

BIOLOGICAL SYSTEMS ENGINEERING, BS

REQUIREMENTS

UNIVERSITY REQUIREMENTS

All undergraduate students must complete both the following Core General Education (Core GenEd) and University Degree and Quality of Work requirements. The requirements below apply to students whose first term at UW-Madison or whose earliest post-high school college attendance at any institution is Summer 2026 or later.

Students whose first term at UW-Madison or whose earliest post-high school college attendance at any institution occurred before Summer 2026 should refer to the archived Guide (<https://guide.wisc.edu/archive/>) for the requirements that apply to them.

CORE GENERAL EDUCATION (CORE GENED) REQUIREMENTS

Civics & Perspectives 3 credits of Civics & Perspectives coursework.

Communication & Literacy 6 credits of Communication & Literacy coursework. This requirement may be partially satisfied by a qualifying placement test score. More information: <https://go.wisc.edu/qualifyingenglishplacement> (<https://go.wisc.edu/qualifyingenglishplacement/>)

Humanities & Arts 6 credits of Humanities & Arts coursework.

Mathematics & Quantitative Reasoning 6 credits of Mathematics & Quantitative Reasoning coursework. This requirement may be partially satisfied by a qualifying placement test score. More information: <https://go.wisc.edu/qualifyingmathplacement> (<https://go.wisc.edu/qualifyingmathplacement/>)

Natural Science & Wellness Complete both:

- 6 credits of Natural Science & Wellness or Natural Science & Wellness + Laboratory coursework.
- one course must be in Natural Science & Wellness + Laboratory coursework.

Social & Behavioral Science 3 credits of Social & Behavioral Science coursework.

Total Credits 30 credits.

For more information see the policy (<https://policy.wisc.edu/library/UW-1095/>).

UNIVERSITY DEGREE AND QUALITY OF WORK REQUIREMENTS

All undergraduate degree recipients must complete the following minimum requirements. Requirements for some programs will exceed these requirements; see program requirements for additional information.

Total Degree 120 degree credits.

Residency Complete 30 credits in residence. A course is considered "in residence" if it is taken when in undergraduate degree-seeking status and:

- is offered by UW-Madison and completed on the UW-Madison campus or at an approved off-site location, or
- is offered by UW-Madison in an online or distance format, or is completed during participation in a UW-Madison study abroad/study away program.

Quality of Work Achieve at least the minimum grade point average specified by the school, college, and/or academic program.

Math Demonstrate minimal mathematics competence by:

- placing above MATH 96, or
- successfully completing MATH 96, or
- successfully completing a more advanced mathematics course such as MATH 112, MATH 113, MATH 114, MATH 141, MATH 211, or MATH 221.

English Language If required to take the UW-Madison English as a Second Language Assessment Test (MSN-ESLAT), demonstrate minimal English language competence by:

- earning credit for ESL 118, or
- achieving a qualifying MSN-ESLAT placement test score.

Language Complete one:

- 2 high school units of a single language other than English, or
- one course with the second semester Language designation.

Major Declaration Declare and complete the requirements for at least one major.

COLLEGE OF AGRICULTURAL AND LIFE SCIENCES REQUIREMENTS

CALS GRADUATION REQUIREMENTS

Cumulative Credits

- Students must earn 120 degree credits.
- Students declared in Biological Systems Engineering BS must earn 125 degree credits.

Quality of Work Students must maintain a minimum cumulative grade point average of 2.000 to remain in good standing and be eligible for graduation.

Residency Students must complete 30 degree credits in residence at UW-Madison after earning 86 credits toward their undergraduate degree.

In addition to the university's general requirements, all undergraduate students in CALS must satisfy a set of college and major requirements. Courses may not double count within university requirements, CALS college requirements, or major requirements. A course may count toward university requirements and a college and/or a major requirement; similarly, a course counted toward college requirements may also be used to satisfy a university and/or a major requirement.

CALS COLLEGE REQUIREMENTS

CALS First-Year Seminar 1 credit. See the full list of eligible courses below or use this link: <https://go.wisc.edu/calsfirstyearseminars> (<https://go.wisc.edu/calsfirstyearseminars/>)

Ethnic Studies 3 credits with the Ethnic Studies designation.

Communication A Complete either:

- 1 course with the Communication A designation, or
- satisfaction of Communication A based on UW Placement Test.

Quantitative Reasoning A Complete either:

- 1 course with the Quantitative Reasoning A designation, or
- satisfaction of Quantitative Reasoning A based on UW Placement Test.

