Biomedical Engineering Career Exploration

Caleb Embree and Edward J. Lazaros

Ball State University

cmembree@bsu.edu; ejlazaros@bsu.edu

Introduction

In the past, biomedical engineering has been about using technological devices to solve medical and biological problems. The field has evolved in recent years to bridge the gap in between biology and engineering, allowing for solutions that are a combination of technology and biology working together, rather than just technological replacements and stand-ins for biological systems (Katona, 2007, p. 89). This article details information about the field of biomedical engineering, how to become a biomedical engineer, and what the pay and job outlook for biomedical engineers are. This article provides information about a lesser known engineering field that combines the sciences with engineering techniques.

Responsibilities of biomedical engineers

Biomedical engineers take problems in medicine or in biology and use their knowledge of engineering processes and of life sciences to come up with a solution to those problems. They often do this to enhance the effectiveness or quality of medicine and patient care. The solutions to these problems can come in a variety of forms. Biomedical engineers can design technology or instruments to make procedures more effective or faster, or they can make artificial organs to give to patients that need a transplant. Those that work in this field can develop new drugs and treatment for diseases. They can also design software so that doctors have an easier time diagnosing a patient and coming up with a treatment plan (U.S. Department of Labor, 2014).

In addition to designing the solutions to medical problems, biomedical engineers make sure that their solutions are safe for use. This can involve conducting research and clinical trials on proposed solutions, to make sure that they are performing at the level that is required without adverse side effects. They can oversee the installation, maintenance, and use of biomedical equipment to make sure that it is being used in a safe and effective manner (U.S. Department of Labor, 2014).

Biomedical engineers often collaborate with members of other disciplines. They often supervise technicians that are working in the lab with them. Biomedical engineers can work with clinicians and doctors to teach them how to use biomedical equipment. Often biomedical engineers will work on interdisciplinary projects, such as working with a chemist to design and synthesize new drugs, as shown in Image 1, or computer scientists to design new software. Other related career professionals that they will often collaborate with are biochemists, electrical and mechanical engineers, and surgeons (U.S. Department of Labor, 2014).

Image 1

A scientist works on synthesizing a drug in a biomedical laboratory. Taken by Linda Bartlett for the National Cancer Institute.

Subfields of biomedical engineering

There are a number of fields and specializations that fall under the category of biomedical engineering. Some key ones are bioinstrumentation, biomechanics, cellular, tissue, and genetic engineering (U.S. Department of Labor). Bioinstrumentation is the science of making instruments for biological devices, and to integrate biology with technology in medical devices and implants (NC State University, 2014). Biomechanics is the study of human movement, and of muscle strength and control (Ball Sate University, 2015). Cell and tissue engineering are related fields that use cells and biological materials to grow new tissue to help treat diseases or to grow new organs (Johns Hopkins University, 2015). Genetic engineering means manipulating and transferring the genetic materials of organisms to control the expression of genes (University of Nebraska, 2006). A genetic engineer is shown working in Image 2.

Image 2

A genetic engineer works to prepare samples of DNA for processing in a PCR machine. Taken by Daniel Stone for the National Cancer Institute.

Becoming a biomedical engineer

To gain entry in the career field of biomedical engineering, a bachelor's degree from an accredited university is required. The degree can either be in biomedical engineering, or it can be in another form of engineering combined with a graduate degree in biomedical engineering or with on-the-job training. During degree study, students should become familiar with biology and the principles of engineering design. Students should take laboratory classes and lecture classes. They should take courses in biomaterials, fluid mechanics, computer programing, and other biological sciences. Undergraduate biomedical engineering programs are accredited by ABET (U.S. Department of Labor).

Specializations such as genetic engineering often require a masters degree or a Ph.D. To advance in the field and lead a research team, biomedical engineers need to have a graduate degree. If the biomedical engineer is planning on specializing in a specific field in medicine, it is common for the engineer to go to medical school or dental school to study in that field (U.S. Department of Labor, 2014).

Pay and benefits of a genetic engineer

The U.S. Department of Labor (2014) reports that in 2012 the median wage for biomedical engineers was $86,960. The lowest 10 percent of biomedical engineers earned less than $52,600, and the highest 10 percent of biomedical engineers earned more than $139,450. The wages paid to biomedical engineers vary according to the industry they are working in. If they work in scientific research or in development, the median salary is $94,150. If they work in manufacturing medical goods and equipment the median salary is $88,850. If the biomedical engineer works in the pharmaceutical industry, their median salary is $87,340, and the median salary is $69,910 if the biomedical engineer works in local, state, or private hospitals. Finally, the biomedical engineer's median salary is $63,440 if they work at a university or college. The biomedical engineer is expected to work on a normal schedule full time, though they may be expected to work longer to meet a deadline. They receive normal benefits such as health care and a pension (U.S. Department of Labor, 2014).

Job outlook for biomedical engineers

The job outlook for biomedical engineers is expected to increase. According to the U.S. Department of Labor (2014) the jobs for biomedical engineers are expected to increase by 27% from 2012 to 2022. This equates to approximately 5,200 new jobs. Biomedical engineering is in such high demand because those in the field engage in a wide variety in activities and produce many different goods. Those goods will be in high demand because the baby boomer generation will need more biomedical devices and services, including procedures to replace hips and joints. In addition, biomedical engineers and researchers will be more in demand as public knowledge of biomedical solutions to problems continues to increase. In addition, many of the current biomedical engineers are aging and will be retiring in the near future, which will create job vacancies that will need to be filled (U.S. Department of Labor, 2014).

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