

Descriptions – Biochemistry

of Courses

511. Medical Biochemistry I

Winter. 3(3-0) One year of organic chemistry. Open only to students in the professional programs in the College of Human Medicine and the College of Osteopathic Medicine.

Basic biochemical principles and terminology, with emphasis on metabolism and function of biomolecules of importance in medical biology.

512. Medical Biochemistry II

Spring. 4(4-0) BCH 511.

Basic biochemical principles and processes pertinent to specific areas of human pathophysiology.

801. Biochemical Research Methods

Fall. 1(1-1) or 2(2-1) May reenroll for a maximum of 2 credits. One year of organic chemistry or CEM 242; BCH 451 or BCH 811, or concurrently.

Discussions and demonstrations of selected experimental techniques of wide application in biochemistry.

811. Advanced Biochemistry

Fall. 4(4-0) One year of organic chemistry, one year of physical chemistry, one term of introductory biochemistry, BCH 801 taken previously or concurrently, or approval of department. Limited to graduate students in biochemistry or other students needing a similar professional preparation.

The structure and function of biomolecules, energy transformations and chemical reactions in living cells, regulation of cell reactions, and the replication of living organisms.

812. Advanced Biochemistry

Winter. 4(4-0) BCH 811.

Continuation of BCH 811.

813. Advanced Biochemistry

Spring. 4(4-0) BCH 812.

Continuation of BCH 812.

821. Biochemical Mechanism and Structure I

Fall. 3(3-0) BCH 401, one year of organic chemistry and physical chemistry or concurrently; or approval of department.

Structures, methods of structural analysis, synthesis, and reaction mechanisms of biological substances including proteins, carbohydrates, lipids, porphyrins, phosphate esters, enzymes and coenzymes.

822. Biochemical Mechanism and Structure II

Winter. 2(2-0) BCH 821 or approval of department.

Continuation of BCH 821.

831. Physiological Biochemistry I

Winter. 3(3-0) BCH 401.

Physiological biochemistry, with emphasis on metabolic interpretation of normal and altered physiological states of the human organism and appropriate animal models.

832. Physiological Biochemistry II

Spring. 3(3-0) BCH 831.

Continuation of BCH 831.

855. Special Problems

Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 12 credits. Approval of department.

Consideration of current problems.

864. Plant Biochemistry

Spring. 4(4-0) BCH 401, BOT 301 or approval of department. Interdepartmental with the Department of Botany and Plant Pathology.

Metabolism of nitrogen-compounds, carbohydrates, and lipids unique to plants' cell organelles; photosynthesis; photorespiration; dark respiration; cell walls; lectins; nitrogen cycle including nitrogen fixation; sulfur cycle.

888. Laboratory Rotation

Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 15 credits. Graduate student majors; approval of department.

Participation in research laboratories to learn experimental techniques and research approaches, broaden research experience, and assess research interests prior to selecting a thesis adviser.

899. Master's Thesis Research

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

960. Selected Topics in Biochemistry

Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 10 credits if different topics are taken. Approval of department.

Topics will be selected from the areas of biochemical genetics, biochemistry of development, biochemical evolution, complex proteins, lipid metabolism, immunochemistry, hormones, control mechanisms and structure of biological macromolecules.

961. Selected Topics in Biochemistry

Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 10 credits if different topics are taken. Approval of department.

Topics will be selected from the areas of bioenergetics, bioinstrumentation, complex carbohydrates, mechanisms of enzyme action, natural products, carbohydrate metabolism, mass spectrometry and biochemistry of isoprenoid compounds.

978. Seminar in Biochemistry

Fall, Winter, Spring. 0 or 1(1-0).

Presentation and discussion of reports by graduate students on biochemical topics of current interest.

999. Doctoral Dissertation Research

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

202. Introductory Biology for Non-Science Majors

Fall, Winter, Spring. 4(3-3) 12 credits in general education natural science courses.

Concepts, procedures, and perspectives appropriate to developing a basic literacy in biology with emphasis on fundamental biological principles and their relation to world society. Appropriate preparation for pre-service elementary teachers.

For prerequisite purposes, the introductory biology sequence in Lyman Briggs School, LBS 140, LBS 141, LBS 242, may be used instead of this sequence.

