831. Physiological Biochemistry I  
Winter. 3(3-0) BCH 401.  
Physiology, 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. 1 to 6 credits. May reenroll for a maximum of 12 credits. Approval of department.

556. Plant Genetics and Molecular Biology  
Spring of even-numbered years. 3(3-0)  
Approval of department and a course in introductory genetics. Interdepartmental with Genetics and the Department of Botany and Plant Pathology. Administered by the Department of Botany and Plant Pathology. Recent advances in genetics and molecular biology of higher plants.

864. Plant Biochemistry  
Spring. 4(0-0) 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, photosorption; dark respiration; cell walls; lectins; nitrogen compounds, carbohydrate metabolism, mass spectrometry; and biochemistry of isoprenoid compounds.

975. Seminar in Biochemistry  
Fall, Winter, Spring. 3(0-0). May reenroll for a maximum of 8 credits. Approval of department.

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

BIOLOGICAL SCIENCE B.S.  
College of Natural Science  
The content of courses 400 and 405, as well as the research and problems courses 498, 800 and 899, may vary from term to term. Brochures giving detailed information about individual courses are available in the Office of the Assistant Dean for Lifelong Education in the College of Natural Science. The courses are primarily designed for in-service teachers and interested adults and are offered in off-campus locations.

202. Introductory Biology for Non-Science Majors  
Fall, Winter, Spring, Summer. 4(3-3) 12 credits in general education natural science courses.

210. General Biology  
Fall, Spring. 4(4-2) Not open to students with credit in LBS 141. Principles of biological organization: scientific method, biochemistry, cell biology, and evolution.

211. General Biology  
Fall, Winter, Summer. 4(4-2) CEM 140 or high school chemistry. Not open to students with credit in LBS 242. Principles of biological regulation and integration: genetics, development, and selected physiological topics.

991. Selected Topics in Biochemistry  
Fall, Winter, Spring. 1 to 3 credits. May reenroll for a maximum of 10 credits if different topics are taken. Approval of department.

405. Topics in Biological Science  
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 3 credits if different topic is taken. Approval of department.

499. Research  
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 12 credits. Approval of director of biological science program and student's adviser.

500. Basic Concepts in Biomechanics  
Winter. 2(2-0) Admission to a college of medicine or approval of department. Interdepartmental with the College of Osteopathic Medicine. Basic concepts of biomechanics and their relationship to functional anatomy and osteopathic manipulative therapy.

501. Special Problems in Biomechanics  
Fall, Winter, Spring, Summer. 1 to 4 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.

Biomechanics — Description of Courses

BIOMECHANICS B.I.M.

College of Osteopathic Medicine

500. Basic Concepts in Biomechanics  
Winter. 2(2-0) Admission to a college of medicine or approval of department. Interdepartmental with the College of Osteopathic Medicine.

501. Special Problems in Biomechanics  
Fall, Winter, Spring, Summer. 1 to 4 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.
Conduct research for master's thesis. May reenroll for a maximum of 12 credits. Approval of instructor.

Electronic components and circuits. Physiological measurements. Ultrasonic techniques in biomedical systems. Biomedical applications of lasers.

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.

Special Topics
Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 9 credits. Approval of department. Independent study in topics of biomechanics.

Biomechanics
Fall. 3(3-0) BIM 810. Application of Newtonian mechanics to problems of force transmission and related motions in the musculoskeletal system.

Theory of Tissue Mechanics
Spring. 3(3-0) Approval of department. Introduces the concepts of stress and strain in tissue and the dependency of mechanical parameters on biological factors.

Research Seminar
Fall, Winter, Spring. 1(1-0) May reenroll for a maximum of 3 credits. Approval of department. Discussion of current research topics in biomechanics with strong clinical application.

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.

Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 12 credits. Approval of department. Conduct research for master's thesis.

BIOMEDICAL ENGINEERING

College of Engineering

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 parameters by electrical impedance measurements. Ultrasensitive techniques in biomedical systems. Biomedical applications of lasers.

Electric Theory of Nerves

Clinical Instrumentation

Materials in Biomedical Engineering
Winter. 3(3-0) PSI 240 or PSI 431 or approval of department. Basics of materials science. Biocompatibility of metals, polymers and ceramics. Internal and external prosthetic materials.

Biological Transport Mechanisms
Spring. 3(3-0) MTH 215. Mechanisms which govern transport of 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 318 or approval of department. Fundamentals of continuum mechanics in relation to morphological classification of tissue. Mechanical properties of connective and muscle tissue.

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.

BOTANY AND PLANT PATHOLOGY

College of Agriculture and Natural Resources

College of Natural Science

Plants, People and the Environment (N)
Fall, Spring. 3(3-0) Relevance of plants to modern society. Basic botanical concepts and socially significant groups of plants. Natural resource exploitation. Plants as they relate to human population growth, food production, and energy resource depletion.

Plant Biology
Fall. 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.

Plant Biology Laboratory
Fall. 1(0-3) BOT 205 or concurrently. Physiological experiments and hands-on study of plant diversity at the cellular, tissue and whole plant level.

Introductory Plant Physiology
Winter, Spring. 4(2-4) CEM 141A or CEM 151; CEM 161; BOT 205 or B S 210 or B S 141. Introductory organic chemistry recommended. General principles of plant physiology relating plant structure to function. Topics include cell physiology, water relations, effects of light and temperature, respiration, photosynthesis, mineral nutrition, and hormone action.

Introductory Morphology
Winter. 4(2-4) BOT 205 or B S 212 or approval of department. Structures and life cycles of representative plant groups showing progressive evolutionary developments.

Introductory Plant Systemsatics
Spring. 4(3-0) BOT 302 or B S 212 or approval of department. Plant diversity with emphasis on identification, classification, nomenclature, and evolutionary relationships of vascular plants.

Forest Protection
Fall. 4(4-0) FOR 304, FOR 305, FOR 320. Interdepartmental with the departments of Entomology and Forestry. Administered by the Department of Forestry. Procedures used to detect and respond to pest, fire and environmental problems in a variety of forest types.

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

Economic Plants
Winter. 3(3-0) BOT 205 or B S 212 or approval of department. Plants used by humans viewed from economic, historical, cultural, and botanical perspectives. Emphasis on food, fiber and medicinal plants. Includes plants used for herbs, dyes, perfumes, alcohol, stimulants, ornamentals, energy.

Aquatic Plants
Fall. 3(2-3) BOT 318 or BOT 302. Students may not receive credit in both BOT 400 and BOT 232. 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.

Honors Work
Fall, Winter, Spring. 3(0-5) Approval of department; Seniors.