

**Biotechnology Engineering.** Students specializing in biotechnology engineering integrate analysis and design with applied biology to solve problems in the production of energy from renewable biological resources, in transferring laboratory developments to large-scale biotechnical production, and in the development of biosensors and biomaterials. Students interested in biotechnology engineering may focus on the mechanisms and processes for the sustainable production and use of energy from renewable biological sources. Students may also focus on addressing the challenges in scaling up the production of genetically altered plants, plant materials and food products, production, packaging, and application of biocontrol agents for plant pests and diseases, microbial production of biological products, tissue culture, and bioremediation. Students may also focus on the development of biosensors for the detection of microorganisms or specific substances, or on the development of products based on biological processes and materials. The recommended electives provide students with strong training in genetics, biochemistry, microbiology, molecular biology, and plant production, in addition to engineering courses on topics such as process design and life-cycle analysis. Modern laboratory techniques in biochemistry are also included in the specialization to provide hands-on skills.

Biological engineers specializing in biotechnology engineering will be needed in the future to work within industrial, governmental, and academic settings in the U.S. and around the world.

**Recommended biological science electives:**

Biological Sciences 101, 102, 103  
Microbiology 102  
Molecular and Cellular Biology 120L  
Plant Biology 113

**Recommended engineering electives:**

Biological Systems Engineering 161  
Chemical Engineering 161B, 161C, 161L  
Civil and Environmental Engineering 143, 148A, 149, 150, 153  
Engineering 180  
Mechanical Engineering 161, 162, 163

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