Introductory Chemistry Complete one:

- CHEM 103
- CHEM 108
- CHEM 109

CALS International Comparisons 3 credits. See the full list of eligible courses below or use this link: <https://go.wisc.edu/calsinternationalcomparisons> (<https://go.wisc.edu/calsinternationalcomparisons/>)

Communication B 1 course with the Communication B designation.

Quantitative Reasoning B 1 course with the Quantitative Reasoning B designation.

Biological Science 5 credits with the Biological Science designation.

Additional Science 3 credits with the Biological, Physical, or Natural Science designations.

Science Breadth 3 credits with the Biological, Physical, Natural, or Social Science designations.

Humanities 6 credits with the Humanities or Literature designation.

Social Sciences 3 credits with the Social Sciences designation.

Capstone Learning Experience Each major articulates the required capstone learning experience.

CALS First-Year Seminars

Code	Title	Credits
AN SCI 135	Grand Challenges and Career Opportunities in Animal and Dairy Sciences	1
BIOCHEM 100	Biochemistry First-Year Seminar	1
COUN PSY 125	The Wisconsin Experience Seminar	1
F&W ECOL 101	Orientation to Wildlife Ecology	1
F&W ECOL 105	Environment, Pollutants, and You	3
GENETICS 155	Freshman Seminar in Genetics	1
INTEGSCI 100	Exploring Biology	2
INTEGSCI 140	Exploring Service in STEM	1
INTER-AG 155	Issues in Agriculture, Environment, and Life Sciences	1

LSC 155	First-Year Seminar in Science Communication	1
MICROBIO 150	Microbiomes and Microbiology - First-Year Seminar	1
PLANTSCI/AGROECOL 100	First-Year Seminar in Agroecology and Plant Science	1
PL PATH 155	Food Frontlines: Security, Sustainability, and Survival	1
SOIL SCI 155	First-year Seminar in Soil and Environmental Sciences	1

Learning Community/Student Group Courses

The following learning community/student group courses are approved as CALS First-Year Seminars.

COUN PSY 117	PEOPLE First Year Seminar	1
INTEGSCI 110	BioHouse Seminar: Biology for the 21st Century	1
INTER-AG 117	GreenHouse Roots Seminar	1
INTER-AG 140	CALS QuickStart: Foundations	1
INTER-AG 175	WISE Seminar	1

CALS International Comparisons

Code	Title	Credits
The 3 credit requirement may be fulfilled as either a stand-alone 3 credit course or as a set of courses as listed below.		
A A E/ENVIR ST 244	The Environment and the Global Economy	4
A A E 319	The International Agricultural Economy	3
A A E/NUTR SCI 350	World Hunger and Malnutrition	3
A A E 352	Global Health: Economics, Natural Systems, and Policy (approved for enrollments Summer 2021 and later)	4
A A E/INTL ST 373	Globalization, Poverty and Development	3
A A E/INTL ST 374	The Growth and Development of Nations in the Global Economy	3
A A E/ECON 473	Economic Growth and Development in Southeast Asia	3
A A E/ECON 474	Economic Problems of Developing Areas	3
A A E/ECON/INTL BUS 462	Latin American Economic Development	3
A A E/ECON 477	Agricultural and Economic Development in Africa	3
AGROECOL 377	Global Food Production and Health	3
AN SCI/DY SCI 370	Livestock Production and Health in Agricultural Development	3
ASIAN/HISTORY/POLI SCI 255	Introduction to East Asian Civilizations (approved for enrollments Summer 2021 and later)	3-4
C&E SOC/SOC 341	Labor in Global Food Systems (approved for enrollments Summer 2020 and later)	3
C&E SOC/ENVIR ST/SOC 540	Sociology of International Development, Environment, and Sustainability	3

