THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Introduction to Biomedical Engineering

BIOMEDE 2000

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture

Course Description:
Fundamentals in biomedical engineering with emphasis on problem-solving, design process, and societal/ethical impact.

Prerequisites and Co-requisites:
Prereq: Math 1172, Engr 1182 or equiv., Chem 1220, Physics 1250, and enrollment in the BiomedE major or pre-major. Concur: Biology 1113, MechEng 2040, and Math 2173 or equiv.

Course Goals / Objectives:
- Learn to apply engineering principles in the biomedical context.
- Build community/network with peers, instructors, and the BME department.
- Gain awareness of career options by connecting course content with job titles, skills, and various pathways for BMEs.
- Appropriately define and describe systems in biomedical engineering contexts (ABET SLO 1).
- Implement the methodology for solving engineering problems (assemble, analyze, calculate, finalize) to setup and solve problems within the biomedical engineering context (ABET SLO 1)
- Analyze biomedical devices using conservation of mass and/or momentum; use analyses to propose device design improvements (ABET SLO 2).
- Evaluate the interactions between humans and biomedical devices (e.g., assistive devices for arthritis and cobalt hip implants) using knowledge of biology and/or physics (ABET Program b).

Course Topics:

- Course Overview and Expectations, Problem Solving Method & Foundations of Conservations Principles, Units, Dimensional Analysis, Clinical Case Study
- Mass Accounting & Conservation Basics, Open Systems- (Vascular Health, Tissue Scaffolds)
- Multicomponent and multiple unit Mass Systems in BME (Pharmaceutical processing, Drug delivery)
- Dynamic Mass Systems in BME (Drug delivery, Tissue Scaffold design)
- Mini Project 1: Evaluation of Cobaltism from Hip Implant Case Study
- Momentum Accounting and Conservation Basics in BME (Human motion)
- Rigid Body Static Systems Cont. (weight lifting, sports medicine)
- Impulse Momentum Theory, Force Platform (Human Motion, crash safety)
- Mini-Project 2: Rehabilitation Engineering & OT/PT Guest Lecture & Assistive Devices Redesign mini-project
- Fluid Static Systems- in BME (Cell Mechanics)
- Steady State Momentum with Mass Exchange in BME (Hemodynamics)
- Reynolds #, Friction loss (Korotkoff sounds, Atherosclerosis)
- Bernoilli Systems (in cardiac devices, etc).
- Mini Project 3: FDA Engineer Guest Lecture & Microfluidic Drug Delivery Design Project

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Designation:
Required