

Biomedical Engineer

Professional Activities

Many biomedical engineers do research, along with life scientists, chemists, and medical scientists, on the engineering aspects of the biological systems of humans and animals. Biomedical engineers also design devices used in various medical procedures, such as the computers used to analyze blood or the laser systems used in corrective eye surgery. They develop artificial organs, imaging systems such as ultrasound, and devices for automating insulin injections or controlling body functions.

Most engineers in this specialty require a sound background in one of the more basic engineering specialties, such as mechanical or electronics engineering, in addition to specialized biomedical training. Some specialties within biomedical engineering include biomaterials, biomechanics, medical imaging, rehabilitation, and orthopedic engineering.

Biomedical engineers are employed in education, industry, hospitals, research facilities of educational and medical institutions, and government regulatory agencies. They often serve a coordinating or interfacing function, using their background in both the engineering and medical fields.

In industry, they may create designs where an in-depth understanding of living systems and of technology is essential. They may be involved in performance testing of new or proposed products. Government positions often involve product testing and safety, as well as establishing safety standards for devices. In the hospital, biomedical engineers may provide advice on the selection and use of medical equipment and supervise its performance testing and maintenance.

They may also build customized devices for special health-care or research needs. In research institutions, biomedical engineers supervise laboratories and equipment and participate in or direct research activities in collaboration with other researchers with such backgrounds as medicine, physiology, and nursing. Some biomedical engineers are technical advisors for marketing departments of companies, and some are in management positions. They generally work indoors in environmentally controlled conditions, must be very exact and highly accurate in performing their jobs, are often required to wear protective or safety equipment, and require the use of their hands to handle and control objects, tools, or controls.

Educational Requirements

A bachelor's degree in engineering is required for almost all entry-level engineering jobs. College graduates with a degree in a natural science or mathematics occasionally may qualify for some engineering jobs, especially in specialties that are in high demand. The biomedical engineering student should first plan to become a good engineer who then acquires a working understanding of the life sciences and terminology, according to the Biomedical Engineering Society website. Good communication skills are also important, because biomedical engineers provide a vital link to professionals with different backgrounds.

In college, prospective biomedical engineers usually select engineering as a field of study, and then choose a discipline concentration within engineering. Some students will major in biomedical engineering, while others may major in chemical, electrical, or mechanical engineering with a specialty in biomedical engineering. Many students continue their education in graduate school, where they obtain valuable biomedical research experience at the master's or doctoral level.

When entering the job market, the graduate should be able to point to well-defined engineering skills for application to the biomedical field, with some project or in-the-field experience in biomedical engineering. Some biomedical engineers also have advanced training in other fields. For example, many biomedical engineers also have an M.D. degree, thereby combining an understanding of advanced technology with direct patient care or clinical research.

Academic Programs

[Devry University](#)

[Illinois Institute of Technology](#)

[Loyola University](#)

[Midwestern University](#)

[Northwestern University](#)

[Southern Illinois University Carbondale](#)

[University of Illinois at Chicago](#)

[University of Illinois at Urbana-Champaign](#)

Employment/Salary Outlook

Engineers have traditionally been concentrated in slower growing or declining manufacturing industries, in which they will continue to be needed to design, build, test, and improve manufactured products. However, increasing employment of engineers in faster growing service industries should generate most of the employment growth.

The aging of the population and the focus on health issues will drive demand for better medical devices and equipment designed by biomedical engineers. Along with the demand for more sophisticated medical equipment and procedures, an increased concern for cost-effectiveness will boost demand for biomedical engineers, particularly in pharmaceutical manufacturing and related industries. However, because of the growing interest in this field, the number of degrees granted in biomedical engineering has increased greatly. Biomedical engineers, particularly those with only a bachelor's degree, may face competition for jobs. Unlike many other engineering specialties, a graduate degree is recommended or required for many entry-level jobs.

State and National Wages

Location	Pay Period	2021		
		Low	Median	High
United States	Hourly	\$29.17	\$46.83	\$74.40
	Annual	\$60,680	\$97,410	\$154,750
Illinois	Hourly	\$29.55	\$44.33	\$62.99
	Annual	\$61,470	\$92,200	\$131,030

State and National Trends

United States	Employment		Percent Change	<u>Job Openings</u> ¹
	2020	2030		
Biomedical Engineers	19,300	20,500	6%	1,400
Illinois	Employment		Percent Change	<u>Job Openings</u> ¹
	2018	2028		
Biomedical Engineers	550	530	-4%	40

¹Job Openings refers to the average annual job openings due to growth and net replacement.

Professional Organizations

Biomedical Engineering Society (bmes.org)

References

Occupational Outlook Handbook, U.S. Department of Labor, Bureau of Labor Statistics
(<https://www.bls.gov/ooh/biomedical-engineer>)

O*NET OnLine (<http://online.onetcenter.org/link/summary/17-2031.00>)

Last Modified: August 16, 2022