

## Office of the Registrar - Michigan State University

### Course Descriptions: Subject/Course Search Results

[Search Again](#) | [Definitions of Course Characteristics](#)

**Course: BE 101 Introduction to Biosystems Engineering**

**Semester:** Fall of every year

**Credits:** Total Credits: 1 *Lab Hours:* 2  
1(0-2)

**Prerequisite:** (MTH 116 or concurrently) or (MTH 132 or concurrently) or (MTH 152H or concurrently) or (LB 118 or concurrently)

**Description:** Introduction to the profession of biosystems engineering. Case studies of engineering design problems with a biological component. Exploration of career opportunities and ethical framework for the profession.

**Semester Alias:** BE 130

**Effective Dates:** FALL 2008 - Open

**Course: BE 130 Engineering Design Fundamentals for Biological Systems**

**Semester:** Fall of every year

**Credits:** Total Credits: 2 *Lecture/Recitation/Discussion Hours:* 1 *Lab Hours:* 2  
2(1-2)

**Prerequisite:** (MTH 132 or concurrently) or (MTH 114 or concurrently) or (MTH 116 or concurrently) or (LBS 117 or concurrently) or (LBS 118 or concurrently) or MTH 152H

**Description:** Professional and fundamental methods of biosystems engineering. Basic engineering methods. Analysis and design. Interdisciplinary design.

**Effective Dates:** FALL 2001 - FALL 2008

**Course: BE 230 Engineering Analysis of Biological Systems**

**Semester:** Spring of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 3  
3(3-0)

**Prerequisite:** (MTH 132 or MTH 152H or LBS 118) and (BS 110 or concurrently)

**Description:** Biosystems modeling of growth and dynamic interactions. Conservation of mass, and sustainability. Steady-state and stability analysis. Ecological concepts. Life-cycle analysis. Design for environment.

**Effective Dates:** FALL 2005 - Open

[View all versions of this course](#)

**Course: BE 332 Engineering Properties of Biological Materials**

**Semester:** Fall of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 3  
3(3-0)

**Prerequisite:** (BS 111 or PLB 105 or MMG 201) and CE 221

**Corequisite:** BE 333 concurrently

**Description:** Physical, thermal, and electromagnetic properties of biological materials necessary for the design and analysis of processes and equipment in biosystems.

**Effective Dates:** FALL 2006 - Open

[View all versions of this course](#)

**Course: BE 333 Biosystems Engineering Laboratory**

**Semester:** Fall of every year

**Credits:** Total Credits: 1 *Lab Hours:* 3  
1(0-3)

**Prerequisite:** BS 110 or BS 111 or PLB 105 or ENT 205 or MMG 201 or MMG 301 or PSL 250 or ZOL141

**Restrictions:** Open only to students in the Biosystems Engineering major.

**Description:** Measurement of physical, chemical, and biological parameters. Properties that characterize engineered biosystems. Data collection and analysis. Experiment design.

**Effective Dates:** SUMMER 2005 - Open

[View all versions of this course](#)

**Course: BE 350 Heat and Mass Transfer in Biosystems**

**Semester:** Spring of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 3  
3(3-0)

**Prerequisite:** (MTH 235 or MTH 255H or LBS 220) and CSE 131 and ((CE 321 or concurrently) or (CHE 311 or concurrently) or (ME 332 or concurrently) or (CE 321 or concurrently) or (CHE 311 or concurrently) or (ME 332 or concurrently)) and (CEM 143 or concurrently)

**Restrictions:** Open only to students in the College of Engineering.

**Not open to students with**

**credit in:** ME 410

**Description:** Steady state and transient heat conduction. Radiation and convection heat transfer. Heat exchangers. Mass transfer application problems in biosystems engineering.

**Effective Dates:** FALL 2005 - Open

[View all versions of this course](#)

**Course:** BE 351 Environmental Thermodynamics

**Semester:** Fall of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 3  
3(3-0)

**Prerequisite:** (MTH 235 or MTH 255H or MTH 340 or LBS 220) and (BS 111 or MMG 201 or PLB 105)

**Not open to students with**

**credit in:** CHE 321 or ME 201

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

**Effective Dates:** FALL 2005 - SPRING 2009

[View all versions of this course](#)

**Course:** BE 385 Engineering Design and Optimization for Biological Systems

**Semester:** Spring of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 2 *Lab Hours:* 2  
3(2-2)

**Prerequisite:** (BE 101 and (BE 230 or concurrently)) and (MTH 235 or MTH 255H or LB 220) and (BS 111 or LB 145)

**Restrictions:** Open to juniors or seniors in the College of Engineering.

**Description:** Design and optimization techniques applied to engineering problems with biological constraints. Project management. Engineering economics. Linear programming.