CSCS 500	Global Health and Communities: From Research to Praxis	3
DY SCI 471	Food Production Systems and Sustainability	3
ENTOM/ ENVIR ST 201	Insects and Human Culture—a Survey Course in Entomology	3
ENTOM/ ENVIR ST 205	Our Planet, Our Health (approved for enrollments Fall 2026 and later)	3
ENTOM/ ZOOLOGY 371	Medical Entomology: Biology of Vector and Vector-borne Diseases	3
F&W ECOL/ ENVIR ST 100	Forests of the World (approved for enrollments Summer 2020 and later)	3
F&W ECOL/ ENVIR ST/ ZOOLOGY 360	Extinction of Species	3
LSC 251	Science, Media and Society (approved for enrollments Summer 2020 and later)	3
PL PATH/ BOTANY 123	Plants, Parasites, and People	3
PL PATH 311	Global Food Security	3
PLANTSCI 370	World Vegetable Crops	3
The following study abroad courses fulfill the CALS International Comparisons requirement. Only the specific course numbers and titles listed, including Topics titles (in parentheses), are approved to meet the CALS International Comparisons requirement.		
BIOCHEM 307	Study Abroad: Introduction to Biological Sciences Research in Japan (approved for enrollments Fall 2026 and later)	3
NUTR SCI/INTER- AG 421	Global Health Field Experience (UW Mobile Clinics and Health Care in Uganda)	3
INTER-AG 321 & INTER-AG/ NUTR SCI 421	Study Abroad Pre-Departure Seminar and Global Health Field Experience (UW Global Health Community Health and Asset-Based Community Development in Sri Lanka)	3
INTER-AG 321 & INTER-AG/ NUTR SCI 421	Study Abroad Pre-Departure Seminar and Global Health Field Experience (UW Agriculture, Health and Nutrition in Uganda)	3
INTER-AG/ NUTR SCI 421	Global Health Field Experience (UW Health, Education and Tanzanian Culture)	3

NAMED OPTIONS WITHIN THE MAJOR

Students may complete the Biological Systems Engineering General Program or select a Named Option. The course requirements on this page represent the general program. Students are encouraged to consider one of the Named Options (Food and Bioprocess Engineering; Machinery Systems Engineering; or Ecological and Environmental Engineering). Links

to learn more about these options, including the course requirements, are included below.

View as listView as grid

- **BIOLOGICAL SYSTEMS ENGINEERING: ECOLOGICAL AND ENVIRONMENTAL ENGINEERING ([HTTPS://GUIDE.WISC.EDU/UNDERGRADUATE/AGRICULTURAL-LIFE-SCIENCES/BIOLOGICAL-SYSTEMS-ENGINEERING/BIOLOGICAL-SYSTEMS-ENGINEERING-BS/BIOLOGICAL-SYSTEMS-ENGINEERING-ECOLOGICAL-ENVIRONMENTAL-ENGINEERING-BS/](https://guide.wisc.edu/undergraduate/agricultural-life-sciences/biological-systems-engineering/biological-systems-engineering-bs/biological-systems-engineering-ecological-environmental-engineering-bs/))**
- **BIOLOGICAL SYSTEMS ENGINEERING: FOOD AND BIOPROCESS ENGINEERING ([HTTPS://GUIDE.WISC.EDU/UNDERGRADUATE/AGRICULTURAL-LIFE-SCIENCES/BIOLOGICAL-SYSTEMS-ENGINEERING/BIOLOGICAL-SYSTEMS-ENGINEERING-BS/BIOLOGICAL-SYSTEMS-ENGINEERING-FOOD-BIOPROCESS-ENGINEERING-BS/](https://guide.wisc.edu/undergraduate/agricultural-life-sciences/biological-systems-engineering/biological-systems-engineering-bs/biological-systems-engineering-food-bioprocess-engineering-bs/))**
- **BIOLOGICAL SYSTEMS ENGINEERING: MACHINERY SYSTEMS ENGINEERING ([HTTPS://GUIDE.WISC.EDU/UNDERGRADUATE/AGRICULTURAL-LIFE-SCIENCES/BIOLOGICAL-SYSTEMS-ENGINEERING/BIOLOGICAL-SYSTEMS-ENGINEERING-BS/BIOLOGICAL-SYSTEMS-ENGINEERING-MACHINERY-SYSTEMS-ENGINEERING-BS/](https://guide.wisc.edu/undergraduate/agricultural-life-sciences/biological-systems-engineering/biological-systems-engineering-bs/biological-systems-engineering-machinery-systems-engineering-bs/))**

MAJOR REQUIREMENTS

Code	Title	Credits
Major Requirements		
Common Requirements		53
General Program Classes and Technical Electives		43
Capstone		5
Total Credits		101

COMMON REQUIREMENTS

The Biological Systems Engineering program requires completion of a minimum of 125 credits to be eligible for graduation. Note that this is higher than the minimum for other CALS programs.

