

Biosystems Engineering

Accredited by the Engineering Accreditation Commission of ABET,
 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 – telephone (410) 347-7700.

1. University Requirements (24)

Writing, Rhetoric and American Cultures (WRA)	4
Integrative Studies in Humanities (IAH)	8
Integrative Studies in Social Sciences (ISS)	8
Bioscience: BS 110 Organisms and Populations	4

2. College Requirements (30)

CEM 141 General Chemistry	4
*EGR 100 Introduction to Engineering Design	2
*EGR 102 Introduction to Engineering Modeling	2
MTH 132 Calculus I	3
MTH 133 Calculus II	4
MTH 234 Multivariable Calculus	4
MTH 235 Differential Equations	3
PHY 183 Physics for Scientists & Engineers I	4
PHY 184 Physics for Scientists & Engineers II	4

3. Major Requirements (68-69)

a. Complete all of the following courses:

BE 101 Introduction to Biosystems Engineering	1
BE 230 Engr Analysis of Biological Systems	3
BE 332 Engr Properties of Biological Materials	3
BE 333 Biosystems Engineering Laboratory	1
BE 350 Heat and Mass Transfer in Biosystems	3
BE 351 Thermodynamics for Biological Engr	3
BE 360 Microbial Systems Engineering	3
BE 385 Egr Desn & Optimization for Biological Sys	3
BE 485 Biosystems Design Techniques	3
BE 487 Biosystems Design Project (W)	3
BS 111 Cells and Molecules	3
CE 221 Statics	3
CE 321 Introduction to Fluid Mechanics	4
CEM 143 Survey of Organic Chemistry	4
CEM 161 Chemistry Laboratory I	1
ECE 345 Electronic Instrumentation and Systems	3
STT 351 Probability and Statistics for Engineering	3

b. Select one of the following courses (3-4):

MMG 301 Introductory Microbiology	3
PLB 301 Introductory Plant Physiology	3
PSL 250 Introductory Physiology	4

c. Select one of the following courses (3):

CSS 440 Soil Biophysics	3
FOR 404 Forest and Agricultural Ecology	3
FSC 440 Food Microbiology	3
MMG 425 Microbial Ecology	3
MMG 445 Microbial Biotechnology	3
PSL 425 Physiological Biophysics	3

*EGR 100 and EGR 102 are required for all students matriculating at MSU beginning Fall Semester, 2008. Students who matriculate before Fall 2008 must complete CSE 131 in place of EGR 102.

d. Select three of the following courses (9):

BE 445 Biosensors for Medical Diagnostics	3
BE 456 Electric Power and Control	3
BE 477 Food Engineering: Fluids	3
BE 478 Food Engineering: Solids	3
BE 481 Land & Water Conservation Engineering	3
BE 482 Non-point Source Pollution Control	3

e. Technical Electives (6)

Complete at least 6 credits selected from a list of approved engineering, technical, or science electives available from the academic adviser. Approved courses include, but are not limited to, those listed in the various concentrations/specializations listed below and additional courses from item d above.

Optional Concentrations

The department offers several concentrations for students who wish to focus on a specific application area in the discipline. The concentrations are available to, but not required of, any student enrolled in the Bachelor of Science program in Biosystems Engineering. Courses completed to satisfy requirement 3. above may also be used to satisfy the requirements of a concentration. Upon completion of the required courses for a given concentration, certification will appear on the student's official transcript.

Biomedical Engineering Concentration (14-15)

To earn a Bachelor of Science degree in Biosystems Engineering with a biomedical engineering concentration, students must complete requirements 1., 2., and 3. above and the following:

All of the following courses (9):

BE 445 Biosensors for Medical Diagnostics	3
ME 494 Biofluid Mechanics and Heat Transfer	3
PSL 425 Physiological Biophysics	3

Two courses from the following (5-6):

BLD 204 Mechanisms of Disease	3
BLD 430 Molecular Laboratory Diagnostics	2
BLD 434 Clinical Immunology	3
BLD 450 Eukaryotic Pathogens	3
MSE 425 Biomaterials and Biocompatibility	3
PLB 400 Introduction to Bioinformatics	3

