BIOLOGICAL SYSTEMS ENGINEERING: FOOD AND BIOPROCESS ENGINEERING

Food and bioprocess engineers develop and manage equipment and systems that process and distribute food and other biologically based materials. They are required by the food industry to help develop processes that add value to food products. These processing technologies are designed to improve the storage life and marketability of food products, reduce their transportation costs, handle processing wastes, and develop alternative uses for biological materials. (For example, newspaper and soy flour are used to make the construction material Environ™, and corn stalks can be used to make chemical absorbent pads.)

The food industry makes up one of the largest segments of our nation's economy and continues to enjoy steady growth due to the ever-changing needs of consumers and increased awareness of nutritional and environmental issues. Food and bioprocess engineers play a vital role in meeting this need. From potato chips to microwavable entrees, food and bioprocess engineers continue to develop processes to convert raw materials from the farm to food products for the dining room table.

REQUIREMENTS

REQUIREMENTS

Code	Title	Credits
Major Requirements		
Common Requirements		53
Specialization & Technical Electives		43
Capstone		5
Total Credits		**101**

COMMON REQUIREMENTS

See Major Requirements (https://guide.wisc.edu/undergraduate/agricultural-life-sciences/biological-systems-engineering/biological-systems-engineering-bs/#requirementstext).

FOOD & BIOPROCESS ENGINEERING SPECIALIZATION

This is a named option that will appear on the student's transcript upon completion.

Code	Title	Credits
CHEM 341	Elementary Organic Chemistry (preferred)	3
or CHEM 343	Organic Chemistry I	
M E 361	Thermodynamics [1]	3
or CBE 310	Chemical Process Thermodynamics	
M E 363	Fluid Dynamics [1]	3-4
or CBE 320	Introductory Transport Phenomena	
BSE 364	Engineering Properties of Food and Biological Materials	3
BSE 461	Food and Bioprocessing Operations	3
BSE 464	Heat and Mass Transfer in Biological Systems	3
Complete one of the following BSE breadth courses:		2-3
BSE 301	Land Information Management	
BSE/CIV ENGR/ SOIL SCI 372	On-Site Waste Water Treatment and Dispersal	
BSE 472	Sediment and Bio-Nutrient Engineering and Management	
BSE 473	Water Management Systems	
BSE/M E 475	Engineering Principles of Agricultural Machinery	
BSE/M E 476	Engineering Principles of Off-Road Vehicles	
BSE 571	Small Watershed Engineering	
BSE 305	Introduction to Precision Agriculture	
AN SCI/BSE 344	Digital Technologies for Animal Monitoring	
M E/BSE 474	Fluid Power	
Complete one of the following (see course lists below):		10-11
Bioprocess Engineering Focus Area		
Food Engineering Focus Area		
Total Credits		**30-33**

[1] Take BSE 249 and M E 361 and M E 363, or take CBE 250 and CBE 310 and CBE 320.

Bioprocess Engineering Focus Area

Code	Title	Credits
MICROBIO 102	General Microbiology Laboratory	2
or MICROBIO 304	Biology of Microorganisms Laboratory	
BIOCHEM 501	Introduction to Biochemistry	3
BSE/ENVIR ST 367	Renewable Energy Systems	3
BSE 460	Biorefining: Energy and Products from Renewable Resources	3
Total Credits		**11**

Food Engineering Focus Area

Code	Title	Credits
FOOD SCI 301	Introduction to the Science and Technology of Food	3
FOOD SCI/ MICROBIO 325	Food Microbiology	3
FOOD SCI 532	Integrated Food Manufacturing	4
Total Credits		**10**

TECHNICAL ELECTIVES

See Major Requirements (https://guide.wisc.edu/undergraduate/agricultural-life-sciences/biological-systems-engineering/biological-systems-engineering-bs/#requirementstext).

CAPSTONE

See Major Requirements (https://guide.wisc.edu/undergraduate/agricultural-life-sciences/biological-systems-engineering/biological-systems-engineering-bs/#requirementstext).

