



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
2006 Volume V: Engineering in Modern Medicine

Mathematics in Bioengineering: Its Application for Today's Students

Guide for Curriculum Unit 06.05.08
by Hermine Smikle

What is Bioengineering? Bioengineering is engineering that is applied to human health. Because human health is concerned with different aspects of our bodies not just the physical aspects, biomedical engineers are concerned with all aspects and a wide range of problems that affect humans. As with the work of other engineers, the work of bio engineers is not always seen by the general public. The work of biomedical engineers --like that of social engineers, mechanical, structural engineers, and other types of engineers -- is concerned with the improvement of conditions for the society. From the bioengineering point of view, the body is considered another system, therefore it needs to be maintained, to be analyzed if problems arise and parts replaced when broken.

This unit addresses drug delivery systems and the biocompatible materials used; how the drug delivery systems and the body interact; and the connections to the mathematics curriculum. This unit aims to present and explain the mathematical models that are used in the study of drug delivery systems. An attempt will be made to make the mathematical concepts applicable to both topics in the domain of both middle school and high school mathematics standards. This unit addresses the content standards that involve linear functions and graphs; exponential functions (used to describe growth and decay); area under the curve; proportion and proportional reasoning and its application; the concept of increase and decrease of volume with respect to time; and the application of graphs to show the concentration of drugs in the blood stream, and the increasing and decreasing quantities over time.

Included in this section will be sample problems that will provide examples necessary and written to provide practice in solving CAPT-type problems. These problems will be written so that they will employ mathematical strategies from algebra 1 through to calculus classes. Efforts will be made to provide a sample scenario that could be used for reading for interdisciplinary information for a high school science and or math class.

(Developed for AP Calculus, grades 11-12; recommended for Mathematics, grades 11-12)

<https://teachersinstitute.yale.edu>

©2021 by the Yale-New Haven Teachers Institute, Yale University

For terms of use visit <https://teachersinstitute.yale.edu/terms>