BIOLOGY IN ENGINEERING FOR ENGINEERING MAJORS, CERTIFICATE

The biology in engineering certificate (BEC) is designed for engineering students who want to strengthen their biology backgrounds. It is offered especially to encourage engineering students in traditional disciplines to prepare themselves to understand the special engineering problems in biology, medicine, public health, and environmental health. A student successfully fulfilling the requirements will have the notation "Certificate for Biology in Engineering for Engineering Majors" added to the transcript.

HOW TO GET IN

HOW TO GET IN

The Certificate for Biology in Engineering for Engineering Majors was designed and is administered by a Biology in Engineering Certificate Committee composed of faculty from multiple engineering disciplines. Students normally should begin the program during their sophomore or junior year, but seniors may also apply.

Prerequisites to enter the certificate program:

- Prior admission to an engineering BS degree program (http://guide.wisc.edu/undergraduate/engineering/#degreesmajorscertificatestext) or Biological Systems Engineering (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/biological-systems-engineering/biological-systems-engineering-bs/) through the College of Agricultural and Life Sciences (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/) at the UW-Madison.
- Students pursuing an undergraduate degree at UW-Madison need to have completed at least one intermediate-level (minimum 200-level) engineering course.

Click here (https://go.wisc.edu/bme-bec-application/) for certificate application.

REQUIREMENTS

REQUIREMENTS

The certificate requires a minimum of 15 credits.

GENERAL BIOLOGY: 5 CREDITS

Choose one from one of the following options.

Code	Title	Credits
BIOCORE 381 & BIOCORE 382	Evolution, Ecology, and Genetics and Evolution, Ecology, and Genetics Laboratory	5
BIOCORE 383 & BIOCORE 384	Cellular Biology and Cellular Biology Laboratory	5
MICROBIO 101 & MICROBIO 102	General Microbiology and General Microbiology Laboratory	5
ZOOLOGY/ BIOLOGY 101 & ZOOLOGY/ BIOLOGY 102	Animal Biology and Animal Biology Laboratory	5
ZOOLOGY/ BIOLOGY/ BOTANY 151	Introductory Biology	5
ZOOLOGY/ BIOLOGY/ BOTANY 152	Introductory Biology	5
ZOOLOGY 153 & BIOLOGY/ ZOOLOGY 102	Introductory Biology and Animal Biology Laboratory	5
ZOOLOGY 153 AND choose 2 additional credits from the advanced biology course list below		5

ADVANCED BIOLOGY: 5 CREDITS MINIMUM

Recommended to choose a lecture/lab combination as outlined below, but any combination of courses is acceptable.

Code	Title	Credits
ANAT&PHY 335	Physiology	5
ANAT&PHY 435	Fundamentals of Human Physiology	5
BIOCORE 485 & BIOCORE 486	Principles of Physiology and Principles of Physiology Laboratory	5
BIOCHEM 501	Introduction to Biochemistry	3
BIOCHEM 507	General Biochemistry I	3
BIOCHEM 508	General Biochemistry II	3-4
BIOCHEM 551	Biochemical Methods	4
BIOCORE 587	Biological Interactions	3
GENETICS 466 & GENETICS 545	Principles of Genetics and Genetics Laboratory	5
GENETICS/ MD GENET 662	Cancer Genetics	3
MICROBIO 303 & MICROBIO 304	Biology of Microorganisms and Biology of Microorganisms Laboratory	5
MICROBIO/ FOOD SCI 324 & MICROBIO/ FOOD SCI 325	Food Microbiology Laboratory and Food Microbiology	5
M M & I 301	Pathogenic Bacteriology	2
M M & I 341	Immunology	3
M M & I/PATH-BIO 528	Immunology	3
M M & I/ BIOCHEM 575	Biology of Viruses	2
ZOOLOGY/ ENVIR ST 315 & ZOOLOGY 316	Limnology-Conservation of Aquatic Resources and Laboratory for Limnology-Conservation of Aquatic Resources	4-5

ZOOLOGY/ENTOM/ M M & I/PATH-BIO 350	Parasitology	3
ZOOLOGY/ ANTHRO/ BOTANY 410	Evolutionary Biology	3
ZOOLOGY 430	Comparative Anatomy of Vertebrates	5
ZOOLOGY 470 & ZOOLOGY 555	Introduction to Animal Development and Laboratory in Developmental Biology	6
ZOOLOGY/ ENVIR ST 510 & ZOOLOGY/ ENVIR ST 511	Ecology of Fishes and Ecology of Fishes Lab	5
ZOOLOGY/ PSYCH 523	Neurobiology	3
ZOOLOGY 570	Cell Biology	3
ZOOLOGY 611 & ZOOLOGY 612	Comparative and Evolutionary Physiology and Comparative Physiology Laboratory	5

