

Perspectives for Biomedical Engineering Education

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There have been dramatic advances in biomedical engineering in recent years, and its scope has been expanding rapidly. The large amounts of biological data obtained from genomic, molecular and cellular levels of studies have led to increasing needs of quantitative treatment and engineering analysis to synthesize the complex information into a systematic body of knowledge that will lead to the emergence of new concepts and technologies. These results also need to be assimilated with those derived from research at the tissue, organ and system level, so that there can be a continuity across the biological hierarchy of multiple scales, culminating in the understanding of whole body functions in health and disease. Therefore, the education of biomedical engineering students need to take an integrative approach, i.e., to integrate between biomedical and engineering sciences, across biological scales, and among basic research, clinical translation and industrial application. In order for the students to become fully competent in such an integrative approach, they need to have strong grounding in fundamental science subjects (mathematics, physics and chemistry) and gain competence in biological sciences and engineering. In addition, they need to receive adequate education in the humanities and social sciences (including ethics), because the application of biomedical engineering in different forms of career is always directed at people and society. With the remarkable advances in novel concepts and technologies, the amount of information a student needs to learn is beyond what can be covered by a regular curriculum. It is critical to develop an attitude and ability for active learning so that the student will learn with motivation and interest, rather than for passing the examinations. The faculty should use a multitude of teaching approaches to maximize the efficacy of teaching and learning, all of which should aim at raising the student's interest and facilitating the knowledge transfer. It is also essential to have a greater emphasis on hands-on experience, including laboratory experiments and internships. We need to adopt a new paradigm of education in order to produce the biomedical engineers equipped to contribute to this rapidly advancing field for the realization of its vast opportunities and potentials.