899. Master's Thesis Research
Fall, Winter, Spring. Variable credit. Approval of department.

BIOMECHANICS  BIM

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.
Basic concepts of biomechanics and their relationship to functional anatomy and osteopathic manipulative therapy.

590. 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.

601. Osteopathic Manipulative Medicine Clerkship
Fall, Winter, Spring. Summer. 8 credits. May reenroll for a maximum of 12 credits. Grade is given in 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.

800. Problems in Biological Science
Fall, Winter, Spring. Summer. 1 to 6 credits. May reenroll for a maximum of 18 credits. B.S. degree in biological science.

850. 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.

890. Independent Study
Fall, Winter, Spring. Summer. 1 to 6 credits. May reenroll for a maximum of 32 credits. Approval of department.
Individual or group work related to biomechanics and/or neuromusculoskeletal system.

899. Master's Thesis Research
Fall, Winter, Spring. Variable credit. May reenroll for a maximum of 12 credits. Approval of department.

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 of odd-numbered years. 4(4-0) MTH 310, PHY 255.

414. Clinical Instrumentation
Winter of even-numbered years. 3(3-0) BME 410

424. Materials in Biomedical Engineering
Fall. 3(3-0) PSL 240 or PSL 431 or approval of department.

431. Biological Transport Mechanisms
Spring. 3(3-0) MTH 215.
Mechanisms which govern transport or movement, 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 tissues.
Descriptions — Biomedical Engineering of Courses

499. Independent Study
Fall, Winter, Spring, Summer. 1 to 4 credits. May enroll for a maximum of 9 credits. Approval of instructor. Individual reading and research under the supervision of a member of the Biomedical Engineering Committee.

400. Aquatic Plants
Fall. 3(2-3) BOT 318 or BOT 392. Students may not receive credit in both BOT 400 and BOT 423. 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.

400I. Honors Work
Fall, Winter, Spring. 3(0-6) Approval of department. Seniors.

401. Special Problems
Fall, Winter, Spring. Summer. 1 to 4 credits. May enroll for a maximum of 16 credits. BOT 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. 4(2-6) B S 212 or LBS 140 or approval of department. Survey of the fungi including characteristics, habits and diversity. Background course for biology students entering to specialize in microbiology, mycology, plant pathology or other fields involving fungi.

403. Introductory Plant Pathology
Fall. 4(2-4) BOT 302 or B S 212 or approval of department. Students may not receive credit in both BOT 405 and BOT 407. General principles of plant pathology including detailed study of selected diseases as examples of important groups.

404. Medical Mycology
Fall, Spring. 4(2-6) BOT 402 or approval of department. Interdepartmental with the Department of Microbiology and Public Health. Characteristics, habits, and laboratory identification of fungal diseases infecting man. Emphasis on laboratory techniques and morphological characteristics of the various mycoses.

407. Diseases of Forest and Shade Trees
Spring. 4(3-2) BOT 301; BOT 302; BOT 315 or FOR 214. Students may not receive credit in both BOT 405 and BOT 407. Diseases which affect trees in forests, parks, suburbs and nurseries, and methods of control.

409. Plant Disease Control
Winter. 3(2-0) BOT 305. Principles and methods in controlling plant diseases. Considerable emphasis is placed on the chemistry of fungicides, and their role in controlling plant diseases. Other factors affecting disease epidemiology are covered.

410. Systematic Botany
Summer. 3(0-6). B S 212, BOT 302 or approval of department. Students may not receive credit in both BOT 411 and BOT 425. Taxonomy, identification, and evolutionary relationships of vascular plants, illustrated by the local flora; extensive field studies.

413. Environmental Plant Physiology
Winter. 3(0-0). B S 210 or LBS 141 or BOT 205. Major topics include plant soil-water relationships, gas exchange, and stress physiology. Minor topics include mineral nutrition and energy budgets.

414. Plant Physiology: Metabolism
Fall. 3(3-0) CEM 241; B S 210 or LBS 141 or BOT 205; BOT 301. General principles underlying plant metabolic processes. Nutrient requirements, photosynthesis, translocation, respiration, nitrogen metabolism, and structures associated with these processes.

415. Plant Physiology: Growth and Development
Spring. Summer of even-numbered years. 5(3-4) BOT 414 or approval of department. Growth and development in plants. Topics include the chemistry and effects of hormones, transport, thermoperiodicity, reproduction, and morphogenesis, dormancy, and biological clocks.

421. Field Studies of Freshwater Algae
Summer. 3 credits. Students may not receive credit in both BOT 421 and BOT 447. One year of botany or zoology or approval of department. Given at W. K. Kellogg Biological Station. An ecological approach to the study of fresh water algae. Algal taxonomy, morphology, life history and distribution. Emphasis on ecological indicators. Extensive field collections. Methods of collection, preservation, and enumeration. Approved through Spring 1987.

423. Aquatic and Wetland Plants
Summer. 3 credits. Students may not receive credit in both BOT 423 and BOT 400. BOT 302, B S 212 or approval of department. Given at W. K. Kellogg Biological Station. Extensive exposure to plants in aquatic environments. Emphasis on systematics, morphology, evolution and community relations. Survey of diverse wetland and aquatic habitats with numerous field trips.

425. Field Plant Systematics
Summer. 4 credits. B S 212 or approval of department. Students may not receive credit in both BOT 425 and BOT 411. One year of botany or general zoology or approval of department. Given at W. K. Kellogg Biological Station. Classification, evolution, distribution and biology of vascular plants. Emphasis on field recognition, identification. Numerous field trips to diverse habitats for common, rare, native and introduced plants.

427. Cell Biology
Fall. 4(4-0) BCH 200 and one year of general botany or general zoology. Organization and structure of the cell, with emphasis on eukaryotes. Structure and function of the nucleus and cytoplasmic organelles. An introduction to molecular biology.

434. Plant Anatomy
Fall, Summer of even-numbered years. 4(2-4) BOT 302. Principles underlying the differentiation and growth of vegetative plant structures with special emphasis upon their functional and developmental genetic relationships.