

BIOSYSTEMS ENGINEERING

What can I do with this major?

AREAS

EMPLOYERS

STRATEGIES

BIOPROCESS ENGINEERING

Applying engineering principles to biological processes and materials to develop alternative energy sources, beneficial products, and to provide alternative strategies for dealing with household, agricultural, industrial, and municipal wastes.

Biological Materials Processing

Biodiesel

Ethanol

Other alternative energy sources

Processing/Bioseparation of Materials to Produce/

Purify

Pharmaceuticals

Oils

Other bio-based products

Treatment System Design/Operation

Household wastes

Municipal wastewater

Solid wastes

Agricultural wastes

Alternative Materials Production

i.e. Straw-based fiberboard

Food processing companies

Manufacturing firms

Land grant universities

Research and education facilities

Research laboratories

Government agencies including:

U.S. and State Departments of Agriculture

U.S. Forest Service

U.S. Natural Resource Conservation Service

U.S. Agricultural Research Service

Alternative fuel production companies

Environmental consulting firms

Power/utilities companies

Pharmaceutical companies

Research firms

Seek related production and processing experience through co-ops, internships, or part-time jobs.

Maintain knowledge of current alternative energy and product industry trends and regulations.

Develop strong verbal and written communication skills.

Seek extensive laboratory and research experience to obtain research positions.

Learn team and individual design skills.

Obtain Ph.D. for optimal teaching and research careers.

Become familiar with the federal job application and employment procedures.

Participate in related clubs and organizations like the student chapter of The American Society of Agricultural and Biological Engineers to build contacts and cultivate related interests.

SOIL AND WATER CONSERVATION ENGINEERING

Applying engineering principles to the complex environmental problems facing development and conservation of soil and water resources including soil erosion, water pollution by sediment and other contaminants from various land uses, stormwater runoff that causes flooding and damages the environment, and the impact of various land uses on aquatic ecosystems.

Land grant universities

Research and education facilities

Research laboratories

Government agencies including:

U.S. and State Departments of Agriculture

U.S. Forest Service

U.S. Natural Resource Conservation Service

U.S. Environmental Protection Agency,

State Environmental and Conservation Agencies

State Departments of Transportation

Maintain knowledge of current environmental issues including policy, conservation, and industry trends.

Seek related experience through co-ops, internships, or part-time jobs in specialized area of interest.

Develop strong verbal and written communication skills.

Seek extensive laboratory and research experience to obtain research positions.

Learn team and individual design skills.

AREAS

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SOIL AND WATER CONSERVATION

ENGINEERING CONTINUED

Erosion and Sediment Control

- Construction sites
- Reclaimed mines
- Disturbed forests and pasture
- Agricultural lands

Stormwater Management for Urban Settings to

Reduce

- Downstream flooding
- Negative ecological impacts

Measuring and Monitoring Hydrologic Phenomena

- Hydrologic elements
- Water quality concerns

Protecting Water Resources from Waste-

Management Operations

- Municipal wastewater and solid waste
- Household wastewater
- Agricultural animal and solid wastes
- Pesticide-contaminated rinsewater

Automated Characterization of Aquatic Habitat

- Underwater video mapping

Development of Instrumentation and Control Systems

- Hydrologic and water quality phenomena

Environmental design and consulting firms

Architectural and building firms

Forest product and mining companies

Obtain Ph.D. for teaching and research careers.

Participate in related clubs and organizations like the student chapter of The American Society of Agricultural and Biological Engineers and/or The Plant, Soil and Environmental Sciences Club to build contacts and cultivate academic interests.

MACHINERY SYSTEMS AND CONTROLS

Improving equipment efficiency in terms of energy, labor, and economics, while minimizing negative environmental impacts.

Site-Specific Control of Machinery

(to reduce inputs/encourage optimal plant growth)

- Agricultural tillage
- Seeding
- Irrigation
- Chemical application equipment

Determining/Predicting the Impact of Military

Vehicles

- Environmental quality of training areas

Agricultural and construction equipment manufacturers

Electronic instrumentation and control companies

Manufacturing firms

Biological production, management, and design companies including:

- Agricultural
- Forest products
- Nursery
- Turf
- Greenhouse
- Mining

Develop strong knowledge of engineering principles with practical application to design and integrate equipment, sensors, and facilities that handle, process, and control biological materials.

Seek related experience through co-ops, internships, and part-time jobs.

Develop strong verbal and written communication skills.

Learn team and individual design skills.

Obtain Ph.D. for optimal teaching and research careers.

AREAS

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MACHINERY SYSTEMS AND CONTROLS

CONTINUED

Control of Spraying Systems to Target Pest/Nutrient Needs

Development of Sensors/Control of Equipment Using Sensors

Crop and process yield monitors

Crop health monitors

Spray applicators

Collection/Use of Spatial Information

Global Positioning System (GPS)

Geographic Information System (GIS)

Agricultural and environmental design and consulting firms

Bulk product handling, processing, and transport manufacturers

Participate in related clubs and organizations like the student branch of The American Society of Agricultural and Biological Engineers to build contacts and cultivate academic interests.

GENERAL INFORMATION

- The Bachelor's degree provides a wide range of engineering career opportunities in industry, business, and government.
- The B.S. also provides a strong foundation for pursuing technical graduate degrees, as well as professional degrees in Business Administration, Medicine, or Law.
- Graduate degrees offer more opportunities for career advancement.
- Related work experience obtained through co-op, internships, part-time, or summer jobs is extremely beneficial.
- Plan informational interviews or job shadowing opportunities to make contacts in government and industry and to learn more about specific fields.
- Engineers need to think in design, scientific and mathematical terms, and must have the ability to study data, sort out important facts, solve problems, and think analytically.
- Engineers should be able to see how entire systems are affected and influenced by the various parts of the system.
- Creativity is useful.
- Other helpful traits include curiosity, technical aptitude, perseverance, a commitment to teamwork, and a basic understanding of the economic and environmental context in which engineering is practiced.
- Develop excellent verbal and written communications skills including presentation and technical report writing.
- Develop computer skills to assist in determining solutions to problems, collecting and analyzing data, and to control various processes.
- Join related professional organizations.
- Rapid changes occur in engineering fields, so continuing education and knowledge of new developments are very important.
- All states and the District of Columbia require registration of engineers whose work may affect the life, health, or safety of the public.
- Learn about state requirements for licensure as a Professional Engineer including the Fundamentals of Engineering (FE) and the Principles of Practice of Engineering (PE) exams.