Code	Title	Credits
Mathematics and Statistics		
MATH 221	Calculus and Analytic Geometry 1	5
MATH 222	Calculus and Analytic Geometry 2	4
MATH 234	Calculus--Functions of Several Variables	4
MATH 319	Techniques in Ordinary Differential Equations	3

or MATH 320	Linear Algebra and Differential Equations	
STAT 324	Introduction to Statistics for Science and Engineering	3

Chemistry

Complete one of the following: 5-9

CHEM 109	Advanced General Chemistry (Recommended)	
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	

Biology

BSE 349	Quantitative Techniques for Biological Systems	3
---------	--	---

Complete one additional Biological Science Breadth Course; the following courses are preferred choices: 2-5

BIOLOGY/ BOTANY/ ZOOLOGY 151	Introductory Biology	
ZOOLOGY 153	Introductory Biology	
BIOLOGY/ BOTANY 130	General Botany	
BIOLOGY/ ZOOLOGY 101	Animal Biology	
AN SCI/ DY SCI 101	Introduction to Animal Sciences	
MICROBIO 101	General Microbiology	
MICROBIO 303	Biology of Microorganisms	
PLANTSCI 110	Introduction to Plant Science and Technology	

Physics

E M A 201	Statics	3
PHYSICS 202	General Physics	5

Foundation

BSE 270	Introduction to Computer Aided Design	3
BSE 380	Introductory Data Science for the Agricultural and Life Sciences	3
BSE 310	Project Economics & Decision Analysis (preferred)	3
or I SY E 313	Engineering Economic Analysis	

Core

BSE 249	Engineering Principles for Biological Systems	3
or CBE 250	Process Synthesis	
BSE 365	Measurements and Instrumentation for Biological Systems	3
BSE 308	Career Management for Engineers	1

Total Credits 53-60

GENERAL PROGRAM REQUIREMENTS

Code	Title	Credits
M E 361	Thermodynamics	3
or CBE 310	Chemical Process Thermodynamics	

BSE 464	Heat and Mass Transfer in Biological Systems	3
E M A 303	Mechanics of Materials	3
Complete one of the following courses:		3-4
M E 363	Fluid Dynamics	
CIV ENGR 310	Fluid Mechanics	
CBE 320	Introductory Transport Phenomena	
Complete a minimum of three of the following:		6-9
BSE 301	Land Information Management	
BSE 364	Engineering Properties of Food and Biological Materials	
BSE/ ENVIR ST 367	Renewable Energy Systems	
BSE/CIV ENGR/ SOIL SCI 372	On-Site Waste Water Treatment and Dispersal	
BSE 405	Artificial Intelligence in Agriculture	
BSE 460	Biorefining: Energy and Products from Renewable Resources	
BSE 461	Food and Bioprocessing Operations	
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	
M E/BSE 474	Fluid Power	
AN SCI/BSE 344	Digital Technologies for Animal Monitoring	
BSE 305	Introduction to Precision Agriculture	
BSE 571	Small Watershed Engineering	
Complete a minimum of 9 credits of coursework numbered 300 or above non-BSE engineering courses		9

Total Credits 27-31

TECHNICAL ELECTIVES

Select courses from one or more of the following four technical elective categories to bring the total number of credits in the General Program Area or in the selected specialization area to 43.

A. INTRODUCTION TO ENGINEERING COURSES

Code	Title	Credits
INTEREGR 170	Design Practicum	3

B. INDEPENDENT STUDY/INSTRUCTION COURSES

CALS or CoE courses with a 001, 299, 399, or 699 course number. No more than 3 credits of coursework in this category can be used to meet technical elective requirements.

C. UPPER-LEVEL COURSES

Part 1. Upper-Level Engineering Courses

This includes BSE courses not taken to meet other curricular requirements. This does not include independent study/instruction courses.

Code	Title	Credits
Any Engineering course numbered 300 or above		
E M A 202	Dynamics	3

Part 2. Upper-Level Science Courses

This includes BSE courses not taken to meet other curricular requirements. This does not include independent study/instruction courses.

Code	Title	Credits
Advanced biological, natural, and physical science courses (i.e., courses with a B, N, or P designation)		
CHEM 341	Elementary Organic Chemistry	3
CHEM 342	Elementary Organic Chemistry Laboratory	1
CHEM 343	Organic Chemistry I	3
CHEM 344	Introductory Organic Chemistry Laboratory	2
CHEM 345	Organic Chemistry II	3
CHEM/M S & E 421	Polymeric Materials	3
PLANTSCI/ ATM OCN 532	Environmental Biophysics	3

D. LOWER-LEVEL SCIENCE AND ENGINEERING COURSES, BREADTH COURSES

Elementary and intermediate biological, natural, and physical science courses except elementary and intermediate math courses; College of Engineering courses numbered 100 through 299; College of Agricultural and Life Sciences courses, Institute of Environmental Studies courses, and/or School of Business courses. Independent study/instruction courses cannot be counted in this category. No more than 12 credits of coursework in this category can be used to meet technical elective requirements.

CAPSTONE

Code	Title	Credits
BSE 508	Biological Systems Engineering Design Practicum I	2
BSE 509	Biological Systems Engineering Design Practicum II	3
Total Credits		5