course in geology or botany or biology or approval of department. Interdepartmental with and administered by the Geology Department.

History of plants through geologic time; their form and evolution; how and where found, identified and reconstructed; their use in determining ancient geographic patterns, paleoenvironments, paleoclimates and community structure. Field trip.

**336. Economic Plants**  
Fall. 3(3-0)

Histories, characteristics, and origins of plants used in industrial processes, drug manufacture, and agriculture. Nontechnical to broaden student's cultural interest in plants.

**400. Aquatic Plants**  
Spring. 3(1-4) One year of botany and zoology or approval of department.

Aquatic plants, their classification, ecology and economic importance. Relationships to problems in fisheries, in wildlife management, and to role in limnology. Experience for student in plant ecology, aquatic biology, and water sanitation.

**400H. Honors Work**  
Fall, Winter, Spring. 3(0-6) Approval of department; Seniors.

**401. Special Problems**  
Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 16 credits. 302, Seniors, approval of department. Students with special ability may carry on laboratory research or study of published literature on a selected topic.

**402. Introductory Mycology**  
Fall, Winter. 4(2-6) B S 212 or approval of department.

Survey of the fungi, a background course for students taking plant pathology or other courses in mycology.

**405. Introductory Plant Pathology**  
Fall. 4(2-4) 302 or B S 212 or approval of department. Students may not receive credit in both 405 and 407.

General principles of plant pathology including detailed study of selected diseases as examples of important groups.

**406. Medical Mycology**  
Fall, Spring. 4(2-6) 402 or approval of department. Interdepartmental with the Department of Microbiology and Public Health.

Characteristics, habits, and laboratory identification of fungus diseases infecting humans. Emphasis on laboratory techniques and morphological characteristics of the various mycoses.

**407. Diseases of Forest and Shade Trees**

Spring. 4(3-2) 301; 302; 318 or FOR 204. Students may not receive credit in both 405 and 407.

Diseases which affect trees in forests, parks, suburbs and nurseries, and methods of control.

**408. Freshwater Ecology**  
Summer. 6 credits. B S 212 or approval of department. Given at W. K. Kellogg Biological Station. Interdepartmental with Biological Science and the Department of Zoology and administered by Biological Science.

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.

**410. Terrestrial Ecology**  
Summer. 6 credits. B S 212 or approval of department. Given at W. K. Kellogg Biological Station. Interdepartmental with Biological Science and the Department of Zoology and administered by Biological Science.

Factors determining distribution and abundance. Interrelationship of plants, animals, and environment. Extensive field investigations of several types of terrestrial communities in light of current theory.

**411. Systematic Botany**  
Summer. 4(2-6) B S 212 or approval of department.

Taxonomy, identification, and evolutionary relationships of vascular plants, illustrated by the local flora; extensive field studies.

**414. Plant Physiology: Metabolism**  
Winter. Summer of odd-numbered years. 4(3-4) 302; 1 year chemistry including organic.

Comprehensive study of metabolic activities of plants. Emphasis on mineral nutrition of plants and processes of photosynthesis, protein synthesis, and respiration.

**415. Plant Physiology: Growth**  
Spring. Summer of even-numbered years. 4(3-4) 414.

Comprehensive study of growth processes of plants, with emphasis on germination, dormancy, hormones, and physiological phenomena associated with phases of development.

**427. Cell Biology**  
(827.) Winter. Summer of odd-numbered years. 4(4-0) BCH 200 and one year of general botany or general zoology.

Cell organization and distribution of standard inclusions. Structure and function of the nucleus and other cytoplasmic organelles.

**431. Histological Techniques**  
Winter. 4(2-6) 302.

Preparation of plant materials for microscopic study. Special emphasis on the many variations in microtechnique, including paraffin and celloidin embedding, freezing microtomy and ultrathin sectioning for electron microscopy.

**434. Plant Anatomy**  
Fall. Summer of even-numbered years. 4(2-4) 302.

Principles underlying the differentiation and growth of vegetative plant structures with special emphasis upon their functional and developmental genetic relationships.

**441. Phytogeography**  
Winter. 3(3-0) 302.

Distribution of plants over the earth, with special reference to North America. Geological history and environmental factors which influence distribution.

**447. Fresh Water Algae**  
Spring. 4(2-4) One year botany or zoology. Primarily for students in Fisheries Biology, Wildlife Management and Sanitary Engineering.

Identification of fresh water algae, especially those forms concerned with fish food problems, water contamination and limnology. Methods for making analyses of samples for biological survey work on lakes and streams. Economic aspects and life histories of the algae.

**450. Ecology**  
Spring. 4(2-4) 318; 301 or 414

Interrelationship of plants and environment. Factors which govern their distribution.

**455. Experimental Ecology**  
Spring. 5(2-9) Approval of department. Interdepartmental with and administered by the Zoology Department.

Dynamics, regulation and production of biological populations, structure composition and stability of biotic communities; biogeochemical and energetic characteristics of ecosystems.

**470. Nematode Diseases of Economic Plants**

Winter of odd-numbered years. 4(2-4) Interdepartmental with and administered by the Department of Entomology.

Major nematode diseases of economically important plants, with emphasis on diagnostic symptoms, nematode biology and principles of control.