

Descriptions—Biological Science of Courses

158H. Honors Organismal Biology Laboratory

Fall. 2(1-3) Interdepartmental with Lyman Briggs School. Administered by Lyman Briggs School. Not open to students with credit in BS 110 or LBS 144. C: LBS 148H concurrently.

Basic procedures used by organismal biologists, including experimental design and statistical methods. Development and implementation of research projects to test hypotheses in genetics, ecology, and evolution.

159H. Honors Cell and Molecular Biology Laboratory

Spring. 2(1-3) Interdepartmental with Lyman Briggs School. Administered by Lyman Briggs School. Not open to students with credit in BS 111L or LBS 145. C: LBS 149H concurrently.

Basic techniques of cellular and molecular biology including experimental design and hypothesis formulation. Student-initiated projects to test hypothesis-driven projects in biochemistry, molecular biology or genetics.

BIOMEDICAL ENGINEERING

BME

Department of Materials Science and Mechanics College of Engineering

424. Biomaterials and Biocompatibility
Spring of even years. 3(3-0) Interdepartmental with Materials Science and Mechanics. P: (PSL 250 and MSM 250)

Materials science of human implants. Design requirements imposed by the body's milieu and the need to protect the body.

441. Tissue Mechanics

Spring of odd years. 3(3-0) Interdepartmental with Materials Science and Mechanics. P: (MSM 211)

Application of solid mechanics to understanding mechanical responses of biological tissues. Microstructure and biological function for soft and hard connective tissues and muscle.

445. Biomechanical Design

Spring. 3(3-0) Interdepartmental with Materials Science and Mechanics. R: Open only to juniors or seniors in the College of Engineering.

Biomechanical product design with application to people or animals. Synthesis, prototyping, and analysis of designs. Project management. Market research.

SA: BME 491A

491. Special Topics (MTC)

Fall, Spring. 3 to 12 credits. A student may earn a maximum of 12 credits in all enrollments for this course.

Special topics in biomedical engineering or bioengineering such as biochemical design, occupational biomechanics, biological surface science, or low temperature biotechnology.

BIOSYSTEMS ENGINEERING

BE

Department of Agricultural Engineering College of Agriculture and Natural Resources College of Engineering

180. Current Issues in Biosystems

Fall, Spring. 2(2-0) P: MTH 110 or MTH 116. R: Open only to freshmen or sophomores.

The relationship of biosystems engineering to current problems in food production and processing. Environment, natural resources, harvesting, handling, safety, and water quality.

230. Principles of Biosystems Engineering

Fall. 3(3-0) P: MTH 132. R: Open only to sophomores or juniors in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Science.

Concepts of biosystems. Hard and soft systems. Conceptual and computer modeling of components of biosystems.

232. Food Production and Processing Systems

Fall. 1(0-2) R: Open only to students in College of Agriculture and Natural Resources or College of Engineering.

Crop and animal production systems. Food processing systems. Field trips required.

329. Fundamentals of Food Engineering

Spring. 3(3-0) Interdepartmental with Food Science. P: FSC 211, MTH 124, PHY 231. R: Not open to freshmen or sophomores.

Unit operations in food industry: fluid mechanics, heat transfer, rate processes, refrigeration, freezing, and dehydration. Thermal process calculations.

SA: FE 329

336. Machinery Systems for Food Production

Fall. 3(3-0) P: MTH 235.

Processes performed by agricultural production machines. Power systems, tillage mechanics, traction, metering, distribution, conveying, fluidization, mixing, separation, and atomization. Machinery management.

SA: AE 336

337. Machinery Systems for Food Processing

Spring. 3(3-0) P: MTH 235.

Principles of design, operation, and performance of equipment for processing raw materials into finished or intermediate products.

SA: AE 338, FE 338

350. Heat Transfer in Biosystems

Spring. 2(2-0) P: MTH 235; CSE 101 or CSE 131. Not open to students with credit in CHE 311 or ME 410.

Steady state and transient heat conduction. Radiation and convection heat transfer. Heat exchangers. Application problems in biosystems engineering.

351. Environmental Thermodynamics

Spring. 3(3-0) P: MTH 235. Not open to students with credit in CHE 321 or ME 201.

First and Second Laws of Thermodynamics with applications in food, biosystems, and environmental engineering. Refrigeration cycles. Entropy. Thermodynamic aspects of fluid flow. Psychrometrics.

402. Agricultural Climatology

Fall of even years. 3(3-0) Interdepartmental with Geography. Administered by Geography. P: MTH 116. R: Not open to freshmen and sophomores.

Relationships between climate and agriculture in resource assessment, water budget analysis, meteorological hazards, pests, crop-yield modeling, and impacts of global climate change.

SA: AE 402

403. Microclimate and Its Measurement

Fall of odd years. 4(3-3) Interdepartmental with Geography. P: MTH 116 R: Not open to freshmen or sophomores.

The climate near the Earth's surface. Energy balance, thermal radiation exchange, heat fluxes, temperature sensors, wind speed and direction, humidity and evapotranspiration and their measurement.

419. Applications of Geographic Information Systems to Natural Resources Management

Spring. 4(2-4) Interdepartmental with Fisheries and Wildlife; Forestry; Geography; Park, Recreation and Tourism Resources; and Resource Development. Administered by Fisheries and Wildlife. P: (GEO 221)

The application of geographic information systems, remote sensing, and global positioning systems to integrated planning and management for fish, wildlife, and related resources.

430. Power and Control Hydraulics

Spring. 3(2-2) P: CE 321 or CHE 311 or ME 332. R: Open only to majors in College of Engineering.

Hydraulic fluid properties. Pump and motor performance parameters. Control valves and hydraulic circuitry components. Analysis and design of hydraulic systems.

SA: AE 430

431. Resource Optimization

Spring. 3(2-2) P: BE 230, MTH 235 Not open to students with credit in BE 831.

Optimal solutions to problems with multiple and conflicting objectives and constraints. Applications to natural and manufactured biological systems.

438. Design of Machinery Structures

Fall. 3(3-0) P: MSM 211. R: Open only to majors in College of Engineering. Not open to students with credit in ME 471.

Design of structural components and systems in machines. Tension, compression, torsion, bending and combined loadings. Joint connections.

SA: AE 438

443. Restoration Ecology

Spring. 3(2-2) Interdepartmental with Fisheries and Wildlife; Zoology. Administered by Fisheries and Wildlife. P: (CSS 210 or BE 230) and (FOR 404 or FW 364 or ZOL 355)

Principles of ecological restoration of disturbed or damaged ecosystems. Design, implementation, and presentation of restoration plans. Field trips required.