**Semester Alias:** BE 431

**Effective Dates:** FALL 2008 - Open

**Course:** BE 402 Agricultural Climatology

**Semester:** Fall of even years

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 3  
3(3-0)

**Prerequisite:** MTH 104 or MTH 110 or MTH 116

**Restrictions:** Not open to freshmen or sophomores.

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

**Interdepartmental With:** Geography

**Administered By:** Geography

**Effective Dates:** FALL 1999 - Open

[View all versions of this course](#)

**Course:** BE 418 Comprehensive Nutrient Management Planning

**Semester:** Fall of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 2 *Lab Hours:* 2  
3(2-2)

**Prerequisite:** CSS 210

**Description:** Comprehensive nutrient management plans (CNMP) for animal feeding operations. Trends in animal production, environmental issues, and diet formulation and their impact on manure production. Development of CNMP for a specific animal feeding operation.

**Interdepartmental With:** Animal Science

**Administered By:** Animal Science

**Effective Dates:** SUMMER 2002 - Open

[View all versions of this course](#)

**Course:** BE 419 Applications of Geographic Information Systems to Natural Resources Management

**Semester:** Spring of every year

**Credits:** Total Credits: 4 *Lecture/Recitation/Discussion Hours:* 2 *Lab Hours:* 4  
4(2-4)

**Prerequisite:** GEO 221

**Description:** Application of geographic information systems, remote sensing, and global positioning systems to integrated planning and management for fish, wildlife, and related resources.

**Interdepartmental With:** Fisheries and Wildlife, Community, Agriculture, Recreation and Resource Studies, Forestry, Geography

**Administered By:** Fisheries and Wildlife

**Effective Dates:** SUMMER 2008 - Open

[View all versions of this course](#)

**Course:** BE 429 Fundamentals of Food Engineering

**Semester:** Spring of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 3  
3(3-0)

**Prerequisite:** FSC 325 and MTH 126 and PHY 231

**Recommended**

**Background:** FSC 211

**Restrictions:** Not open to students in the College of Engineering.

**Description:** Definition and measurement of food properties, thermodynamics, fluid mechanics, heat transfer, and mass transfer.

**Semester Alias:** BE 329

**Interdepartmental With:** Food Science

**Administered By:** Biosystems Engineering

**Effective Dates:** SPRING 2008 - Open

**Course:** **BE 431 Bio-resource Optimization**

**Semester:** Fall of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 2 *Lab Hours:* 2  
3(2-2)

**Prerequisite:** BE 230 and (MTH 235 or MTH 255H or LBS 220)

**Not open to students with**

**credit in:** BE 831

**Description:** Optimal engineering solutions to problems with conflicting objectives and biological constraints. Linear and goal programming, problem formulation, project management, risk and uncertainty.

**Effective Dates:** FALL 2003 - FALL 2008

[View all versions of this course](#)

**Course:** **BE 443 Restoration Ecology**

**Semester:** Spring of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 2 *Lab Hours:* 2  
3(2-2)

**Recommended**

**Background:** (CSS 210 or BE 230) and (FOR 404 or FW 364 or ZOL 355)

**Description:** Principles of ecological restoration of disturbed or damaged ecosystems. Design, implementation, and presentation of restoration plans.

**Interdepartmental With:** Fisheries and Wildlife, Zoology

**Administered By:** Fisheries and Wildlife

**Effective Dates:** FALL 1999 - Open

[View all versions of this course](#)

**Course:** **BE 445 Biosensors for Medical Diagnostics**

**Semester:** Spring of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 3  
3(3-0)

**Prerequisite:** (BS 111 or LB 145) and (CEM 141 or CEM 151) and (ECE 302 or ECE 345)

**Recommended**

**Background:** Biology, chemistry, and electronics

**Restrictions:** Open to juniors or seniors or graduate students in the College of Engineering.

**Not open to students with**

**credit in:** BE 845

**Description:** Biosensors, their components, properties, and associated electronics for applications in medical diagnostics.

**Effective Dates:** FALL 2008 - Open

**Course:** **BE 452 Watershed Concepts**

**Semester:** Fall of every year, Spring of every year, Summer of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 3  
3(3-0)

**Prerequisite:** ESA 324 and ZOL 355

**Recommended**

**Background:** organic chemistry

**Description:** Watershed hydrology and management. The hydrologic cycle, water quality, aquatic ecosystems, and social systems. Laws and institutions for managing water resources.

