

# ENGINEERING

## What can I do with this major?

### AREAS

#### ANY ENGINEERING DISCIPLINE

Research and development  
Design  
Production  
Operations  
Management  
Teaching  
Consulting  
Sales and marketing  
Law  
Manufacturing  
Healthcare

### EMPLOYERS

Engineering companies  
Consulting companies  
Industry  
Local, state, and federal government  
Colleges and universities

### STRATEGIES

Obtain relevant experience through co-ops or internships for industry-related career.  
Develop strong verbal, written, teamwork, and problem-solving skills.  
Pursue Master of Science (MS), Master of Engineering (ME), or Master of Business Administration (MBA) degrees for increased opportunities in technical management.  
Obtain Ph.D. for teaching and research careers.  
Learn federal, state, and local government job application procedures.  
Pursue professional engineering licensure.

#### AEROSPACE

Propulsion  
Fluid mechanics  
Thermodynamics  
Structural design  
Celestial mechanics  
Acoustics  
Guidance and control systems

Aerospace product and parts manufacturing industries (engines, communication systems, navigation systems, electronic devices)  
Aircraft, missile, and space vehicle industries  
Communications equipment manufacturers  
Commercial airlines  
Research and development firms  
Federal government:  
Department of Defense  
National Aeronautics and Space Administration

#### ***Discipline develops technologies for use in aviation, defense and space exploration.***

Anticipate specializing in the development of new technologies or in particular aerospace products.  
Stay abreast of status of federal funding for defense and space programs.  
Seek knowledge of computer-aided design (CAD) software, robotics, optics and lasers.  
Seek co-op or internship opportunities in the aerospace industry.  
Develop effective verbal and written communication skills and learn to work well on a team.  
Join chapters of national organizations such as the American Institute of Aeronautics and Astronautics to build a network of professional contacts and participate in design competitions.  
Note, job prospects in aerospace engineering may be influenced by economic conditions and the demand for military products.

## AREAS

## EMPLOYERS

## STRATEGIES

### **BIOMEDICAL**

Bioinstrumentation  
Biomechanics  
Biomaterials  
Systems physiology  
Clinical engineering  
Rehabilitation engineering

Medical equipment and supplies manufacturers  
Pharmaceutical manufacturers  
Hospitals and healthcare facilities  
Research facilities of educational and medical institutions  
Federal government:  
Regulatory agencies  
Veteran's Administration  
National Institutes of Health

***Discipline combines engineering and biomedical sciences to study and develop tools, techniques and products to improve human health.***

Build laboratory and research skills through courses and/or work with professors.  
Seek internships, part-time employment or volunteer experiences in the biomedical field.  
Join related professional organizations such as the Biomedical Engineering Society to network with professionals in the field and submit research and design projects.  
Develop strong teamwork skills, as biomedical engineers often work closely with other engineers in related specialty areas, i.e. biomechanics and biomaterials as well as with medical personnel.  
Many positions require a graduate or professional degree; some biomedical engineers pursue medical school.  
Maintain an outstanding grade point average; seek experiences in hospital or healthcare settings through volunteering, shadowing, part-time positions, or internships, secure strong faculty recommendations and plan to meet with a pre-health advisor periodically.

### **BIOSYSTEMS ENGINEERING**

See What can I do with a major in Biosystems Engineering?

## AREAS

### **CHEMICAL and BIOMOLECULAR**

Bulk and fine chemicals  
Consumer products  
Biotechnology and pharmaceuticals  
Electronics  
Environmental safety and health  
Fuels and energy conversion  
Materials  
Process design

## EMPLOYERS

Private and national research laboratories  
Industries including:  
Agricultural chemicals, industrial bulk and fine chemicals, plastics, biotechnology, pharmaceutical, cosmetics, textiles, petroleum, food processing, energy, environmental, automotive, pulp and paper, rubber and rubber products, electronics, consumer products  
Federal government:  
Department of Energy  
Environmental Protection Agency  
Nuclear Regulatory Commission  
Department of Agriculture