Ecosystems Engineering Concentration (15)

To earn a Bachelor of Science degree in Biosystems Engineering with an ecosystems engineering concentration, students must complete requirements 1., 2., and 3. above and the following:

All of the following courses (9):

BE 481	Land and Water Conservation Engr	3
BE 482	Non-point Source Pollution Control	3
MMG 425	Microbial Ecology	3

Two of the following courses (at least one 400 level) (6):

CE 280	Principles of Env. Engineering and Sci	3
CE 422	Applied Hydraulics	3
CE 487	Microbiology for Env. Sci. and Engineering	3
CSS 210	Fundamentals of Soil Science	3
CSS 440	Soil Biophysics	3
CSS 455	Pollutants in the Soil Environment	3
FW 443	Restoration Ecology	3

Food Engineering Concentration (15-16)

To earn a Bachelor of Science degree in Biosystems Engineering with a food engineering concentration, students must complete requirements 1., 2., and 3. above and the following:

All of the following courses (9):

BE 477	Food Engineering: Fluids	3
BE 478	Food Engineering: Solids	3
FSC 440	Food Microbiology	3

Two of the following courses (at least one 400 level) (6-7):

BMB 200	Introduction to Biochemistry	4
FSC 211	Principles of Food Science	3
FSC 401	Food Chemistry	3
FSC 430	Food Processing: Fruits & Vegetables	3
FSC 431	Food Processing: Cereals	3
FSC 432	Food Processing: Dairy Foods	3
FSC 433	Food Processing: Muscle Foods	3

Other Electives (Variable)**Total Credits Required for Degree****128**

These requirements are effective for students admitted to the Biosystems Engineering major beginning Fall 2008. The Department of Biosystems and Agricultural Engineering (BAE) constantly reviews program requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with his/her adviser to obtain assistance in planning an appropriate schedule of courses. Students who have questions about Biosystems Engineering should contact the Biosystems Engineering Advising Office, 1410 Engineering Building, phone (517) 355-6616 extension 1.

Biosystems Engineering

Sample Program

Freshman Year				Sophomore Year			
Fall	Credits	Spring	Credits	Fall	Credits	Spring	Credits
BE 101	1	BS 111	3	BS 110	4	BE 230	3
CEM 141	4	EGR 102	2	IAH 201-210 (A)	4	CE 221	3
CEM 161	1	ISS 2XX	4	MTH 234	4	CEM 143	4
EGR 100	2	MTH 133	4	PHY 184	4	IAH 2XX (B)	4
MTH 132	3	PHY 183	4			MTH 235	3
WRA 1XX	4						
Total	15	Total	17	Total	16	Total	17

Junior Year				Senior Year			
Fall	Credits	Spring	Credits	Fall	Credits	Spring	Credits
BE 332	3	BE 350	3	BE 485	3	BE 487	3
BE 333	1	BE 360	3	BE Choice D	3	BE Choice D	3
BE 351	3	BE 385	3	Choice C	3	BE Choice D	3
CE 321	4	ECE 345	3	ISS 3XX	4	Tech Elective	3
Choice B	3-4	Tech Elective	3	Elective	3	Elective	2/3
STT 351	3						
Total	17/18	Total	15	Total	16	Total	14/15

PROGRAM EDUCATIONAL OBJECTIVES

The overall purpose of the MSU biosystems engineering undergraduate program is to prepare graduates who will integrate and apply principles of engineering and biology to a wide variety of socially important problems. To achieve that purpose, the primary objectives of the biosystems engineering program are to prepare graduates to:

- identify and solve problems at the interface of biology and engineering, using modern engineering techniques and the systems approach, and
- analyze, design, and control components, systems, and processes that involve critical biological components.

Additionally, the biosystems engineering program is designed to help graduates succeed in diverse careers by developing a professional foundation that includes vision, adaptability, a practical mindset, effective communication skills, the ability to work in cross-disciplinary teams, an appreciation for global, economic, and societal issues, and a commitment to continuing professional growth and ethical conduct.

(Approved by the Biosystems Engineering faculty, student group, and Industry Advisory Board, April 2004)