

BIOSYSTEMS ENGINEERING

What can I do with this major?

AREAS

EMPLOYERS

STRATEGIES

NATURAL RESOURCES

Design, Build, Operate, Maintain:
Drainage, Irrigation Systems and Water Control Structures
Instrumentation and Control Systems
Stormwater Management Systems
Erosion and Sediment Control
Stormwater Management
Hydrologic Phenomena:
Measuring and Monitoring
Water Resources Protection
Wetland Protection
Waste Management Operations
Water Treatment Systems
Aquatic Habitat Characterization and Protection

Colleges and universities
Private research institutions
Government agencies:
U.S. and State Departments of Agriculture
U.S. Forest Service
U.S. Natural Resource Conservation Service
U.S. Environmental Protection Agency
State departments of transportation
State environmental and conservation agencies
Local public works departments
Industry:
Hydroelectric power
Water treatment
Environmental design and consulting
Architecture firms
Builders
Forest products
Mining
Local and regional utility districts

Pursue experience in government or industry through co-ops, internships or part-time jobs in specialized area of interest.
Take additional courses in biology, biochemistry, water chemistry, soil chemistry, geology, etc. to support understanding of environmental impact.
Seek knowledge of current environmental issues, particularly those related to water and soil protection.
Prepare to work with individuals and on teams. Consider participating in team design competitions.
Develop strong verbal and written communication skills along with laboratory and research skills.
Participate in related clubs and organizations like the student chapter of The American Society of Agricultural and Biological Engineers or The Plant, Soil and Environmental Sciences Club.

POWER AND MACHINERY

Design, Build, Operate, Maintain:
Agricultural Equipment:
Tractors and specialized equipment for irrigating, seeding, harvesting, chemical application, commodity/waste transport, tilling, food processing
Construction Equipment:
Heavy equipment for earth moving, trenching, pipe-laying, drilling, horizontal boring; lighter equipment such as skid-steers
Off-road utility vehicles
Lawn and garden equipment
Standards and Safety

Industry:
Agricultural equipment
Instrumentation and control systems
Bulk product handling, processing and transport
Agricultural production
Forest products
Environmental consulting
Food processing
Nursery
Greenhouse
Turf
Mining
Forestry
Lawn and garden equipment

Develop strong knowledge of engineering principles with practical application to design and integrate equipment, sensors and facilities that handle, process and control biological materials.
Take courses that relate to machine design, monitoring, automation and safety, e.g. power transmission, hydraulic power, GIS/GPS application, etc.
Seek related experience through co-ops, internships and part-time jobs in biosystems engineering field.
Develop analytical, problem solving, computer, communication and design skills through coursework, research with faculty and participation in student chapters of professional organizations.

AREAS

EMPLOYERS

STRATEGIES

INFORMATION AND ELECTRICAL TECHNOLOGIES

Design, Build, Operate, Maintain:

Instrumentation and Control Systems:

Monitors, Sensors, Global Position Systems (GPS), Geographic Information Systems (GIS)

Standards and Safety

Industry:

Agricultural and construction equipment
Instrumentation and control systems

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

Take courses that relate to monitoring and instrumentation, e.g. circuits, instrumentation and controls, geomatics, GIS/GPS application, etc.

Seek related experience through co-ops, internships and part-time jobs in biosystems engineering field.

Develop analytical, problem solving, computer, communication and design skills through coursework, research with faculty and participation in student chapters of professional organizations.

BIOLOGICAL, BIOPROCESS, FOOD ENGINEERING

Environmental Protection

Environmental Remediation

Agrichemicals

Pharmaceuticals

Medical Implants

Bioinstrumentation

Natural Materials Production

Hazardous Waste Treatment, Disposal, Utilization

Enzyme Processing of Biomass, Food, Feed, Waste

Food and Feed Production

Food Safety:

Pasteurization, Sterilization, Irradiation, Transport, Storage

Colleges and universities

Private research institutions

Government agencies:

U.S. and State Departments of Agriculture

U.S. Forest Service

U.S. Natural Resources Conservation Service

U.S. Agricultural Research Service

Industry:

Environmental consulting

Food processing

Pharmaceutical

Manufacturing

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

Learn about the work of regulatory agencies and stay current on industry and product trends.