## STRATEGIES

***Discipline combines chemistry, physics, biology and engineering to solve problems involving the use or production of chemicals and biological systems to develop new materials and processes and to increase efficiency and lower cost.***

Pursue a strong foundation in fundamentals in lower division classes as well as specialized knowledge for specific career opportunities in upper division classes.  
Develop exceptional communication and interpersonal skills for work on multidisciplinary teams. Attention to detail is crucial.  
Pursue experimental design, data interpretation and problem solving competence through coursework and research with professors.  
Seek internship or co-op experiences in the chemical engineering field.  
Join professional associations such as American Institute of Chemical Engineers to maintain current knowledge of opportunities in the field.  
Prepare for professional license via review classes.

### **CIVIL**

Structural  
Urban planning  
Construction  
Environmental  
Water resources  
Transportation  
Geotechnical

Construction industry  
Utility companies  
Oil companies  
Telecommunications businesses  
Manufacturing companies  
Railroads  
Airports  
Road construction companies  
Engineering, architectural, consulting companies  
City, state and federal government:  
Department of Transportation  
Army Corps of Engineers  
Federal Aviation Administration  
Department of Energy

***Broad discipline providing for communities through development and improvement of services including construction, transportation, city planning, water, energy, pollution.***

Pursue a strong background of engineering fundamentals as preparation for entering the work force or graduate school.  
Develop the ability to communicate effectively, as civil engineers are likely to collaborate with professionals in a variety of disciplines.  
Seek experience organizing and directing people and materials through related internships, co-ops, summer jobs, and leadership experiences in student organizations.  
Join the American Society of Civil Engineers to participate in projects and activities to increase marketability beyond graduation.  
Note: states may require licensing or registration.

## AREAS

## EMPLOYERS

## STRATEGIES

### **COMPUTER**

Information protection  
Communications and wireless networks  
Computational science  
Operating systems  
Computer networks  
Computer systems  
Embedded systems  
Computer vision and robotics  
Circuit design  
Signal, image and speech processing  
VLSI  
Bioinformatics

Industries including:  
Aerospace, automotive, computer and electronics manufacturers, transportation, telecommunications, guidance and control systems, defense, electric power and energy, semiconductor, electronics, environmental, medical equipment, chemical, pharmaceutical, computer, pulp, paper, textile, metal  
Financial and business service companies  
Scientific service companies (instruments, lab equipment, software)  
Technical service companies (intelligence, information systems, defense)  
Federal government:  
Armed forces  
National Aeronautics and Space Administration  
Federal Bureau of Investigation  
National Institute of Standards and Technology  
Departments of Defense, Energy, Transportation  
National Institutes of Health

***Discipline involves the design and development of computer hardware and software and hardware-software integration.***

Expect to take classes in engineering fundamentals, math, science and computer science.  
Develop strong attention to detail, analytical skills and the ability to persevere through lengthy projects.  
Seek ways to enhance interpersonal, communication, and teamwork skills for work with people of differing backgrounds.  
Join student chapters of organizations such as Institute for Electrical and Electronics Engineers (IEEE) and Association for Computing Machinery (ACM) to build contacts with peers and mentors, participate in student competitions and develop job leads.

### **ELECTRICAL**

Automatic controls  
Bioelectronics  
Digital systems  
Electromagnetics  
Analog electronics  
Power and energy systems  
Communications and signal processing

Industries including:  
Aerospace, automotive, computer and electronics manufacturers, transportation, telecommunications, guidance and control systems, defense, electric power and energy, semiconductor, electronics, environmental, medical equipment, chemical, pharmaceutical, computer, pulp, paper, textile, metal  
Scientific service companies (instruments, lab equipment, software)  
Technical service companies (intelligence, information systems, defense)  
Federal government:  
Armed forces  
National Aeronautics and Space Administration  
Federal Bureau of Investigation  
National Institute of Standards and Technology  
Departments of Defense, Energy, Transportation  
National Institutes of Health

***Broad discipline applies engineering principles to the design and production of electronic systems and electrical devices.***

Prepare for a course load including engineering fundamentals, math, science and electrical engineering.  
Pursue design projects and laboratory experience throughout college career.  
Seek related experience through research, internships, co-ops or part-time employment.  
Join student chapters of industry organizations such as Institute for Electrical and Electronics Engineers (IEEE) to develop communication and leadership skills, to participate in competitions and to take advantage of professional networking opportunities.

