



INDUSTRY OVERVIEW: ENGINEERING

What is the field of Engineering?

Engineers apply scientific and mathematical principles to develop efficient solutions to technical problems. They find ways to take scientific discoveries and create practical applications to meet the needs of consumers and societies as a whole. From crafting artificial limbs, to building bridges, to developing new synthesization techniques for manufacturing petroleum-based chemicals, to designing the next generation of integrated circuits, engineers use their technical skills to architect, design, develop, test, produce, and maintain a wide variety of products. There are several specialties within the broad field of engineering, each with differences in work environments and skill requirements. The common denominators across all areas of engineering are generally a passion for math and science, a willingness to think “outside the box,” technical savvy, and strong quantitative abilities.

Students interested in engineering can pursue careers in the field by aligning their course of study with a pre-professional track. Students who engage in this program can either: (1) participate in a B.A./B.S. Combined Plan Program with Columbia or SUNY-Stony Brook, (2) participate in a B.A./M.S. Combined Plan Program with Columbia or SUNY-Stony Brook, or (3) independently apply for admission to an M.S. program at a graduate school of their choice after completing their Bachelor’s Degree. Students should expect to spend no fewer than three years at Yeshiva and will be required to have a B+ average in technical courses with no single grade in any of these courses being lower than a B.

Career Paths

There are several different types of work settings in which engineers are employed. In an industrial setting, engineers use their knowledge to solve problems relating to development and design. They are also involved in other technical, professional, and administrative areas of the company. In consulting firms, engineers are brought in as outside consultants to work on various projects for other organizations. They usually have a specific specialty. In a government job, engineers of all disciplines work on projects for the public good. Some engineers enter academia, where they procure grants for independent research and also help train the next generation of engineers in college or university settings. Finally, some use the quantitative and analytical skills gained from their engineering background to enter the business arena, such as in finance or venture capital.

Engineering Disciplines

Civil Engineering includes designing, constructing, and maintaining physical structures. Most civil engineers work in the construction industry, while others work for utility companies, real estate developers, and telecommunication businesses. Some civil engineers work for consulting firms and in government jobs.

Industrial Engineering involves maximizing productivity and finding the best way to utilize people, materials, and technology. Areas within industrial engineering include quality engineering, operations research, and ergonomics. Another important branch of industrial engineering in the corporate world is financial engineering, which combines engineering methods with advanced knowledge of mathematics, economics, and financial theory.

Biomedical Engineering uses engineering ideas in the areas of biology and medicine. Biomedical engineers design instruments and devices to be used in healthcare settings. This includes biomechanics, genetic engineering, and medical imaging.

Chemical Engineering uses general engineering principles and applies them to the production and/or use of chemicals. This can include designing equipment or making the manufacturing process more efficient. Chemical engineers can work in process design, quality control, computer applications, or research and development.

Energy Engineering involves the use of engineering to enhance an organization's energy efficiency. This area includes engineers from all disciplines, and there are jobs available in all sectors. These positions are typically filled from the undergraduate level. Those seeking work in this field should be up-to-date on the latest energy issues and be familiar with how energy and utility companies work.

Requirements/Skills

The combined Bachelor's and Master's degree in Engineering is often sufficient in order to obtain an entry-level position in the industry, depending upon the economy and the demand for graduates. A doctorate is often, but not always, held by those who are considered leaders in the field. Undergraduate internship opportunities, unpaid or paid, are an excellent way to develop skills and gain the experience necessary for a full-time job. Internships exist in many parts of the country, including those far removed from the New York area, so students should consider the benefits of spending a summer away from home to increase their chances of finding the right opportunity.

Engineers work on the interface between science and management. As such, both communications skills and computer literacy are critical to success in the field. Other important skills include critical thinking, logical reasoning, interpersonal skills, and the ability to work as part of a team.

P.E. Licensure

Students who obtain a B.S. may be eligible to apply for a Professional Engineer License (P.E.). This is clearly more critical in some fields of engineering than in others (e.g. allowing mechanical engineers or civil engineers to sign drawings before procuring Government agency approval, ability to testify in court as a professional witness in areas of negligence, etc.). This licensure is received through a combination of education, experience, and passing two exams: the Fundamentals of Engineering exam and the Principles and Practice of Engineering exam. These exams are not taken until either right before or after graduation. The licensing process is overseen by the National Council of Examiners for Engineering and Surveying.

Where to Find Opportunities

Many companies as well as federal agencies have internship programs posted on their websites. As always, the best methods for obtaining jobs include networking with professionals in the field, looking on employer websites, working with professional associations, and searching online job databases.

Professional Associations

National Society of Professional Engineers: www.nspe.org
American Council of Engineering Companies: www.acec.org
American Association of Engineering Societies: www.aaes.org
National Academy of Engineering: www.nae.edu
American Society of Civil Engineers: www.asce.org
Institute of Industrial Engineers: www.iienet.org
American Institute for Medical and Biological Engineering: www.aimbe.org
American Institute of Chemical Engineers: www.aiche.org
Association of Energy Engineers: www.aeecenter.org
National Council of Examiners for Engineering and Surveying: www.ncees.org

Online Job Search Resources

www.discoverengineering.org
www.engcen.com
www.graduatingengineer.com
www.engineer.net
www.thinkjobs.com
www.tryengineering.org