Develop excellent laboratory, research and computer skills. Strong communications skills are necessary for working with teams of colleagues.

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.

AREAS

EMPLOYERS

STRATEGIES

ENERGY

Alternative Energy Production:

- Biodiesel
- Ethanol
- Solar
- Wind
- Hydroelectric
- Geothermal

Environmental Protection
Energy Conservation

Colleges and universities
Private research institutions
Government agencies:
 U.S. Department of Energy: National Renewable Energy Lab
 U.S. Department of Agriculture: Forest Service
Industry:
 Alternative fuel production
 Environmental consulting
 Power/utilities
 Energy conservation

Seek experience in alternative energy production or conservation through co-ops, internships or part-time jobs.
Maintain knowledge of current alternative energy trends and regulations.
Develop strong verbal and written communication skills.
Seek extensive laboratory and research experience to obtain research positions.
Obtain Ph.D. for optimal teaching and research careers.
Become familiar with the federal job application and employment procedures.
Participate in campus and community organizations focusing on alternative energy production and environmental protection, i.e. The Department of Energy's Solar Decathlon Competition.

AQUACULTURE

Freshwater or Saltwater Fish, Shellfish and Plant Production:

- Feeding and Ventilation Systems
- Harvesting Systems
- Processing Systems
- Water Quality
- Sanitation
- Water Conservation
- Environmental Impact

Fresh and saltwater farms or hatcheries (rivers, lakes, oceans, ponds, tanks)
Aquatic systems equipment companies
Government:
 National Oceanic and Atmospheric Administration
 National Institute of Food and Agriculture
 U.S. Fish and Wildlife Service
 U.S. Department of Agriculture
 U.S. Environmental Protection Agency

Pursue experience in some aspect of production through internships or research with private or government organizations.
Take courses pertaining to fish genetics, fish diseases, aquatic ecology, water quality, principles of aquaculture, hatchery management, production methods, etc. Additional courses in business may be helpful for management positions.
Stay abreast of current laws regulating food safety and production in the aquaculture industry.
Seek membership in professional organizations such as the Aquacultural Engineering Society to network with colleagues and gain knowledge of the field.

AREAS

STRUCTURES

Nurseries
Greenhouses
Animal Housing
Storage Structures:
 Ventilation
 Temperature and Humidity Controls
 Irrigation
Waste Storage, Reuse, Transportation

EMPLOYERS

Industry:
 Nursery
 Greenhouse
 Agricultural equipment
 Instrumentation and control systems
 Bulk product handling, processing and transport
 Agricultural production
 Waste management operations

STRATEGIES

Pursue experience in nursery, greenhouse or agricultural operations through part-time jobs, internships or co-ops to learn the about the industry.
Take additional courses to support area of specialization such as plant physiology, plant propagation, animal breeding and genetics, animal nutrition, etc.
Participate in design contests through the American Society of Agricultural and Biological Engineers to apply coursework knowledge to real world problems and build professional contacts.
Cultivate communication, design and teamwork skills.

GENERAL INFORMATION

- One of the great strengths of a Biosystems Engineering degree is its breadth; you will gain expertise and experience with a wide variety of engineering tools. Because of this breadth, Biosystems Engineering programs vary widely across the country, usually emphasizing the tools required to meet the specific needs of the state or region. Check with the faculty or advising offices for details about your program's focus areas.
- A bachelor's degree provides a wide range of engineering career opportunities in industry, business and government.
- A bachelor's degree 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 in research, management and teaching positions.
- Related work experience obtained through co-op, internships, part-time or summer jobs is extremely beneficial.
- Develop excellent verbal and written communications skills, including presentation and technical report writing.
- Learn to think in design, scientific and mathematical terms and develop the ability to study data, sort 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.
- Hone computer skills to assist in determining solutions to problems, collecting and analyzing data and to control various processes.
- 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.
- Plan informational interviews or job shadowing opportunities to make contacts in government and industry and to learn more about specific fields. Become familiar with state and federal job application and employment procedures.
- Join related professional organizations.
- Rapid changes occur in engineering fields, so continuing education and knowledge of new developments are very important.
- In most states, a bachelor's degree from an accredited program enables you to sit for the Fundamentals of Engineering exam, which is the first step towards licensure as a Professional Engineer.
- 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.