**Semester Alias:** RD 452

**Interdepartmental With:** Environmental Studies and Agriscience, Crop and Soil Sciences, Forestry, Fisheries and Wildlife

**Administered By:** Environmental Studies and Agriscience

**Effective Dates:** SUMMER 2008 - Open

[View all versions of this course](#)

**Course:** **BE 456 Electric Power and Control**

**Semester:** Spring of every year

**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 2 *Lab Hours:* 2  
3(2-2)

**Prerequisite:** ECE 201 or ECE 345

**Description:** Alternating current circuits, power distribution, electrical machines, protection, and programmable motor controllers. Design project related to food and agricultural industries.

**Semester Alias:** AE 356

**Effective Dates:** SUMMER 2004 - Open

[View all versions of this course](#)

**Course: BE 460 Natural Resource Economics****Semester:** Spring of every year**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 3  
3(3-0)**Prerequisite:** EC 201 and (ESA 302 or EEP 255)**Description:** Economic framework for analyzing natural resource management decisions. Spatial and inter-temporal allocation of renewable and nonrenewable resources. Special emphasis on institutions, externalities, and public interests in resource management.**Semester Alias:** RD 460**Interdepartmental With:** Environmental Studies and Agriscience, Environmental Economics and Policy, Park, Recreation and Tourism Resources**Administered By:** Environmental Studies and Agriscience**Effective Dates:** SUMMER 2007 - Open[View all versions of this course](#)**Course: BE 475 International Studies in Biosystems Engineering****Semester:** Fall of every year, Spring of every year, Summer of every year**Credits:** Variable from 1 to 6**Reenrollment Information:** A student may earn a maximum of 6 credits in all enrollments for this course.**Restrictions:** Approval of department; application required.**Description:** Study abroad emphasizing biosystems and agricultural engineering issues affecting agriculture and natural resources in world, national, and local communities.**Effective Dates:** SUMMER 2007 - Open**Course: BE 477 Food Engineering: Fluids****Semester:** Fall of every year**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 2 *Lab Hours:* 2  
3(2-2)**Prerequisite:** BE 350 and BE 351**Description:** Unit operations, process engineering, equipment, and industrial practices of the food industry. Manufactured dairy products: thermal processing, pipeline design, heat exchange, evaporation, dehydration, aseptic processing, membrane separation, cleaning, and sanitation.**Semester Alias:** FE 465**Interdepartmental With:** Food Science**Administered By:** Biosystems Engineering**Effective Dates:** SUMMER 2006 - Open[View all versions of this course](#)**Course: BE 478 Food Engineering: Solids****Semester:** Spring of every year**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 2 *Lab Hours:* 2  
3(2-2)**Prerequisite:** BE 350 and BE 351**Description:** Analysis and design of unit operations and complete systems for handling, processing, and manufacturing bulk, granular, and solid food products. Material variability and microbial, chemical, and physical hazards.**Effective Dates:** SPRING 2005 - Open**Course: BE 481 Land and Water Conservation Engineering****Semester:** Fall of every year**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 2 *Lab Hours:* 2  
3(2-2)**Prerequisite:** CSE 131 and (CE 321 or CHE 311) and (BE 351 or concurrently)**Description:** Hydrology of small watersheds. Flood routing. Quantifying runoff, infiltration, evapotranspiration. Drainage design. Global Positioning Systems. Geographic Information Systems and applications in engineering projects. Irrigation efficiency.**Semester Alias:** AE 481**Effective Dates:** FALL 2005 - Open[View all versions of this course](#)**Course: BE 482 Non-point Source Pollution Control****Semester:** Spring of every year**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours:* 2 *Lab Hours:* 2  
3(2-2)**Prerequisite:** (BE 481 or CE 421) and BE 350**Description:** Identification, estimation, and control of non-point source pollution from agricultural and urban sources. Geographic Information Systems (GIS) based computer models of watersheds. Engineering design of practices and structures to control non-point source pollution. Development of watershed management plans.**Effective Dates:** FALL 2005 - Open[View all versions of this course](#)

