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

955. Plant Physiology and Biochemistry I
Winter of even-numbered years. 3(3-0) Approval of department. Interdepartmental with the Department of Botany and Plant Pathology.

956. Plant Physiology and Biochemistry II
Winter of odd-numbered years. 3(3-0) Approval of department. Interdepartmental with the Department of Botany and Plant Pathology.

960. Selected Topics in Biochemistry
Fall, Winter, Spring, Summer. 1(1-0) or 2(2-0) May reenroll for a maximum of 6 credits if a different topic is taken. Approval of department.

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

961. Selected Topics in Biochemistry
Fall, Winter, Spring, Summer. 1(1-0) or 2(2-0) May reenroll for a maximum of 6 credits if a different topic is 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, O or 1(1-0).

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

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

BIOLICAL SCIENCE

B S

College of Natural Science

The content of courses 400, 405, 420, 440, 430 and 451, as well as the research and problems courses 499, 500 and 599, 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.

200. Studies in Contemporary Biological Science
Spring. 3(3-0) 12 credits in a Department of Natural Science sequence.

Biological topics relating directly to contemporary problems of world society are presented after an introduction to the uses and limitations of science and to the world of biology.

201. Contemporary Biology Laboratory
Spring. 1(0-3) 200 or concurrently.

Students practice processes and procedures of science in the laboratory, design and carry out a self-selected laboratory investigation of a biological topic, report and evaluate reports of scientific work.

202. Biological Science for Elementary Teachers
Fall, Winter, Spring. 4(3-3)

Fundamental principles of biology which provide background appropriate for preparation for elementary education teaching.
Descriptions - Biological Science Courses

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.

450. Outdoor Environmental Studies
Summer. 3 credits. May reenroll for a maximum of 9 credits when new topics are given. Teaching experience or approval of department. B.S. 451 must be taken same summer. Given at W. K. Kellogg Biological Station. Emphasis on environmental understanding. Planning and developing interdisciplinary program for elementary and intermediate children.

451. Outdoor Environmental Studies: Laboratory
Summer. 5 credits. May reenroll for a maximum of 15 credits when new topics are given. Teaching experience, B.S. 450. Given at W. K. Kellogg Biological Station.
Perfoming lesson plans and materials developed in B.S. 450, while interacting with elementary and intermediate children in four week outdoor activity oriented programs. Emphasis on environmental understanding.

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 advisor. 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.

500. 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.

BIOMECHANICS BIM

College of Osteopathic Medicine

550. 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 high school athletes. Analyze functional role of 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.

680. Athletic Medical Systems
Fall, Spring. 3(3-0) Bachelor's degree and involvement with secondary school athletics. Health care systems for athletes in growth years. Physiological and psychological applied to human development, training and care. Injury prevention, emergency medicine and rehabilitation stressed.

790. Independent Study
Fall, Winter, Spring. 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, Transmission of physiological events to electrical signals, Detection of physiological variables by electrical impedance measurements, Ultrasonic techniques in biomedical systems. Biomedical applications of lasers.

411. Electric Theory of Nerves

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. 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 study and research under the supervision of a member of the Biomedical Engineering Committee.

BIOPHYSICS BPY

College of Human Medicine
College of Natural Science
College of Osteopathic Medicine

400H. Honors Work in Biophysics
Fall, Winter, Spring. 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
Fall. 3(3-0) One year organic chemistry or biochemistry: 1 year biology, PHY 259, 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 Engineering
Fall, Winter, Spring. 3(3-0) One year organic chemistry or biochemistry, PHY 259, PHY 259, MTH 113 or approval of department. Salient features of biophysics, principles and methods; radiation biophysics, membrane biophysics; bioelectric phenomena; neurobiology, and psychophysics.

1DC. Biological Membranes
For course description see Interdisciplinary Courses.

480. Special Topics in Biophysics
Fall, Winter, Spring, Summer. 2 to 4 credits. Approval of department. PHY 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 reenroll for a maximum of 15 credits. Approval of department. Undergraduate research under one of our faculty.

804A. Neuroscience Laboratory I
Winter. 3(2-4) Approval of instructor. Interdepartmental with the departments of Psychology, Physiology and Psychology and 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.

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