## AREAS

### **ENGINEERING PHYSICS**

Engineering (process and testing)  
Quality control  
Research  
Development  
Instrumentation

## EMPLOYERS

Industries including:  
High technology, semiconductor, chemical, aerospace, agriculture, energy, fuel, computer, transportation, healthcare  
National laboratories  
National Aeronautics and Space Administration  
Federal government:  
Department of Commerce  
Department of Defense

## STRATEGIES

***Broad interdisciplinary field involves applying physics principles in engineering contexts.***  
Choose a major in engineering physics or supplement physics major with engineering minor; both science and math aptitude are fundamental.  
Seek internship, co-op and/or research experience with professors in area of interest.  
Develop strong oral, written communication and experimental design skills through coursework and laboratory practice.  
Pursue advanced degree in engineering, engineering physics or physics for increased employment opportunities.

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### **ENVIRONMENTAL**

Air quality  
Water quality  
Solid/Water waste management  
Toxic waste management  
Hazardous waste clean-up/Bioremediation  
Industrial hygiene  
Radiation protection  
Public health  
Land/Wildlife management  
Recycling

Consulting companies specializing in water/waste water treatment, water resource management, solid and hazardous waste management, air pollution control, hazardous waste remediation  
Industries including:  
chemical, energy, pharmaceutical, mining and manufacturing  
Local water, sewer, health and public works departments  
Testing laboratories  
Public interest organizations  
Research firms  
Construction companies  
State departments of Environment and Conservation  
Federal government:  
Department of Energy  
Department of Defense  
Environmental Protection Agency

***Discipline plays vital role in preventing and developing solutions for environmental problems.***  
Plan to supplement engineering coursework with classes in biology, hydrology, chemistry, geology and computational methods.  
Seek experience in the environmental engineering field through co-ops, internships and part-time positions.  
Develop strong interpersonal and communication skills for interacting with legal and business professionals to solve environmental issues.  
Expect to work outdoors at least part of the time for environmental testing, quality control and site investigation work.  
Join community groups or service organizations such as Student Conservation Association that focus on environmental awareness; attend public meetings about waste management.  
Maintain current knowledge of environmental issues, regulations and statutes.  
Consider membership in professional engineering organizations such as the American Association for Environmental Engineers for networking and job leads.

## AREAS

### **INDUSTRIAL**

Project, program or operations management  
Manufacturing systems  
Computer-integrated manufacturing automation  
Supply chain management and logistics  
Productivity, methods and process engineering  
Quality measurement and improvement  
Human factors and ergonomics  
Strategic planning  
Management of change  
Financial engineering  
Engineering management  
Lean, six sigma  
Systems design  
Modeling and simulation  
Optimization  
Data analytics

## EMPLOYERS

Industries including:  
Manufacturing, aerospace, transportation,  
construction, communications, electrical and  
electronics machinery  
Retail companies  
Consulting companies  
Banks and financial institutions  
Hospitals and healthcare organizations  
Education and public service agencies  
Utility companies  
Not-for-profit organizations  
Small businesses and start-ups (entrepreneurship)  
State and federal government including armed  
forces

## STRATEGIES

***Discipline focuses on effectively utilizing people, products, machines, materials, energy, etc. to improve processes or systems.***

Plan to take courses in engineering and business.  
Seek experiences in student organizations to develop leadership, interpersonal, and communication skills. Diplomacy is important in the field, as people are considered a factor of production.  
Pursue practical experience through part-time jobs, co-ops or internships to develop a professional network and increase marketability.  
Consider membership in student chapters of organizations such as the Institute of Industrial & Systems Engineers to participate in competitions on topics including operations research, manufacturing, human factors, ergonomics, management science, lean practices and simulation.  
Earn MS or MBA for advancement in management or administration; some programs offer dual degrees.

