

EE 480 Introduction to Biomedical and Clinical Engineering

Credits: 3

Categorization of credits: engineering topic

Instructors or course coordinator: Olga Boric-Lubecke

Textbook and Other Required Materials: “Introduction to Biomedical Engineering,” J. Enderle, S. Blanchard, and J. Bronzino, Elsevier

Designation: Elective

Catalog Description: EE480 Introduction to Biomedical and Clinical Engineering (3)
Application of engineering principles and technology to biological and medical problems. Introduction to human anatomy, physiology, medical terminology, clinical measurements. Systems modeling, physiological control systems, computer applications, health-related problems. Pre: 213 and either MATH 244 or MATH 253A.

Prerequisites: EE213 (Basic Circuit Analysis II) and either MATH 244 or MATH 253A.

Class Schedule: 3 lecture hours per week

Topics Covered:

- Biomedical Engineering in Modern Health Care Systems
- Ethical and Regulatory Issues
- Anatomy and Physiology
- Biomechanics
- Biomaterials
- Tissue Engineering
- Bioelectric Phenomena and Electrical Safety
- Bioinstrumentation
- Biomedical Sensors
- Biosignal Processing
- Medical Imaging
- Rehabilitation Engineering and Prosthetics

Course Objectives and Their Relationship to Program Objectives:

Student should understand (i) principles of applying engineering to biology and medicine, (ii) basic physiology, (iii) principles of biomedical instrumentation operation, (iv) ethical issues associated with development, testing, and use of biomedical instrumentation, and (v) develop skills for biomedical instrumentation system design and application in modern health care systems.

[Program objectives this course addresses: 1, 2, and 5]

Course Outcomes and Their Relationship to Program Outcomes:

The following are the course outcomes and the subset of Program Outcomes (numbered 1-7 in square braces "[]") they address:

1. An understanding of applying engineering principles to design of biomedical devices. [1]
2. An understanding of ethical and societal impact of developing, testing, and using biomedical devices. [4]
3. An understanding of anatomy and physiology. [1]
4. An understanding of biomechanics and biomaterials.[1]
5. A knowledge of bioelectric phenomena and principles of bioelectric measurements. [1, 4]
6. An understanding of different modalities of medical imaging, including radiation imaging, ultrasound, and MRI. [1, 4]
7. An understanding of rehabilitation engineering, prosthetics, and tissue engineering. [1, 4].
8. A knowledge of electrical safety issues and approached to protection. [1, 2, 4]
9. An ability to design a biomedical device. [1, 2, 3, 4, 6]

Contribution of Course to Meeting Professional Component

Engineering Topic: 100%

Computer Usage:

All class materials and announcements are posted on Lulima. Students use MATLAB for some homework problems, and Microsoft Office or equivalent to prepare their project presentations and reports. Students use IEEE Xplore, Goggle Scholar and similar search engines to find references for their projects.

Design Credits and Features:

There is 1 design credit for EE 480. Design is incorporated into the final project for the course. Each student may work individually or in a team of no more than 2 students to design a biomedical device of their choice. Students submit project proposals and give proposal presentations in the middle of the semester, and submit 1 final project reports and give final project presentations at the end of semester.

Person Preparing Syllabus and Date: Olga Boric-Lubecke, Oct. 13, 2014. Modified by A. Ohta, Jan. 20, 2021.