601. Osteopathic Manipulative Medicine Clerkship
Fall, Spring, Summer. 1 to 20 credits. A student may earn a maximum of 30 credits in all enrollments for this course.
R: Open only to graduate professional students in the College of Osteopathic Medicine upon completion of Units I and II. Required training in the diagnosis of musculoskeletal dysfunction and application of osteopathic manipulative techniques.
QA: BIM 601

620. Directed Studies
Fall, Spring, Summer. 1 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course.
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 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course.
Directed study in topics of biomechanics.
QA: BIM 800

810. Tissue Biomechanics
Fall. 3(2-2)
Integrate concepts of tissue mechanics and microstructure, develop experimental methods to study connective tissue mechanics using engineering principles.
QA: BIM 810, BIM 871

811. Biomechanical Analysis
Fall. 2(2-0)
Methods for analysis of biokinematic and biokinetic data.
QA: BIM 811

812. Experimental and Analytical Biomechanics
Spring. 3(2-2)
P: BIM 811.
Experimental and analytical methods to measure and interpret biomechanics of musculoskeletal system.
QA: BIM 810, BIM 811, BIM 872

813. Kinanthropometry and Biomechanics
Spring. 3(2-2)
P: BIM 811.
Size, position, and mobility of the human body in a mechanical biokinetic system. Detailed study of body joints and kinematic models.
QA: BIM 805 QA: BIM 810, BIM 872

840. Theory of Connective Tissue Mechanics
Spring of odd-numbered years. 22(2-0)
P: BIM 810.
Mechanical properties, chemical content, and anatomical structure in connective tissues.
QA: BIM 812 QA: BIM 812

841. Theory of Neuromuscular Mechanics
Fall of even-numbered years. 22(2-0)
Neurological control of joint mechanics.
QA: BIM 810, BIM 865

842. Theory of Joint Mechanics
Spring. 2(2-0)
P: BIM 811.
Motion and force transmission, and their relationship to anatomical structure and tissue function in joints.
QA: BIM 810 QA: BIM 810, BIM 865

860. Occupational Biomechanics
Fall. 3(2-0)
Applications of biomechanics in ergonomics with emphasis on the whole body.
QA: BIM 810 QA: BIM 810

861. Clinical Biomechanics
Spring of even-numbered years. 3(3-0)
Application of biomechanics to medicine.

890. Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
R: Approval of department. Individual or group work related to biomechanics and/or neuromuscular systems.
QA: BIM 890

895. Experimental Research Methods
Fall, Spring, Summer. 1 to 25 credits. A student may earn a maximum of 25 credits in all enrollments for this course.
QA: BIM 899

BIOMEDICAL ENGINEERING
BME

College of Engineering

311. Introduction to Biomedical Engineering
Fall. 3(3-0) Interdepartmental with Materials Science and Mechanics, Mechanical Engineering, and Electrical Engineering.
P: BSM 111, MTH 235, PHY 184.
QP: MTH 310, PHY 208, BME 210

405. Biomedical Electronics
Fall of even-numbered years. 3(2-0) Interdepartmental until ECE 265.
P: MTH 120, PHY 184.
Electronic components and circuits. Physiological measurements, transduction of physiological events to electrical signals. Ultrasonic techniques, biomedical applications of laser, x-ray and magnetic resonance imaging.
QP: MTH 112, PHY 238 QA: BME 410

424. Biomaterials and Biocompatibility
Spring of odd-numbered years. 3(3-0) Interdepartmental with Materials Science and Mechanics.
P: BME 311, PSL 250.
Materials science of human implants. Design requirements imposed by the body’s milieu and the need to protect the body.
QP: PSL 240, PSL 490 QA: BME 410

435. Biological Transport Mechanisms
Fall of odd-numbered years. 3(3-0) Interdepartmental with Chemical Engineering and Mechanical Engineering.
P: BME 311, MTH 235.
QP: BME 210, MTH 310, MTH 246 QA: BME 431

441. Tissue Mechanics
Spring of even-numbered years. 3(3-0) Interdepartmental with Materials Science and Mechanics.
P: BME 311.
Application of solid mechanics to understanding mechanical responses of biological tissues. Micromechanical 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 15 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
P: BME 311.
Special topics in biomedical engineering or biotechnology such as biochemical design, occupational biomechanics, biological surface science, or low temperature biotechnology.
QA: BME 499

BOTANY AND PLANT PATHOLOGY—Courses

BOTANY AND PLANT PATHOLOGY
BOT

Department of Botany and Plant Pathology
College of Natural Science

195. Plant Biology
Fall, Spring. 3(3-0)
Plant structure, function, development, genetics, diversity and ecology.
QA: BOT 265

206. Plant Biology Laboratory
Fall, Spring. 1(0-3)
P: BOT 165 or concurrent.
Cell structure and function, physiology, growth and development, and diversity of plants.
QA: BOT 206

207. The Form and Evolution of Plants
Spring. 4(2-4)
P: BS 110 or BOT 105.
Divergent and convergent evolution throughout the plant kingdom. Basic principles underlying the structure, function, and reproduction of plants.
QA: BOT 212, BOT 205 QA: BOT 302

213. Plants of Michigan
Fall. 3(3-3)
P: BS 110 or BOT 105.
Plants of Michigan and the Great Lakes region and the major habitats in which they occur. Principles and rational of classification. Relationships between life histories, morphology and environment.
QA: BOT 205, BS 212

301. Introductory Plant Physiology
Fall, Spring. 3(3-3)
P: CEM 141 or CEM 151; CEM 161; BOT 105 or BS 111 or LBS 145.
General principles of plant physiology relating plant structure to function. Cell physiology, water relations, effects of light and temperature, respiration, photosynthesis, mineral nutrition, and hormone action.
QA: CEM 141, CEM 151, CEM 161, BOT 205, BS 216, LBS 141 QA: BOT 301

335. Plants Through Time
Spring. 3(3-3)
P: BS 110 or BS 212 or BOT 105 or GLG 201. R: Juniors and above.
Evolutionary history of plants, the development of ecosystems, and the use of plant fossils in the reconstruction of ancient environments and climate.
QA: BOT 205, BS 212, LBS 140 QA: GUL 325

336. Useful Plants
Spring. 3(3-3)
P: CEM 141 or CEM 151 or CEM 152; BOT 105 or BS 110, LBS 141, LBS 145.
Ways in which plants are used for myriad purposes from food and construction materials to medicines and perfumes. The potential for expanding the uses of plants through biotechnology will be explored.
QA: BOT 205, BS 212 QA: BOT 306

492. Biology of Fungi
Fall. 3(3-3)
P: BS 110, BS 111 or BOT 105 or LBS 140 or MPH 302.
Major groups of fungi: characteristics, habitats and diversity. Significance of fungi in nature and their economic importance.
QA: BOT 205, LBS 140, BS 212 QA: BOT 402, BOT 306

405. Introductory Plant Pathology
Spring. 4(2-4)
P: BS 110, BS 111 or BOT 105 or LBS 140. R: Not open to students with credit in BOT 607.
Important plant diseases and the organisms that cause them. Principles of disease management including application of chemicals, plant breeding, biological control, and genetic engineering.
QA: BOT 302, BS 212, LBS 140 QA: BOT 405