BIOLOGY IN ENGINEERING: 3 CREDITS MINIMUM

Choose from the following courses:

Code	Title	Credits
B M E/M E 414	Orthopaedic Biomechanics - Design of Orthopaedic Implants	3
B M E/M E 415	Biomechanics of Human Movement	3
B M E/PHM SCI 430	Biological Interactions with Materials	3
B M E/E C E 462	Medical Instrumentation	3
B M E/E C E 463	Computers in Medicine	3
B M E/M E 505	Biofluidics	3
B M E 510	Introduction to Tissue Engineering	3
B M E/M E 516	Finite Elements for Biological and Other Soft Materials	3
B M E 520	Stem Cell Bioengineering	3
B M E 545	Engineering Extracellular Matrices	3
B M E 550	Introduction to Biological and Medical Microsystems	3
B M E/M E 615	Tissue Mechanics	3
B M E/MED PHYS/ PHMCOL-M/PHYSICS/ RADIOL 619	Microscopy of Life	3
BSE 249	Engineering Principles for Biological Systems	3
BSE 349	Quantitative Techniques for Biological Systems	3
BSE 364	Engineering Properties of Food and Biological Materials	3
BSE 365	Measurements and Instrumentation for Biological Systems	3
CBE/B M E 560	Biochemical Engineering	3
CIV ENGR 320	Environmental Engineering	3
CIV ENGR 322	Environmental Engineering Processes	3
CIV ENGR/ M&ENVTOX/ SOIL SCI 631	Toxicants in the Environment: Sources, Distribution, Fate, & Effects	3
COMP SCI/ B M I 576	Introduction to Bioinformatics	3
E C E 542	Introduction to Microelectromechanical Systems	3
I SY E/B M E 564	Occupational Ergonomics and Biomechanics	3
M S & E 553	Nanomaterials & Nanotechnology	3

SEMINAR: 1 CREDIT

Code	Title	Credits
B M E 517	Biology in Engineering Seminar	1

CERTIFICATE COMPLETION REQUIREMENT

This undergraduate certificate must be completed concurrently with the student's undergraduate degree. Students cannot delay degree completion to complete the certificate.

LEARNING OUTCOMES

LEARNING OUTCOMES

1. Develop an understanding of basic biology and a selected area of advanced biology.
2. Develop an understanding of the challenges in biology, medicine, public health, and environmental health that are currently being addressed by engineering research and development.
3. Demonstrate proficiency in the application of engineering principles to solve problems in the field based on biological principles.

ADVISING AND CAREERS

ADVISING AND CAREERS

(Contact the advisor from your home department or the Chair)

CHAIR AND CERTIFICATE ADMINISTRATION - BIOMEDICAL ENGINEERING

Professor John Puccinelli
2132 Engineering Centers Building
john.puccinelli@wisc.edu
(608) 890-3573

BIOLOGICAL SYSTEMS ENGINEERING

Professor Anita Thompson
232B Agricultural Engineering Building
amthompson2@wisc.edu
(608) 262-0604

CHEMICAL AND BIOLOGICAL ENGINEERING

Professor John Yin
3172 Wisconsin Institutes for Discovery
john.yin@wisc.edu

(608) 316-4323

CIVIL AND ENVIRONMENTAL ENGINEERING

Professor Katherine McMahon
5552 Microbial Sciences Building
tmcmahon@engr.wisc.edu (trina.mcmahon@wisc.edu)
(608) 890-2836

ELECTRICAL AND COMPUTER ENGINEERING

Professor Daniel van der Weide
1439 Engineering Hall
danvdw@engr.wisc.edu
(608) 265-6561

INDUSTRIAL AND SYSTEMS ENGINEERING

Professor Robert Radwin
2106 Engineering Centers Building
rradwin@wisc.edu
(608) 263-6596

MATERIALS SCIENCE AND ENGINEERING

Professor Padma Gopalan
1143 Engineering Research Building
pgopalan@wisc.edu
(608) 265-4258

MECHANICAL ENGINEERING

Professor Corinne Henak
3031 Mechanical Engineering
chenak@wisc.edu
(608) 263-1619

NUCLEAR ENGINEERING AND ENGINEERING PHYSICS

Professor and Chair Paul Wilson
paul.wilson@wisc.edu
(608) 262-8384