210. General Biology

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

Concepts relating to basic attributes and diversity of living things.

211. General Biology

Fall, Winter. 4(4-2) CEM 130 or high school chemistry. Not open to students with credit in LBS 242.

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 LBS 140.

Continuation of B S 211.

400. Biological Science for Teachers

Fall, Winter, Spring, Summer. 3 to 4 credits. May reenroll 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.

405. Topics in Biological Science

Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 6 credits if different topic is taken. Approval of department.

Presentation of single topics from the biological sciences by senior faculty and guest lecturers. Topics are selected to facilitate development of strong biological science programs in schools.

408. Freshwater Ecology

Summer. 6 credits. B S 212 or approval of department. Given at W. K. Kellogg Biological Station. Interdepartmental with the departments of Zoology, and Botany and Plant Pathology.

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 the departments of Botany and Plant Pathology, and Zoology.

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

BIOLOGICAL SCIENCE B S

College of Natural Science

The content of courses 400, 405, 420, and 440, as well as the research and problems courses 499, 800 and 899, may vary from term to term. Brochures giving detailed information about individual courses are available in the Science and Mathematics Teaching Center and the Office of the Assistant Dean for Lifelong Education. These courses are primarily designed for in-service teachers and interested adults and are offered in off-campus locations.

420. Seminar in Recent Advances in Biological Science

Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll 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.

422. Terrestrial Field Biology for Teachers

Summer. 3 credits. A course in biology or approval of department. Given at W. K. Kellogg Biological Station.

Ecology of forest, field and prairie ecosystems. Emphasis on natural history and field identification of Michigan's common land plants and animals. Biological collection techniques and reference materials.

425. Aquatic Field Biology for Teachers

Summer of even-numbered years. 3 credits. A course in biology or approval of department. Given at W. K. Kellogg Biological Station.

Investigation of Michigan's aquatic and wetland ecosystems with special emphasis on field identification of key plant and animal species. Ecological concepts, reference materials, and biological collection techniques.

440. Man and Environment Workshop for Teachers

Summer. 3 credits. Approval of department. Given at W. K. Kellogg Biological Station.

Discussions and practical work sessions concerning the development of ideas and activities for environmental studies in and outside the classroom. Designed for intermediate and secondary inservice teachers.

460. Ornithology for Teachers

Summer. 3 credits. A course in biology or approval of department. Not open to Zoology majors. Given at W. K. Kellogg Biological Station. Interdepartmental with and administered by the Department of Zoology.

Distribution, breeding cycles, migration, food and feeding habits, voice and other important areas of avian biology. Emphasis on field identification and natural history.

499. Research

Fall, Winter, Spring. 2 to 4 credits. May reenroll 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.

805. Outdoor Environmental Studies

(451.) Summer. 1 to 4 credits. May reenroll for a maximum of 9 credits if different topics are taken. B S 422 or B S 425 or ZOL 460 or approval of department. Given at W. K. Kellogg Biological Station.

Emphasis on environmental understanding. Development of educational materials through team research and testing. Interaction with elementary and middle school children in two-week outdoor oriented workshop.

899. Master's Thesis Research

Fall, Winter, Spring. Variable credit. Approval of department.

BIOMECHANICS

BIM

College of Osteopathic Medicine

560. Acupuncture and Other Peripheral Stimulation Therapy

Winter. 1 to 3 credits. Approval of department.

Clinical application of traditional Chinese acupuncture and related peripheral stimulation therapies.

561. Clinical Craniosacral Manipulative Therapy

Spring. 1 to 3 credits. Approval of department.

Basic concepts of the craniosacral system, clinical applications.

590. Special Problems in Biomechanics

Fall, Winter, Spring, Summer. 1 to 8 credits. May reenroll for a maximum of 32 credits. Approval of department.

Each student will work under direction of a faculty member on an experimental, theoretical or applied problem.

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.

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. Sub-threshold 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.

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.

BIOPHYSICS

BPY

**College of Human Medicine
College of Natural Science**

400H. Honors Work in Biophysics

Fall, Winter, Spring, Summer. 3 to 6 credits. May reenroll for a maximum of 6 credits. Approval of department.

Independent study and investigation under the direction of a faculty member.

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.