

## **BMED 2310 Intro Biomed Engr Design (Required)**

**Catalog Description:** BMED 2310 Problems- Biomedical Engr II (1-6-3)  
Prerequisite(s): BMED 2210 and BMED 2250 (w/ minimum grade of “C” in both) Biomedical engineering problems from industrial and clinical applications are addressed and solved in small groups using problem-based learning methodologies.

**Textbook:** Engineering Design: A Project Based Introduction, Dym and Little, Wiley (2008)

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### **Topics Covered:**

1. Real World Design Problems in Biomedical Engineering
2. Engineering Design Concepts, Tools, and Methodologies
3. Usability & Human Factors
4. Computer Aid Designing (CAD)
5. Introduction to Intellectual Property
6. Introduction to Regulatory Strategies in the U.S. (FDA)
7. Ethics in the engineering profession
8. Visual Communication Tools (sketches, CAD, modeling, and prototyping)

### **Course outcomes:**

Students who complete this course will be able to:

Outcome 1: Explain the “big picture” of engineering design (Student Outcome c)

- 1.1 Differentiate engineering analysis and design
- 1.2 Characterize design problems and the process used to solve them
- 1.3 Explain the relationship between form and function of a product

Outcome 2: Define, formulate, and solve design problems (Student Outcomes c and d)

- 2.1 Characterize the different types of design problems, decompose and diagram a product’s components, and select and apply design problem solution strategies
- 2.2 Describe the overall process of formulating a design problem, determine customer and company requirements, and prepare an engineering design specification
- 2.3 Establish a consensus among members of a design team

Outcome 3: Create concept designs, build and test prototypes (Student Outcomes b, c, and k)

- 3.1 Describe and apply function decomposition diagrams
- 3.2 Distinguish alternative design concepts as different, generate alternative design concepts, and evaluate concepts using weighted rating methods
- 3.3 Describe why companies build and test parts and products, and describe tests to validate form, fit, and function
- 3.4 Characterize traditional and rapid prototyping processes

Outcome 4: Select appropriate materials, and design for failure, safety, tolerances and environment (Student Outcome c)

- 4.1 Explain the interdependency of product function, material, process, and geometry

- 4.2 Describe fundamental material classes and properties, establish criteria for screening materials, and explain the differences between dimensions and tolerances
- 4.3 Identify product failure modes, establish failure mode causes, likelihood, detectability, and describe and apply safety hierarchy fundamentals
- Outcome 5: Consider human factors/ ergonomics (Student Outcome c)
  - 5.1 Describe the human machine system model, specify human limitations for applying forces and torques, and specify the size and range of motion limitations
  - 5.2 Describe and apply strategies for design for fit
- Outcome 6: Understand the standards for professional conduct within the biomedical engineering community (Student Outcomes f and g)
  - 6.1 Generate effective written reports
  - 6.2 Construct and present effective oral presentations
  - 6.3 Understand what constitutes ethical conduct within the engineering profession

**Correlation between course outcomes and student outcomes:**

<b>BMED 2310</b>											
Course outcomes	Biomedical Engineering Student Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
1.1			X								
1.2			X								
1.3			X								
2.1			X								
2.2			X								
2.3				X							
3.1			X								
3.2			X								
3.3		X	X								X
3.4											X
4.1			X								
4.2			X								
4.3			X								
5.1			X								
5.2			X								
6.1							X				
6.2							X				
6.3						X					