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### **MATERIALS SCIENCE AND ENGINEERING**

Metallurgy  
Ceramics  
Plastics/Polymers  
Composites  
Semiconductors and electronic materials  
Optical materials  
Biomaterials  
Nanomaterials  
Material research and development  
Extraction/Synthesis  
Processing  
Structure analysis  
Performance  
Failure analysis  
Material selection

Industries/manufacturers including:  
Automobile, appliance, electronic, aerospace equipment, machinery, biomedical, communications, sporting goods, security, alternative energy production  
Airlines, railroads, and utility companies  
Research institutes  
Federal government:  
Department of Energy  
Department of Defense  
National Aeronautics Space Administration

***Discipline focuses on the development of new materials and the improvement of existing ones.***

Gain laboratory and research experience as an undergraduate through coursework, projects with professors, co-ops or internships.  
Develop effective problem solving, communication and teamwork skills.  
Seek undergraduate membership in professional organizations such as the American Society for Materials to learn more about opportunities in the field and to build professional contacts.  
Note, some areas benefit by additional study in business administration, medicine, management and/or law.  
Plan to pursue a graduate degree to specialize in a particular material, process or characterization technique.

## AREAS

## EMPLOYERS

## STRATEGIES

### **MECHANICAL**

Machine design  
Systems design  
Manufacturing and production  
Energy conversion  
Energy resources  
Transportation and environmental impact  
Materials and structures

Industries including:  
Automotive, aerospace, electronics, chemical products, petroleum, textiles, industrial equipment, heating and air conditioning systems  
Utility companies  
National laboratories  
Federal government:  
Department of Energy  
Department of Defense  
Federal Aviation Administration  
National Aeronautics and Space Administration

***Very broad discipline incorporating the research, design, development, manufacturing and testing of mechanical devices.***

Learn computer-aided design (CAD) and computer-aided manufacturing (CAM).  
Obtain related experience through engineering internships, co-ops or part-time jobs.  
Develop strong interpersonal and communication skills; consider a class in public speaking to enhance presentation skills. Plan to collaborate with other types of engineers and with those in industry.  
Join student chapter of American Society of Mechanical Engineers to take advantage of mentorship programs, learn more about specialties in the field and participate in design competitions.

### **MECHATRONICS**

Robotics  
Automation  
Control systems  
Computer-integrated manufacturing  
Analog and digital systems  
Microprocessors and microcontrollers  
Machine design  
Systems design  
Manufacturing processes  
Smart materials and structures  
Intelligent systems  
Artificial intelligence, machine learning  
Internet of things

Industries including:  
Automotive, aerospace, computer and electronics manufacturing, transportation, telecommunication, guidance and control systems, defense, electric power and energy, semiconductor, electronics, environmental, medical equipment, chemical, pharmaceutical, computer, paper, textile, metal, plastic  
Scientific service companies:  
Instruments, lab equipment and software  
Technical service companies:  
Intelligence, information systems, and defense  
Federal government:  
Department of Energy  
Department of Defense  
Federal Bureau of Investigation  
National Aeronautics and Space Administration  
National Institute of Standards and Technology  
Patent and Trademark Office

***Discipline involves the design and development of smart electromechanical systems and devices.***

Prepare for a course load including engineering fundamentals, math, and computer science, Computer Engineering, mechanical and electrical engineering.  
Pursue design projects and laboratory experience throughout college career.  
Seek related experience through research, internships, co-ops or part-time employment.  
Develop effective problem solving, communication, and teamwork skills.  
Join student chapters of professional organizations such as Institute of Electrical and Electronics Engineers (IEEE), American Society of Mechanical Engineers (ASME), Society of Manufacturing Engineers (SME), and Society of Women Engineers (SWE) to develop communication and leadership skills, to participate in competitions and to take advantage of professional networking opportunities.

