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BIOMEDICAL ENGINEERING AND ITS APPLICATION IN MEDICINE

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Resume

In this article, integrated trends in biomedical engineering, modern biological principles, applications in the field of medicine, the combination of engineering principles with biological knowledge, even helping the development of life-saving concepts, biomedical engineering of human organs and tissues as design problems, medical and solving biological problems, has traditionally been a rational science for improving medical treatment, including diagnosis, monitoring and therapy, scope of work, management of advanced medical equipment in hospitals in compliance with relevant industry standards, regular testing, preventive care, etc. Brogan’s word on display and equipment recommendations.

Keywords: biomedical engineering, mechanical engineering, electrical engineering, electronics, chemical engineering, chemistry, mathematics, surgical robot, transducers, kidney dialysis.

Today, a biomedical engineering course has been opened in higher medical educational institutions, and students of this course are studying with highly qualified specialists.

First of all, let's imagine what comes before our eyes when we say biomedical engineering. Biomedical engineering is a research field that combines engineering and medicine. Biomedical engineering studies the development of technologies and the application of principles used in medicine. The result of this research is technology that can support all types of medical care, from diagnosis and analysis to treatment and recovery.

What is studied in biomedical engineering?

Unlike other engineering fields, biomedical engineering studies and applies a thorough knowledge of modern biological principles to the engineering projects they design. Biomedical majors combine various aspects of engineering with human biology. Some areas integrated into biomedical engineering are:

- Mechanical engineering.
- Electrical engineering.
- Chemical engineering.
- Chemistry.
- Mathematics.
- Information technologies in medicine.

• Human anatomy, including molecular biology, genetics, anatomy and physiology.

• biomedical physics.

• Biomedical transducers and devices.

• Design of biomedical systems.

Key Role of Biomedical Engineers in Medicine [1,2].

In healthcare, biomedical engineers play an important role in the development of medical device technologies. Combining engineering principles with biological knowledge to meet medical needs has led to the development of revolutionary, even life-saving, concepts such as:

• Artificial organs.

• Surgical robot.

• Modern prostheses.

• New drugs.

• Kidney dialysis.

Biomedical engineering is a field that focuses on medical advances to improve human health. These include the development of advanced medical devices, such as the creation of artificial organs or advances in the identification of proteins in cells.

Biomedical engineering or medical engineering is the application of engineering principles and design concepts in medicine and biology to medical purposes (eg, diagnosis or treatment). Biomedical engineering has also traditionally been a logical discipline for the development of medical treatments, including diagnostics, medical monitoring, and therapy [3,4].

Biomedical engineering of human organs and tissues solves medical and biological problems as design problems. Since the 1950s, when X-ray examination entered mass clinical practice, engineering developments have been actively used in medicine, and by the 21st century, engineering developments are widely used in medicine. The development of biomedical engineering is now a unique field among established fields, summarizing the new transitions from those interdisciplinary specialties. This field of science and technology is designed to bridge the gap between engineering science (technology) and medicine in order to improve the quality of medical care, including the diagnosis, monitoring and treatment of diseases.

Biomedical engineering (bioengineering) is one of the fields of science and technology that studies and develops the application of engineering principles and concepts in the field of medicine and biology to create artificial organs and compensate for the lack of physiological functions (biological engineering). Before the molecular modeling and synthesis of genetically modified organisms, including cultivated plants and farm animals (genetic engineering), as well as chemical compounds with predetermined properties (protein engineering, engineering enzymology). Medical engineering combines design and problem-solving skills from engineering and the medical and biological sciences to develop health treatments, including diagnostics, monitoring, and therapies, based on fundamental principles of molecular and cellular biology.

Biomedical engineering has recently emerged as an independent research field compared to many other engineering fields. This development summarizes the new transitions from interdisciplinary specializations, which the field is now considered to be unique. This field of science and technology is designed to bridge the gap between engineering science (technology) and medicine in order to improve the quality of medical care, including the diagnosis, monitoring and treatment of diseases. In addition, in non-medical aspects, biomedical engineering is closely related to biotechnology.

The most prominent biomedical technical developments include the development of biocompatible prostheses and various diagnostic and therapeutic medical devices. Imaging devices such as clinical devices, micro-implants, magnetic resonance imaging, regenerative tissue growth, pharmaceuticals and therapeutic biologics [5,6].

