What can I do with a major in...

Bioproducts and Biosystems Engineering

Bioproducts and biosystems engineers apply knowledge of engineering, technology, chemistry, and biology to select the appropriate renewable resources – such as wood, agricultural residues, fiber crops, and other biomass – for producing a wide range of “green” materials, including chemicals, plastics, wood products, paper, building materials, and energy. Bioproducts and biosystems engineers also develop energy-efficient, economical, and environmentally friendly processes, and equipment for manufacturing these products. They consider the ethical and safety issues surrounding bioproducts as well as their economic impact, and they design sustainable systems that protect the environment, humans, plants, and animals. In addition to basic science and engineering, they may focus on bioresources, biological/biochemical processes, bio-based products, and biological systems.

- Environmental and ecological engineers focus on engineering applications to land and water resources, air and soil quality, land-use management, ecosystem services, ecological restoration, and waste management.
- Bioproducts engineers design and develop engineering solutions for sustainable manufacturing and end-use applications of “green” products, including biofuels, bioenergy, biodegradable plastics, building materials, paper, and chemicals.
- Food engineers design and develop systems for production, processing, distributing, and storing food and agricultural materials.

**INDUSTRIES**

- Agriculture
- Alternative energy
- Building products/materials
- Consulting
- Ecological restoration
- Ecology/environmental research
- Environmental consulting
- Food processing
- Food safety and security
- Government agencies
- Institutes
- Laboratories
- Law
- Manufacturing
- Marketing
- Public health
- Pulp and paper products
- Quality control
- Renewable plastics
- Research
- University laboratories
- Wood products

**EMPLOYERS**

- 3M
- Andersen Corporation
- Appvion, Inc.
- Barr Engineering
- Cargill
- CHS Inc.
- Domtar Paper Company
- Donaldson
- Ecolab
- General Mills
- Kellogg’s
- Minnehaha Creek Watershed Dist.
- MN Pollution Control Agency
- Natureworks
- POET
- Renewable Energy Group
- The Schwan Food Company
- Virent
- Verso Paper
- Westwood Professional Services
- WSB/Water Resources Group

**TECHNICAL SKILLS**

- Advanced and Basic Chemistry Laboratory Techniques
- Biology Laboratory Techniques
- ChemDraw
- Excel
- LoggerPro
- Mathematica
- MATLAB

**CSE Career Outcomes**

Average Starting Salary: $59,077*

Post-graduation Outcomes:*
POSSIBLE POSITIONS

- **Alternative energy specialist:** Designs and installs systems that use renewable energy sources.
- **Bioprocessing/food engineer:** Integrates biology and engineering to design sustainable systems that produce high quality food, renewable energy, and biomaterials for consumers while protecting the environment.
- **Bioproducts engineer:** Develops sustainable biomass conversion solutions to meet the world’s growing materials and energy demand.
- **Environmental consultant:** Offers expert advice to local, state, and federal government agencies and private sector clients who need to adopt environmentally sound practices or clean up contaminated sites.
- **Environmental engineer:** Addresses the many environmental and natural resource challenges that affect air, soil, and water quality.
- **Manufacturing engineer:** Design, integrate, or improve manufacturing systems and related processes. May work to increase producibility and decrease costs.
- **Process engineer:** Develops the series of actions that efficiently and economically make products (plastics, chemicals, fuel, pharmaceuticals, etc.)
- **Product engineer:** Plans and develops the tools, processes, machines, and equipment necessary to produce or manufacture products.
- **Project engineer:** Leads a group of technical engineers and serves as the contact person to the client.
- **Research engineer:** Conducts basic, systematic investigations leading to new knowledge for a specific application that influences the design and construction of prototypes.

**Some of these positions may require an advanced degree.**

GET INVOLVED

- American Society of Agricultural and Biological Engineers
- CSE K-12 Outreach
- CSE Ambassadors
- CSE International Ambassadors
- Food and Bioproducts Engineering Organization
- National Society of Black Engineers
- Residential Building Science and Technology Club
- Society of Asian Scientists and Engineers
- Society of Hispanic Professional Engineers
- Society of Women Engineers
- Solar Vehicle Project
- Technical Association of the Pulp and Paper Industry

RESOURCES

- **American Bioenergy Association:** [biomass.org](http://biomass.org)
- American Council of Engineering Companies: [acec.org](http://acec.org)
- American Council of Engineering Companies-MN chapter: [acecmn.org](http://acecmn.org)
- American Society of Agricultural and Biological Engineers: [asabe.org](http://asabe.org)
- Association of Energy Engineers: [aeecenter.org](http://aeecenter.org)
- **Department of Bioproducts and Biosystems Engineering:** [bbe.umn.edu](http://bbe.umn.edu)
- Midwest Renewable Energy Association: [midwestrenew.org](http://midwestrenew.org)
- Minnesota Society of Professional Engineers: [mnspe.org](http://mnspe.org)
- Minnesota Technology Assistance Program: [mntap.umn.edu](http://mntap.umn.edu)
- **National Society of Professional Engineers:** [nspe.org](http://nspe.org)
- Pulp and Paper: [pulpandpaper.net](http://pulpandpaper.net)
- Technical Association of the Pulp and Paper Industry: [tappi.org](http://tappi.org)
- U.S Department of Agriculture-Agricultural Research Service: [ars.usda.gov/careers](http://ars.usda.gov/careers)
- U.S. Department of Energy: [energy.gov](http://energy.gov)

See the Major Binders available in the CSE Career Center’s Resource Center for more information about this major and career.

*Salary and Career Outcomes gathered from the 2016-2017 CSE Graduation Survey
Post-graduation outcomes reflect the percentage of students who were employed full-time in their field or were enrolled in a graduate program. For detailed starting salary information see the CSE Career Center website.*