FOUR-YEAR PLAN

FOUR-YEAR PLAN

Students must complete at least 125 total credits to be eligible for graduation.

SAMPLE BIOLOGICAL SYSTEMS ENGINEERING FOUR-YEAR PLAN– FOOD AND BIOPROCESS ENGINEERING SPECIALIZATION–BIOPROCESS ENGINEERING FOCUS AREA

First Year

Fall	Credits	Spring	Credits
MATH 221[1]	5	MATH 222	4
CHEM 109[2]	5	BSE 310	3
LSC 100 (or other COMM A)	3	INTEREGR 170	3
Ethnic Studies	3	MICROBIO 101 & MICROBIO 102	5
	16		**15**

Second Year

Fall	Credits	Spring	Credits
BSE 249 or CBE 250	3	BSE 308	1
BSE 270	3	BSE 349	3
MATH 234	4	MATH 320	3
CHEM 341	3	INTEREGR 397 (COMM B)	3
E M A 201	3	PHYSICS 202	5
	16		**15**

Third Year

Fall	Credits	Spring	Credits
M E 361	3	BSE 364	3
BSE/ENVIR ST 367	3	BSE 365	3
BIOCHEM 501	3	BSE 508	2
STAT 324	3	M E 363 or CBE 320	3-4
Humanities	3	Technical Electives	3
		CALS International Studies	3
	15		**17-18**

Fourth Year

Fall	Credits	Spring	Credits
BSE 380	3	BSE 460	3
BSE 461	3	BSE 464	3
BSE 509	3	BSE Breadth Requirement	3
Technical Electives	2-3	Elective Courses	9
Humanities	3		
	14-15		**18**

Total Credits 126-128

1. MATH course dependent on placement score and transfer credit evaluation.
2. If CHEM 103 & CHEM 104 are taken in place of CHEM 109, it is suggested to take CHEM 103 in the fall semester and CHEM 104 in the spring semester of the first year and move MICROBIO 101 & MICROBIO 102 to the first semester of the second year.

SAMPLE BIOLOGICAL SYSTEMS ENGINEERING FOUR-YEAR PLAN– FOOD AND BIOPROCESS ENGINEERING SPECIALIZATION–FOOD ENGINEERING FOCUS AREA

First Year

Fall	Credits	Spring	Credits
MATH 221[1]	5	MICROBIO 101	3
CHEM 109[2]	5	INTEREGR 170	3
LSC 100 (or other COMM A)	3	BSE 310	3
Humanities	3	MATH 222	4
		Ethnic Studies	3
	16		**16**

Second Year

Fall	Credits	Spring	Credits
BSE 249 or CBE 250	3	BSE 308	1
BSE 270	3	BSE 349	3
MATH 234	4	MATH 320	3
CHEM 341	3	PHYSICS 202	5
E M A 201	3	CALS International Studies	3
	16		**15**

Third Year

Fall	Credits	Spring	Credits
FOOD SCI 301	3	BSE 364	3
FOOD SCI/ MICROBIO 325	3	BSE 365	3
BSE 380	3	BSE 508	2
M E 361 or CBE 310	3	M E 363 or CBE 320	3-4
STAT 324	3	Technical Electives	3
	15		**14-15**

Fourth Year

Fall	Credits	Spring	Credits
FOOD SCI 532	4	BSE 464	3
BSE 461	3	Humanities	3
BSE 509	3	BSE Breadth Requirement	3
INTEREGR 397 (COMM B)	3	Technical Elective	3

Technical Electives	3-4 Elective Courses	6
	16-17	**18**

Total Credits 126-128

1 MATH course dependent on placement score and transfer credit evaluation.

2 If CHEM 103 & CHEM 104 are taken in place of CHEM 109, it is suggested to take CHEM 103 in the fall semester and CHEM 104 in the spring semester of the first year, and move BSE 310 to the second year.