BE.010 Spring 2005
Session #4 notes

Bioengineering at MIT

Outline of this session:
- overview of the new Biological Engineering (BE) undergraduate major at MIT

note: the following is a summary of the new SB Degree in Biological Engineering at MIT by the School of Engineering Biological Engineering Division

Introduction

Professor of Biological and Mechanical Engineering Linda G. Griffith is the director of the Biotechnology Process Engineering Center at MIT. She is interested in the applications of tissue engineering to replace damaged body parts, such as lost cartilage in the bone.

SB in Biological Engineering

The molecular and genomic revolutions in the past decades paved the path for a greater degree of overlap between two previously distinct fields. These revolutions made it possible for researchers to explore and develop new engineering applications to biology. The new undergraduate degree program in BE at MIT was developed in response to these changes. Proposed by the School of Engineering Biological Engineering Division and co-chaired by Linda G. Griffith and Roger D. Kamm, it is designed to be an extension to the PhD program in BE at MIT.

Biological Engineering vs. Biomedical Engineering

The BE major stands distinct from Biomedical Engineering (BME). While BE employs engineering to the life sciences, particularly to biology, BME makes use of a wide range of engineering techniques to advance clinical medicine specifically. The emphasis on biology in BME is not always stressed.

Students majoring in BE have a much broader view of engineering applications in biology when compared with students in BME. The MIT schools of science and engineering are working to develop a wide range of options with which to explore biological engineering, such as BME, Mechanical Engineering (course 2a), Electrical Engineering (course 6) with a biology related concentration, among others. These options will be discussed on greater detail in future session notes.

Biological Engineering Roadmap

Students with no advanced credit use year 1 to complete MIT's general institute requirements (GIR's). Years 2 and 3 are spent taking a variety of courses in biology (course 7), chemistry (course 5) and biological engineering. Laboratories supplement classes by providing the necessary hands-on experience. Year 4 is devoted to electives and a final, capstone design project.

Year 1
3.091/5.11x Chemistry

7.01x	Biology I
8.01	Physics I: Mechanics
8.02	Physics II: Electricity and Magneticism
18.01, 18.02	Calculus I, II
BE.010J	Introduction to Bioengineering (optional)

Year 2

BE.109	Laboratory Fundamentals in Biological Engineering
BE.110/2.772	Thermodynamics of Biomolecular Systems
BE.180	Biological Engineering Programming
BE.320	Biomolecular Kinetics and Cell Dynamics
5.12	Organic Chemistry
18.03	Differential Equations

Year 3

5.07	Biochemistry
7.03	Genetics
7.06	Cell Biology
BE.181	Biological Engineering Computation
BE.310	Molecular, Cellular, and Tissue Biomechanics
BE.330	Fields, Forces, and Flows in Biological Systems

Year 4

BE.309	Biological Engineering II: Instrumentation and Measurement
BE.380	Capstone Design Project
2 BE electives	(in Pharmacology/Toxicology, Cell and Tissue Engineering, Systems Biology, and/or Microbial Systems)