The entire field of engineering is a field of innovation: ideas, skyscrapers, and everything from automobiles to aerospace engineering. The field of biomedical engineering is increasingly focused on innovative advances aimed at improving human health and wellness at all levels. As part of biomedical engineering, all aspects of chemical engineering, electrical engineering, electronics, mechanical engineering, materials science, chemistry, mathematics, computer science, and engineering are interwoven with human biology in biomedical engineering to improve human health.

Biomedical engineers analyze biological and medical problems and develop solutions to improve the quality and efficiency of patient care. The growing demand for biomedical engineers is largely due to the general shift towards the use of machines and technology in all aspects of life.

Successful biomedical engineering depends on certain characteristics. It is not true to say that all successful biomedical engineers have the same set of personality traits that set them apart. Regardless of the educational requirements for biomedical engineering, there are a number of characteristics that will benefit people interested in becoming biomedical engineers in the future.

Solving complex problems: Biomedical engineers may encounter problems for which solutions are not immediately available and must be able to review available information to develop and implement appropriate solutions.

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Because the field of biomedical engineering is based on science and technology, a successful biomedical engineer typically must have a solid understanding of scientific methods and principles and be able to apply them to work. Biology, physics, general engineering, and technology are all biomedical engineers must be proficient in. In a situation where there are multiple options, experienced biomedical engineers should be the ones who can weigh the outcomes of each available option to determine the most reasonable option given the available resources.

In addition to the ability to solve complex problems while thinking critically, biomedical engineers must be able to use logic and reasoning to determine how to approach a problem. There are two answers to the question of whether a course in biomedical engineering depends on how deeply a student is willing to study the field. Typically, you only need to complete high school and earn a bachelor's or master's degree in biomedical engineering. This will be enough to officially qualify as a biomedical engineer. It depends on how deep the student wants to go, as some students want to continue their studies until they get a PhD in biomedical engineering, while some students stop after getting a bachelor's degree in this field. Generally, a bachelor's degree in biomedical engineering takes four years to become recognized in the field.

How Long Do Biomedical Engineers Take? How long a biomedical engineer stays in school depends on whether the engineer wants to gain more skills in the field or just stop at the bachelor’s level. Biomedical engineering students can be taught using various pedagogical technologies in teaching computer science based on the pedagogical skills of the teacher. For example, in the teaching of circuit engineering, we focus on teaching using the “Blitz Questionnaire” or “Correct Placement” method by consolidating current, intermediate and final knowledge [7,8].

With the help of this method, we can focus students on the correct organization of the sequence of actions, on logical thinking, on the basis of the studied topic, on learning to choose many different opinions and information. Through this technology, students are able to communicate their independent thoughts to others because this technology provides the perfect environment for this. Purpose: to determine the level of mastery of a new topic, the state of completion of homework assignments, to give insights into what students know about the topic before passing the new topic and what they will learn at the end of the lesson, to use this method in working with students by dividing them into small groups. guarantees positive results. When using this method in the course of the lesson, the following sequences are implemented:

A special handout is prepared by the professor-teacher, which expresses the concepts that serve to illuminate the essence of the subject being studied in a logical sequence.

Each group member is given a handout and tasked with placing the concepts in a logical sequence based on their concepts. After the groups have completed the task, the professor will give the correct answer. The extent to which the task was performed correctly is determined and evaluated. The advantage of the "Blitz" method technology is that in this process, students learn the skills of studying the topic in certain parts and identifying the logical connection and connection between the parts based on analysis and synthesis.

The use of the “Blitz” or “Correct placement” method in the course of the lesson helps students and professors work together actively.

“Blitz” or “Correct placement” method, like the above-mentioned methods, can be used in the educational process, and it gives good results in working individually and as a team. This method aims to help students work with texts during the lesson, to consolidate and remember the learned topic, to learn what they don't know, to repeat what they know, and most importantly, to determine the level of mastery, that is, to evaluate everyone. It is recommended to use these methods in current, intermediate and final evaluations.

In summary, biomedical engineering or medical engineering is the application of engineering principles and design concepts in medicine and biology to medical purposes. It has traditionally been a logical science to improve medical treatment, including diagnosis, monitoring, and therapy. The job scope of a biomedical engineer also includes managing advanced medical equipment in hospitals while adhering to relevant industry standards. This includes procurement, routine testing, preventive maintenance, and equipment recommendations, a role used in technical or clinical engineering for biomedical equipment.

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