Pre-Engineering

General Engineering Discipline

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

General Engineering Discipline Employers

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

General Engineering Discipline 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 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 Employers

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

Aerospace Strategies

- Anticipate specializing in the development of new technologies or in particular aerospace products.
- Stay abreast of the 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.
- Job prospects in aerospace engineering may be influenced by economic conditions and the demand for military products.

Biomedical

- Bioinstrumentation
- Biomechanics
- Biomaterials
- Systems physiology
- Clinical engineering
- Rehabilitation engineering

Biomedical Employers

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

Biomedical Strategies

- 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 (e.g., 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 prehealth advisor periodically.

Chemical and Biomolecular

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

Chemical and Biomolecular Employers

- Agricultural chemicals
- Industrial bulk and fine chemicals
- Plastics
- Biotechnology
- Pharmaceutical
- Cosmetics
- Textiles
- Consumer products
- Petroleum
- Food processing
- Energy
- Environmental
- Automotive
- Pulp and paper
- Rubber and rubber products
- Electronics
- Private and national research laboratories
- Federal government:
  - Department of Energy
  - Environmental Protection Agency
  - Nuclear Regulatory Commission
  - Department of Agriculture

Chemical and Biomolecular Strategies

- 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

Civil Employers

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

Civil Strategies

- 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.

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

Computer Employers

- Aerospace
- Automotive
- Computer and electronics manufacturers
- Transportation
- Telecommunications
- Guidance and control systems
- Defense
- Electric power and energy/Semiconductor
- Scientific service companies (e.g., instruments, lab equipment, software)
- Electronics
- Environmental
- Medical equipment
- Chemical
- Pharmaceutical
- Computer
- Pulp and paper
- Textile and metal
- Technical service companies (e.g., intelligence, information systems, defense)
- Financial and business service companies
- National Aeronautics and Space Administration
- Federal government

Computer Strategies

- 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 Engineering

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

Electrical Engineering Employers

- Aerospace
- Automotive
- Computer and electronics manufacturers
- Transportation
- Telecommunications, guidance and control systems
- Defense
- Electric power and energy/Semiconductor
- Technical service companies (e.g., intelligence, information systems, defense)
- Scientific service companies (e.g., instruments, lab equipment, software)
- Electronics
- Environmental
- Medical equipment
- Chemical
- Pharmaceutical
- Computer
- Pulp and paper
- Textile and metal
- National Aeronautics and Space Administration
- Federal government

Electrical Engineering Strategies

- 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.

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

Environmental Employers

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

Environmental Strategies

- 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.

Industrial

- Project, program, or operations management
- Manufacturing systems
- Supply chain management and logistics
- Productivity, methods and process engineering
- Quality measurement and improvement
- Human factors
- Strategic planning
- Management of change
- Financial engineering
- Engineering management
- Six sigma
- Lean

Industrial Employers

Industries:

- Manufacturing
- Aerospace
- Transportation
- Construction
- Communications
- Electrical and electronics machinery

State and federal government including armed forces

Small businesses, start-ups, entrepreneurship

Hospitals and healthcare organizations

Education and public service agencies

Utility companies

Retail companies

Consulting companies

Banks and financial institutions

Not-for-profit organizations

Industrial Strategies

- 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 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.

Mechanical

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

Mechanical Employers

Industries:

- Automotive
- Aerospace
- Electronics
- Chemical products
- Petroleum
- Textiles
- Industrial equipment
- Heating and air conditioning systems

National Aeronautics and Space Administration

Utility companies

National laboratories

Federal government:

- Department of Energy
- Department of Defense
- Federal Aviation Administration

Mechanical Strategies

- 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.

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

Nuclear Employers

Nuclear utility companies

National laboratories

Industries:

- Medical equipment
- Power equipment
- Defense
- Aerospace

Industries continued:

- Environmental
- Waste management
- Food preservation

Hospitals

Federal government:

- Department of Energy

Federal government continued:

- National Aeronautics and Space Administration
- Nuclear Regulatory Commission
- Environmental Protection Agency
- Department of Homeland Security
- Department of Defense

Nuclear Strategies

- 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 sas extraction
- Petroleum and coal product manufacturing
- Maintenance and inspection
- Sales

Petroleum Employers

- Energy production companies
- Drilling companies
- Oil companies
- Health and safety
- Geosciences
- Procurement and construction
- 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
- Oilfield services
- Pipelines
- Petroleum companies and refineries

Petroleum Strategies

- 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, 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 Pre-Engineering Information

- 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 con text 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.