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.
Perfecting 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 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.

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 musculoskeletal systems; illustrated in various high school sports.

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.

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.

685. Advanced Neurobiology
Spring. 3(3-0) CON 387. 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.

850. Athletic Medical Systems
Fall, Winter, Spring, Summer. Bachelor's degree and involvement with secondary school athletics.
Health care systems for athletes in growth years. Physiological and psychological aspects applied to human development, training and care. Injury prevention, emergency medicine and rehabilitation stressed.

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.

411. Electric Theory of Nerves
Winter. 4(4-0) MTH 213, PHY 288.
Neurophysiology, basic organization, structure, function and electrical activity of neurons. Subthreshold membrane phenomena: Nernst-Planck equations, constant field membrane model, electrotoc current, 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.

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.

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
Spring. 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; ther­ mal biophysics; bioenergetics; and photobiology.

403. Introductory Biophysics: Membranes and Electrical
Fall, 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; neuro­ biology; 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 492 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 Zoology 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.