## AREAS

### NUCLEAR

Electrical power reactor facilities  
Nuclear fuel cycle facilities  
Nuclear instrumentation for industrial applications  
Radioactive waste management  
Environmental science  
Medical research and technology  
Space exploration  
Food supply

## EMPLOYERS

Nuclear utility companies  
Industries including:  
    Medical equipment, power equipment, defense,  
    aerospace, environmental, waste management,  
    food preservation  
National laboratories  
Hospitals  
Federal government:  
    Department of Energy  
    National Aeronautics and Space Administration  
    Nuclear Regulatory Commission  
    Environmental Protection Agency  
    Department of Homeland Security  
    Department of Defense

## STRATEGIES

***Discipline focuses on research and development to derive benefits from nuclear processes.***

Develop strong research skills as an undergraduate through coursework, internships or co-ops related to nuclear energy.  
Exhibit curiosity, attention to detail, problem-solving skills, and perseverance for success in the field.  
Travel to some off-site locations including reactors, laboratories or installations sites may be required.  
Consider student membership in the American Nuclear Society to learn more about specialties in the field, build contacts and cultivate leadership potential.

### PETROLEUM

Research and development  
Design  
Management  
Reservoir engineers  
Drilling engineers  
Production engineers  
Subsurface engineers  
Completions engineers  
Support activities for mining  
Oil and gas extraction  
Petroleum and coal product manufacturing  
Maintenance and inspection  
Sales

Energy production companies  
Drilling companies  
Oil companies  
Health and safety  
Geosciences  
Procurement and construction  
Oilfield services  
Pipelines  
Petroleum companies and refineries  
Government:  
    Department of U.S. Army: Corp of Engineers  
    Department of Interior  
    Bureau of Indian Affairs  
    Bureau of Land Management  
    Bureau of Ocean Energy Management  
    Geological Survey  
    Bureau of Safety and Environmental Enforcement

***Discipline works in the production of hydrocarbons, in relation to crude oil or natural gas. Designing, developing, investigating, and producing methods for extracting oil and gas.***

Seek knowledge of computer-aided design (CAD), software, drill, optics and lasers.  
See co-op or internship opportunities in petroleum engineering industry.  
Develop effective verbal and written communication skills, research and analytical skills and mathematical reasoning and problem sensitivity skills.  
Prepare for the initial Fundamentals of Engineering (PE/FE) exam that can be taken after earning a bachelor's degree.  
Join the Society of Petroleum Engineers and pursue SPE certification.  
Note, states may require licensing, registration, or continuing education (CEUs).

**GENERAL INFORMATION**

- Utilize Sloan Career Cornerstone Center's website to learn more about opportunities in engineering.
- A bachelor's degree provides a wide range of career opportunities in industry, business, and government.
- A bachelor's degree is good background for pursuing technical graduate degrees as well as professional degrees in Engineering, Business Administration, Medicine, or Law.
- Graduate degrees offer more opportunities for career advancement, college or university 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 work well on a team to maximize collaborations with other engineers and those outside of the profession.
- Develop computer expertise within field.
- Engineers need to think in scientific and mathematical terms and exhibit the abilities to study data, sort out important facts, solve problems and think logically.
- Other helpful traits include intellectual curiosity, creativity, technical aptitude, perseverance, and a basic understanding of the economic and environmental context in which engineering is practiced.
- Because of rapid changes in most engineering fields, both continued education and keeping abreast of new developments are very important.
- Join relevant professional associations, attend meetings, participate in design competitions and stay up-to-date on research/publications.
- All states and the District of Columbia require registration of engineers whose work may affect the life, health, or safety of the public.
- Professional or technical societies confer certification in some areas.
- Research Fundamentals of Engineering (FE) exam requirements, as this exam is typically the first step in becoming a Professional Engineer (PE).
- Professional Engineer (PE) licensing guidelines vary by state. Check with the National Council of Examiners for Engineering and Surveying (NCEES) for links to state boards.
- Become familiar with the federal job application and employment procedures.