BIOSYSTEMS ENGINEERING

What can I do with this major?

AREAS	EMPLOYERS	STRATEGIES
NATURAL RESOURCES Design, build, operate, maintain: Drainage and irrigation systems Water supply and waste water systems Water quality monitoring Erosion and sediment control Stormwater management Hydrologic phenomena (rain runoff): Measuring and monitoring Conservation and restoration 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 Resources Conservation Service U.S. Environmental Protection Agency State departments of transportation State environmental agencies City and county storm water agencies Hydroelectric power Water treatment Environmental design and consulting Architecture firms Builders Forest products Mining Industry regulators 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, including 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 (ASABE) or the Society of Women Engineers (SWE).
POWER AND MACHINERY Design, build, operate, maintain: Tractors and specialized equipment for irrigating, seeding, harvesting, chemical application, commodity/waste transport, tilling, food processing Heavy equipment for earth moving, trenching, pipelaying, drilling, horizontal boring, lighter equipment such as skid-steers Off-road utility vehicles Lawn and garden equipment Standards and safety Instrumentation and controls	Industry: Equipment companies Instrumentation and control systems Bulk 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; 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, hydraulic power, GIS/GPS application, etc.). Seek related experience through co-ops, internships, and part-time jobs in biosystems engineering. 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
INSTRUMENTATION AND CONTROL TECHNOLOGIES Design, build, operate, maintain: Instrumentation and control systems: Monitors and sensors for equipment and process control Control systems for greenhouses Process managment using global position systems (GPS), geographic information systems (GIS) Advance information processing Image processing for process control Big data analysis for decision-making Monitoring ecosystems and animals Standards and safety	Colleges and universities Private research institutions Industry: Agricultural and construction equipment Instrumentation and control systems Food processing Pharmaceuticals Greenhouses Natural resources consulting firms Biomedical instrumentation Government agencies: U.S. Army Corps of Engineers U.S. Enviromental Proctection Agency U.S. Food and Drug Administration Food Safety and Inspection Service	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 production Animal 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 to build contacts and cultivate related interests such as the student chapter of the American Society of Agricultural and Biological Engineers (ASABE).

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 energy production 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 (e.g., the Department of Energy 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 (e.g., 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 (AES) to network with colleagues and gain knowledge of the field.

AREAS	EMPLOYERS	STRATEGIES

STRUCTURES

Nurseries
Greenhouses
Animal housing
Storage structures:
- Ventilation
- Temperature and humidity controls
- Irrigation

Waste storage, reuse, transportation

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

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, genetics, animal nutrition, etc.

Participate in design contests through the American Society of Agricultural and Biological Engineers (ASABE) 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 which will allow you to gain expertise and experience with a wide variety of engineering.
- 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, pharmacy, dentistry, 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 approach problems 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.