**Course: BE 485 Biosystems Design Techniques****Semester:** Fall of every year**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours: 2 Lab Hours: 2*  
3(2-2)**Prerequisite:** BE 130 and BE 332 and BE 333 and BE 350 and BE 351 and (BE 431 or concurrently) and (STT 351 or concurrently)**Restrictions:** Open to juniors or seniors in the Biosystems Engineering major.**Description:** Engineering design process. Problem identification, analysis, design, modeling, materials, cost estimation, and final specifications. Safety, environmental, and ethical considerations.**Semester Alias:** BE 486**Effective Dates:** SUMMER 2006 - Open[View all versions of this course](#)**Course: BE 487 Biosystems Design Project (W)****Semester:** Spring of every year**Credits:** Total Credits: 3 *Lab Hours: 6*  
3(0-6)**Prerequisite:** (BE 485) and completion of Tier I Writing requirement**Restrictions:** Open to seniors in Biosystems Engineering major.**Description:** Individual or team design project selected in BE 485. Information expansion, development of alternatives, and evaluation, selection, and completion of a design project.**Semester Alias:** AE 488**Effective Dates:** SUMMER 2006 - Open[View all versions of this course](#)**Course: BE 490 Independent Study****Semester:** Fall of every year, Spring of every year, Summer of every year**Credits:** Variable from 1 to 5**Reenrollment Information:** A student may earn a maximum of 5 credits in all enrollments for this course.**Prerequisite:** (BE 230 or BE 350)**Restrictions:** Approval of department; application required.**Description:** Supervised individual student research and study in biosystems engineering.**Semester Alias:** AE 490**Effective Dates:** FALL 2000 - Open[View all versions of this course](#)**Course: BE 491 Special Topics in Biosystems Engineering****Semester:** Fall of every year, Spring of every year, Summer of every year**Credits:** Variable from 1 to 4**Reenrollment Information:** A student may earn a maximum of 12 credits in all enrollments for this course.**Prerequisite:** (BE 230 or BE 331 or BE 350)**Restrictions:** Approval of department.**Description:** Special topics in biosystems engineering.**Semester Alias:** AE 491**Effective Dates:** FALL 2003 - Open[View all versions of this course](#)**Course: BE 815 Instrumentation for Biosystems Engineering****Semester:** Spring of every year**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours: 3*  
3(3-0)**Description:** Theory and techniques of measuring temperature, pressure, flow, humidity, and moisture in biological materials.**Semester Alias:** AE 815**Effective Dates:** SUMMER 2005 - Open[View all versions of this course](#)**Course: BE 820 Research Methods in Biosystems Engineering****Semester:** Fall of every year**Credits:** Total Credits: 1 *Lecture/Recitation/Discussion Hours: 1*  
1(1-0)**Restrictions:** Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering.**Description:** Procedures and methods for designing and executing research projects.**Semester Alias:** AE 820**Effective Dates:** SUMMER 1997 - Open**Course: BE 825 Properties of Biological Materials****Semester:** Fall of every year**Credits:** Total Credits: 3 *Lecture/Recitation/Discussion Hours: 3*  
3(3-0)**Description:** Determination, analysis, and modeling of engineering properties of materials encountered in biological engineering.

