Biological Engineering

The Biological Engineering Department involves students with hands-on experiences in laboratory and field projects to develop new bio-based products, technologies, and engineering services.

We offer specific courses in biochemical engineering, synthetic biological engineering, metabolic engineering, biophotonics, biofuels, tissue engineering, biomaterials engineering, bionanoelectronic devices, and biosensors that provide students with new skills required by employers in industry, government national laboratories, medical and other research institutes, and universities.

What do biological engineers do?

- Engineer living systems to improve quality of life and to create new industries.

- Design, build, and test systems in biomedical, bionano sensors, and bioprocess fields.

- Engineer bioenvironmental systems for sustainability and security.

- Develop new technologies based on engineered biological systems.

Why our students recommend Biological Engineering at USU:

- Personalized program (15 students/faculty)

- Small class sizes (15 – 20 students)

- Breadth of topics/interdisciplinary

- Hands on research opportunities for freshmen through seniors

- Growing job market

- Diversity
Coursework topics include:

- **Synthetic Biology**: Genetically engineering bacteria cells to make bioplastics and spider silk.

- **Metabolic Engineering/Modeling**: mathematical modeling of biochemical pathways to make valuable products like anticancer drugs.

- **Integrated Tissue Engineering**: biomedical applications for improving tissues performance and studying anticancer drugs.

- **Molecular & Cellular Sensing & Imaging**: "seeing" cells divide and the effects of medical drugs on inhibiting growth of cancer cells or disease-causing cells.

- **Biomaterials & Biosurfaces**: preventing contamination of prosthetics and other surfaces on the surface and inside the human body.

- **Biochemical Engineering**: biochemical processes applied to design and operate bioreactors to produce value products including pharmaceuticals, bioenergy compounds, and bioplastics.

- **Downstream Processing**: separation, purification, concentration of pharmaceutical drugs, environmental chemicals, and bioplastics and spider silk chemicals for commercial applications.

- **Biophotonics**: interaction of light with human tissues and cells for disease detection and gene manipulation.

- **Biological Microelectromechanical Systems** (BioMEMS): designing very small machines with components between 1 to 100 micrometers in size for medical and health applications including Lab-On-Chip, or embedded in medical devices such as stents.

- **Biofuels**: using algae cells to make transportation fuels, including biodiesel, butanol, acetone, ethanol and natural gas.

For more information visit our website: [be.usu.edu](http://be.usu.edu)