

# Cornell Engineering

## Department of Biological and Environmental Engineering

### BIOLOGICAL ENGINEERING UNDERGRADUATE DEGREE PROGRAM

The biological revolution of this century has given rise to a growing demand for engineers who can tackle local, national, and global challenges by combining the power of engineering principles with the constantly evolving science of biology. To solve the daunting problems confronting society today, engineers need strong math and science skills, effective communication abilities, and an appreciation for the scope and complexity of the challenges they are facing.

If you have a strong aptitude for the sciences and math and an interest in solving engineering problems that relate to living systems, biological engineering (BE) at Cornell is definitely worth investigating. The field places you at the intersection of three great challenges facing humanity today:

**BREAK  
THE RULES to  
EXPLORE NEW  
WAYS to HELP  
HUMANITY**

protecting and remediating Earth's natural resources, including water, soil, air, and energy;

ensuring an adequate and safe food supply in an era of expanding world population, and;

developing engineering systems that monitor or intervene in the mechanisms of living organisms (micro-organisms, plants, and animals) and ecosystems.

You can focus your studies in biomaterials, nanobiotechnology, ecological and microbial systems, computational biological engineering, synthetic biology, molecular and cellular systems, and/or sustainability.

You will take courses in basic and advanced biology, chemistry, mathematics, physics, computing, design, engineering applications, and fundamental engineering sciences (fluid mechanics, solid mechanics, thermodynamics, and transport processes).

Depending upon your interests, you will choose advanced BE courses in areas such as biomaterials, bioprocessing, bioinstrumentation, biotechnology applications, engineering ethics, computer-aided design, renewable energy systems, and watershed engineering. You will also select other courses in the College of Engineering that strengthen to your academic focus area or allow you to pursue any of the engineering minors.

Planning to go to medical school? You will find an excellent fit between your required pre-med courses and the BE major. With proper planning, you can complete the biomedical minor at the same time.

#### BE REQUIRED COURSES

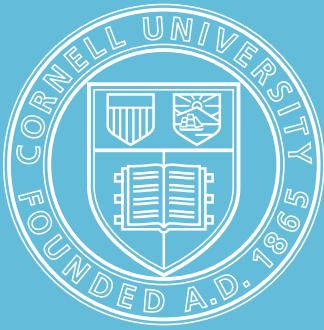
CS 11XX	Introduction to Computing
BEE 2510	Process for Environmental Sustainability
or	
BEE 2600	Principles of Biological Engineering
BEE 3400	Design and Analysis of Biomaterials
BEE 3310	Bio-Fluid Mechanics
BEE 3500	Heat and Mass Transfer in Biological Engineering
BEE 3600	Molecular & Cellular Bioengineering
BEE 4500	Bioinstrumentation
BIOG 1XXX	Intro Bio Lecture + Lab
and	
BIO 33XX	Biochemistry
CEE 3040	Uncertainty Analysis in Engineering
or	
ENGRD 2700	Basic Engineering Probability & Statistics
CHEM 1570	Introduction to Organic and Biological Chemistry
or	
CHEM 3570	Organic Chemistry for the Life Sciences
ENGRD 2020	Statics and Mechanics of Solids
BEE 2220	Bioengineering Thermodynamics and Kinetics
or	
ENGRD 2210	Thermodynamics



**BIOLOGICAL ENGINEERING**

## SOME AREAS OF FACULTY RESEARCH

- biological transport processes
- biomaterials design
- bioprocess engineering
- bioremediation
- biosensors and instrumentation
- cellular engineering
- controlled environment agriculture and aquaculture
- ecosystem management and pollution control
- environmental systems analysis
- food processing engineering
- international development
- microbial fuel cells
- microbial soil dynamics
- nanoscale bioengineering
- soil and water engineering
- sustainable energy systems



Cornell University is an equal-opportunity affirmative-action educator and employer. Produced by the Office of Engineering Admissions.

The BE major emphasizes developing communication and teamwork skills. As an undergraduate, you may engage in research, work as a teaching assistant, compete as a member of an engineering student-design team, complete an engineering co-op or internship, or study abroad.

Graduates pursue career opportunities in private industry, public agencies, and educational institutions. Recent graduates are working in biotechnology and at companies that focus on food, energy and consumer products, environmental consulting, international projects, public health and the pharmaceutical industry. Roughly one-third of the bachelor-level graduates pursue advanced study in engineering, science, business, or law.

The BE degree program is accredited by the Accreditation Board for Engineering and Technology and graduates may become registered professional engineers through formal examination and professional employment.

## MASTER OF ENGINEERING DEGREE PROGRAM

The one-year master of engineering (M.Eng.) degree will prepare you to hit the ground running and stand out in the career of your choice.

The M.Eng. program in the graduate field of Biological and Environmental Engineering (BEE) is flexible, allowing candidates to select their courses and project area to meet their individual goals.

M.Eng. candidates in the field of BEE choose their design project and complete appropriate courses in one of the following areas: bioenergetics and stress factors, biomechanics, controlled-environment agriculture, energy systems engineering, engineering to solve global challenges, food process engineering, metabolic engineering, micro-bioreactors, microbial fuel cells, molecular engineering, nucleic acid engineering, physiological engineering, and soil and water engineering.

## BE SAMPLE ELECTIVE COURSES

BEE 3299	Sustainable Development
BEE 3710	Physical Hydrology for Ecosystems
BEE 4010	Renewable Energy Systems
BEE 4110	Hydrologic Engineering in a Changing Climate
BEE 4150	Engineering Ethics and Professional Practice
BEE 4530	Computer-Aided Engineering: Applications to Biological Processes
BEE 4550	Biologically Inspired Microsystems Engineering
BEE 4570	Biorobotics
BEE 4600	Deterministic & Stochastic Modeling in Biological Engineering
BEE 4640	Bioseparation Processes
BEE 4730	Watershed Engineering
BEE 4750	Environmental Systems Analysis
BEE 4870	Sustainable Bioenergy Systems
BEE 4880	Applied Modeling & Simulation for Renewable Energy Systems
BEE 4890	Entrepreneurial Management for Engineers
BEE 5330	Engineering Professionalism

## BE By the Numbers

Biological Engineering undergraduate students 223

College of Engineering 19

College of Agriculture & Life Sciences 204

Biological and Environmental Engineering graduate students 55

Starting salaries of B.S. Biological Engineering graduates (for 2018)

Low \$28,000

Median \$57,080

High \$85,000

**bee.cornell.edu**