

***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,

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 Natural Science

200. 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.

305. Poisonous Plants

Spring. 2(0-4) Three terms of Natural Science. Primarily for Veterinary Medicine students.
Plants poisonous to livestock and human beings, particularly those occurring in Michigan.

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

Winter. 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

Winter, Spring. 4(2-6) 402 or approval of department.
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(3-3) 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.

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 celloidon 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. Introductory Nematology

Winter of odd-numbered years. 3(2-3) Interdepartmental with and administered by the Department of Entomology.
Biology, taxonomy and control of plant parasitic and saprophytic nematodes.