

BMED 4602 Capstone Design (Required)

Catalog Description: BMED 4602 Capstone Design (1-6-3)
Prerequisite(s): BMED 2310 and BMED 3610 (w/ concurrency). Team-oriented design project in biomedical engineering, incorporating engineering standards and realistic design constraints. Includes introduction to relevant regulatory, intellectual property, and business management topics.

Textbook: Design of Biomedical Devices and Systems, 2nd edition, King and Fries, Marcel-Dekker (2008)

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Topics Covered:

1. FDA Regulatory Guidelines
2. Identifying and collecting User Needs
3. Development of Design Inputs
4. Intellectual Property
5. Concept Generation and Selection
6. Human Factors Engineering
7. Concept Development and Prototyping
8. Marketing
9. Societal Impact

Course outcomes:

Students who complete this course will be able to:

Outcome 1: Develop a biomedical engineering design solution for a client (Student Outcomes c, e, g, and k)

- 1.1 Develop a problem statement and design requirements/constraints for a design problem of interest to a client
- 1.2 Use design requirements/constraints to develop a design solution by evaluating a number of alternative designs
- 1.3 Build a prototype, model, or related proof of concept of a design

Outcome 2: Understand the non-engineering challenges that must be overcome to develop an effective design solution to a biomedical engineering problem (Student Outcomes f and h)

- 2.1 Identify and describe the potential social impact and ethical concerns within the United States associated with a design. For IP students, identify and describe the potential social impact and ethical concerns within the country of the student's international program (IP) experience.
- 2.2 Explain the pre- and post-market impact of FDA regulations. For IP students, explain the pre- and post-market impact of the regulatory body in the country of the student's IP experience.

Outcome 3: Understand and communicate a final design and the multiple constraints and considerations that were involved in its creation (Student Outcomes c and g)

- 3.1 Create and deliver an effective written report that describes a final design and its rationale
- 3.2 Conduct and communicate an analysis of critical processes, components or assemblies, CAD drawings, costs of production, material selection and rationale, and manufacturing considerations.

Correlation between course outcomes and student outcomes:

BMED 4602											
	Biomedical Engineering Student Outcomes										
Course outcomes	a	b	c	d	e	f	g	h	i	j	k
1.1			X		X		X		X	X	
1.2			X		X						X
1.3			X								X
2.1						X		X			
2.2							X	X			
3.1							X				
3.2			X				X				X

The Wallace H. Coulter Department of Biomedical Engineering Student Outcomes:

- a. an ability to apply knowledge of mathematics, science, and engineering;
- b. an ability to design and conduct experiments, as well as to analyze and interpret data;
- c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, societal, political, ethical, health and safety, manufacturability, and sustainability;
- d. an ability to function on multidisciplinary teams;
- e. an ability to identify, formulate, and solve engineering problems;
- f. an understanding of professional and ethical responsibility;
- g. an ability to communicate effectively;
- h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- i. a recognition of the need for, and an ability to engage in lifelong learning;
- j. a knowledge of contemporary issues;
- k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;