<p><b>Effective Dates:</b> SUMMER 2006 - Open</p> <p style="text-align: center;"><b>View all versions of this course</b></p>
<p><b>Course:</b> <b>BE 835 Engineering Analysis and Optimization of Biological Systems</b></p> <p><b>Semester:</b> Fall of every year</p> <p><b>Credits:</b> Total Credits: 3 <i>Lecture/Recitation/Discussion Hours:</i> 3(3-0)</p> <p><b>Recommended Background:</b> Undergraduate degree in an engineering discipline, and one year of biological science.</p> <p><b>Description:</b> Application of quantitative modeling methods to the description, analysis, design, and operation of biological systems. Dimensional analysis. Theory of models. Network design. Life-cycle assessment. Multi-criteria optimization.</p> <p><b>Effective Dates:</b> FALL 2004 - Open</p>
<p><b>Course:</b> <b>BE 845 Biosensor Principles and Applications</b></p> <p><b>Semester:</b> Spring of every year</p> <p><b>Credits:</b> Total Credits: 3 <i>Lecture/Recitation/Discussion Hours:</i> 3(3-0)</p> <p><b>Recommended Background:</b> Knowledge of biology, chemistry, and electronics.</p> <p><b>Description:</b> Nanotechnology-based biosensors, their components, desirable properties, and associated electronics. Applications related to healthcare, biodefense, food and water safety, agriculture, bio-production, and environment. Multidisciplinary interactions necessary for biosensor development.</p> <p><b>Effective Dates:</b> SPRING 2008 - Open</p>
<p><b>Course:</b> <b>BE 852 Systems Modeling and Simulation</b></p> <p><b>Semester:</b> Fall of even years</p> <p><b>Credits:</b> Total Credits: 3 <i>Lecture/Recitation/Discussion Hours:</i> 3(3-0)</p> <p><b>Recommended Background:</b> STT 422 or STT 442 or STT 464 or GEO 463</p> <p><b>Description:</b> General systems theory and concepts. Modeling and simulation methods. Applications of systems approach and techniques to natural resource management, and to ecological and agricultural research.</p> <p><b>Interdepartmental With:</b> Fisheries and Wildlife, Forestry, Resource Development</p> <p><b>Administered By:</b> Fisheries and Wildlife</p> <p><b>Effective Dates:</b> FALL 1996 - Open</p>
<p><b>Course:</b> <b>BE 853 Applied Systems Modeling and Simulation for Natural Resource Management</b></p> <p><b>Semester:</b> Spring of odd years</p> <p><b>Credits:</b> Total Credits: 3 <i>Lecture/Recitation/Discussion Hours:</i> 2 <i>Lab Hours:</i> 2 3(2-2)</p> <p><b>Recommended Background:</b> (FW 820 or BE 486 or ZOL 851) or or approval of department.</p> <p><b>Restrictions:</b> Open only to seniors and graduate students</p> <p><b>Description:</b> Mathematical models for evaluating resource management strategies. Stochastic and deterministic simulation for optimization. System control structures. Team modelling approach.</p> <p><b>Interdepartmental With:</b> Fisheries and Wildlife, Forestry, Resource Development, Zoology</p> <p><b>Administered By:</b> Fisheries and Wildlife</p> <p><b>Effective Dates:</b> SPRING 1997 - Open</p>
<p><b>Course:</b> <b>BE 870 Engineering Methods for Food Safety</b></p> <p><b>Semester:</b> Fall of every year</p> <p><b>Credits:</b> Total Credits: 3 <i>Lecture/Recitation/Discussion Hours:</i> 3(3-0)</p> <p><b>Recommended Background:</b> Undergraduate degree in engineering and/or a functional knowledge of calculus, food microbiology, and basic principles of food engineering.</p> <p><b>Description:</b> Engineering methods for ensuring the safety of processed food products. Emphasis on meeting government regulations for thermal processing and safety of commercially processed products. Predictive models for microbial growth, survival, and inactivation. Applying experimental data and mathematical models for process validation. Statistical methods for process variability, as related to food safety.</p> <p><b>Effective Dates:</b> FALL 2005 - Open</p>
<p><b>Course:</b> <b>BE 890 Special Problems</b></p> <p><b>Semester:</b> Fall of every year, Spring of every year, Summer of every year</p> <p><b>Credits:</b> Variable from 1 to 3</p> <p><b>Reenrollment Information:</b> A student may earn a maximum of 6 credits in all enrollments for this course.</p> <p><b>Restrictions:</b> Approval of department; application required.</p> <p><b>Description:</b> Individual study in biosystems engineering.</p> <p><b>Semester Alias:</b> AE 890</p> <p><b>Effective Dates:</b> SUMMER 1997 - Open</p>
<p><b>Course:</b> <b>BE 891 Advanced Topics in Biosystems Engineering</b></p> <p><b>Semester:</b> Fall of every year, Spring of every year, Summer of every year</p>

**Credits:** Variable from 1 to 3

**Reenrollment Information:** A student may earn a maximum of 6 credits in all enrollments for this course.

**Restrictions:** Open only to seniors and graduate students.

**Description:** Biosystems engineering topics not covered in regular courses.

**Semester Alias:** AE 891

**Effective Dates:** SUMMER 2005 - Open

[View all versions of this course](#)

**Course:** **BE 892 Biosystems Engineering Seminar**

**Semester:** Spring of every year

**Credits:** Total Credits: 1 *Lecture/Recitation/Discussion Hours:* 1  
1(1-0)

**Restrictions:** Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering.

**Description:** Current topics in biosystems engineering.

**Semester Alias:** AE 892

**Effective Dates:** SUMMER 1997 - Open

**Course:** **BE 899 Master's Thesis Research**

**Semester:** Fall of every year, Spring of every year, Summer of every year

**Credits:** Variable from 1 to 10

**Reenrollment Information:** A student may earn a maximum of 99 credits in all enrollments for this course.

**Restrictions:** Open only to master's students in the Biosystems Engineering major.

**Description:** Master's thesis research.

**Semester Alias:** AE 899

**Effective Dates:** SUMMER 1997 - Open

**Course:** **BE 999 Doctoral Dissertation Research**

**Semester:** Fall of every year, Spring of every year, Summer of every year

**Credits:** Variable from 1 to 24

**Reenrollment Information:** A student may earn a maximum of 99 credits in all enrollments for this course.

**Restrictions:** Open only to doctoral students in the Biosystems Engineering major.

**Description:** Doctoral dissertation research.

**Semester Alias:** AE 999

**Effective Dates:** SUMMER 1997 - Open

[Search Again](#) | [Definitions of Course Characteristics](#)