

BIOLOGICAL SCIENCE

111. Cells and Molecules
 Fall, Spring. 4(3-3)
 P: CEM 141 or CEM 151.
 Cell structure and function; macromolecular synthesis; energy metabolism; molecular aspects of development; principles of genetics.

BIOMECHANICS BIM

590*. Special Problems in Biomechanics
 Fall, Spring, Summer. 1(01-00) May reenroll for a maximum of 22 credits.
 R: Not open to freshmen and sophomores.
 Approval of department.
 Each student works under faculty direction on an experimental, theoretical, or applied problem.
 QP: DEPT.APP QA: BIM 590

601*. Osteopathic Manipulative Medicine Clerkship
 Fall, Spring, Summer. 4 to 12 credits in increments of 2 credits.
 P: Units I and II. R: Open only to graduate-professional students in the College of Osteopathic Medicine.
 Advanced training in the diagnosis of musculoskeletal dysfunction and application of osteopathic manipulative techniques.
 QA: BIM 601

620*. Directed Studies
 Fall, Spring, Summer. 2 to 10 credits in increments of 2 credits. May reenroll for a maximum of 10 credits.
 R: Open only to students in the College of Osteopathic Medicine. Approval of department.
 Individual or group work on special problems related primarily to the biomechanics of the musculoskeletal system.
 QA: BIM 620

800*. Special Topics
 Fall, Spring, Summer. 1(01-00) May reenroll for a maximum of 3 credits.
 R: Open only to graduate students. Approval of department.
 Directed study in topics of biomechanics.
 QP: DEPT.APP QA: BIM 800

810*. Tissue Biomechanics
 Fall. 3(02-02)
 R: Open only to Biomechanics graduate students.
 Integrate concepts of tissue mechanics and microstructure, develop experimental methods to study connective tissue mechanics using engineering principles.
 QA: BIM 812 BIM 871

811*. Biomechanical Analysis
 Fall. 2(02-00)
 R: Open only to Biomechanics graduate students.
 Methods for analysis of biokinematic and biokinetic data.
 QA: BIM 805

812*. Experimental and Analytical Biodynamics
 Spring. 3(02-02)
 P: BIM 811.
 Experimental and analytical methods to measure and interpret biodynamics of musculoskeletal system.
 QP: BIM 805 QA: BIM 811 BIM 873

813*. Biokinematics
 Spring. 3(02-02)
 P: BIM 811.
 Size, position, and mobility of the human body as a mechanical linkage system. Detailed study of body joints and kinematic models.
 QP: BIM 805 QA: BIM 810 BIM 872

840*. Therapy of Connective Tissue Mechanics
 Fall. 3(03-00)
 P: BIM 810.
 Mechanical properties, chemical content, and anatomical structure in connective tissues.
 QP: BIM 812 QA: BIM 812

841*. Theory of Neuromuscular Mechanics
 Fall. 3(03-00)
 R: Open only to Biomechanics graduate students.
 Neurological control of joint mechanics.
 QA: BIM 810 BIM 805

842*. Theory of Joint Mechanics
 Fall. 3(03-00)
 P: BIM 813.
 Motion and force transmission, and their relationship to anatomical structure and tissue function in joints.
 QP: BIM 810 QA: BIM 810 BIM 805

860*. Occupational Biomechanics
 Fall. 3(03-00)
 P: BIM 813.
 Applications of biomechanics in ergonomics with emphasis on the whole body.
 QP: BIM 810 QA: BIM 810

861*. Clinical Biomechanics
 Fall. 3(03-00)
 R: Open only to Biomechanics graduate students.
 Application of biomechanics to medicine.

890*. Independent Study
 Fall, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 22 credits.
 R: Open only to graduate students in Biomechanics. Approval of department.
 Individual or group work related to biomechanics and/or neuromuscular system.
 QP: P

895*. Experimental Research Methods
 Fall. 1(00-02)
 R: Open only to Biomechanics graduate students.
 Methods of experimental research in biomechanics.
 QA: BIM 871 BIM 872 BIM 873

899*. Master's Thesis Research
 Fall, Spring, Summer. 1 to 25 credits. May reenroll for a maximum of 25 credits.
 R: Open only to Biomechanics graduate students. Approval of department.
 QP: DEPT.APP QA: BIM 899

BIOMEDICAL ENGINEERING BME

311*. Introduction to Biomedical Engineering
 Fall. 3(3-0) Interdepartmental with the Department(s) of Metallurgy, Mechanics, and Materials Science, Chemical Engineering, Mechanical Engineering, Electrical Engineering, Metallurgy, Mechanics, and Materials Science.
 P: MTH 235, PHY 184, BS 210
 Physical and mechanical properties of soft and hard tissues. Biomaterials. Biocompatibility. Biochemical processes, biological transport and thermodynamics. Bioelectronics and instrumentation.
 QP: MTH 310 PHY 289BS 210

405*. Biomedical Electronics
 Fall of even-numbered years. 3(3-0)
 Interdepartmental with the Department(s) of Electrical Engineering.
 P: MTH 132, PHY 184.
 Electronic components and circuits. Physiological measurements, transduction of physiological events to electrical signals. Ultrasonic techniques, biomedical applications of lasers, x-ray and magnetic resonance imaging.
 QP: MTH 112 PHY 238 QA: BME 410

424*. Biomaterials and Biocompatibility
 Spring of even-numbered years. 3(3-0)
 Interdepartmental with the Department(s) of Metallurgy, Mechanics, and Materials Science, Metallurgy, Mechanics, and Materials Science.
 P: BME 311, PSL 245
 Materials science of human implantable materials. Design requirements imposed by the body's milieu and the need to protect it.
 QP: PSL 240 ORPSL 430 QA: BME 424

431*. Biological Transport Mechanisms
 Fall of odd-numbered years. 3(3-0)
 Interdepartmental with the Department(s) of Chemical Engineering, Mechanical Engineering.
 P: BME 311 and MTH 235
 Mechanisms which govern transport of momentum, heat and mass. Application to the mathematical description of transport processes in biological systems and to solution of biomedical problems.
 QP: MTH 215 QA: BME 431

441*. Tissue Mechanics
 Spring of odd-numbered years. 3(3-0)
 Interdepartmental with the Department(s) of Metallurgy, Mechanics, and Materials Science, Metallurgy, Mechanics, and Materials Science.
 P: BME 311.
 Application of solid mechanics to understanding mechanical responses of biological tissues. Microstructure and biological function for soft and hard connective tissues and muscle.
 QP: ANT 316 QA: BME 481

491*. Special Topics (MTC)
 Fall, Spring. 3 to 12 credits. May reenroll for a maximum of 12 credits.
 P: BME 311.
 Special topics in biomedical engineering or bioengineering such as biochemical design, occupational biomechanics, biological surface science, or low temperature biotechnology.
 QP: APPROVAL QA: BME 499

491A*. Biomechanical Design
 . 3(3-0)
 P: BME 311, MMM 211, MMM 306.
 Special topics in biomedical engineering or bioengineering of current interest and importance.
 QP: APPROVAL QA: BME 499

491B*. Occupational Biomechanics
 . 3(3-0)
 P: BME 311.
 Special topics in biomedical engineering or bioengineering of current interest and importance.
 QP: APPROVAL QA: BME 499

491C*. Biological Surface Science
 . 3(3-0)
 P: BME 311.
 Special topics in biomedical engineering or bioengineering of current interest and importance.
 QP: APPROVAL QA: BME 499