

# Bioengineering & Biological Engineering – What is the difference?

Penn State offers two programs in the College of Engineering that have similar sounding names. Both combine engineering and biological sciences and have many similarities, yet have a quite different focus. This information is being provided so a student can decide if Biological Engineering is a good choice as an alternative to the Bioengineering program.

## **Bioengineering:**

The application of engineering skills and analysis to innovation in the health care industry and to quantitative understanding of biological systems. Bioengineers develop new medical devices, design diagnostic and therapeutic tools, and model physiological systems.

## **Biological Engineering:**

The application of engineering skills and analysis to developing products utilizing biological processes, including pharmaceutical products, food supplements, preservatives, bio-nanotechnology, and biomass-based energy. Biological Engineering also includes machinery development, protecting the environment from erosion and pollution, and structural design.

Students in the Biological Engineering major choose from one of three options:

### Food and Biological Process Engineering option

Microbiological engineering, Food processing, Bio-energy

### Agricultural Engineering option

Power and machinery, Structural design and analysis

### Natural Resource Engineering option

Stormwater management, Stream restoration, Bioremediation

# Program Comparison

The curriculum of both programs require courses that are common and can be used for either program. Certain first year and sophomore year courses that are unique to Bioengineering can still be used if a student switches to the Biological Engineering major, which has a great deal of flexibility in using credits from other engineering programs. This is illustrated in the two tables below:

<b>First and second year courses that are common to both programs</b>	
ENGL 15 – Composition & Rhetoric	ECON 2, 4 – Economic Principles
CHEM 110 – Chemical Principles I	First Year Seminar
CHEM 111 – Experimental Chemistry I	PHYS 211 – Mechanics
MATH 140 – Calculus I	PHYS 212 – Electricity and Magnetism
MATH 141 – Calculus II	CAS 100A/B – Effective Speech
EDSGN 100 – Intro. to Engineering Design	
General education requirements are the same, including GA, GS, GH, GHA	
<b>How the Food and Biological Process Engineering Option of B E can use courses that are unique to the Bioengineering program</b>	
<b>Course taken for BioE:</b>	<b>Counts in B E as:</b>
MATH 230 – Vector Analysis	MATH 231 – Calculus of Several Variables
CHEM 112 – Chemical Principles II	Technical Elective
BIOL 141 – Introductory Physiology	Biological Engineering Emphasis Elective
E MCH 210 – Statics, Strength of Materials	E MCH 211/213 – Statics, Strength of Mater.
CMPSC 200 – Programming for Engineers	Technical Elective
BIOE 201 – Cell and Molecular Bioeng.	Engineering Science/Design Elective
<i>A student pursuing the Food and Biological Process Engineering Option of the B E major can get the Bioengineering or Environmental Engineering minor without taking extra credits, if the student plans carefully with help from a B E advisor</i>	

For more information about the Biological Engineering major, we would be happy to meet with you to discuss the curriculum, career opportunities, etc. Please contact:

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