BME 495
Capstone Design I

The Department of Biomedical Engineering

CLASS HOURS
Tuesday 1pm -2:00 pm (Lecture)
Fens 698
Thursday 10:00am – 12:50 pm, (Teamwork)
FMH 203

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OFFICE HOURS
Dr. J. Schesser
Meetings by appointment (Fenster 610)
(973) 596 3193 joelsd@njit.edu
Dr. G. Collins
Meetings by appointment (CHEN 201)
(973) 596 6496 george.collins@njit.edu

TEXT
None. Supplemental handouts will be provided as needed.

COURSE DESCRIPTION:
Prerequisites: BME 372 or BME 420 or BME 351 Senior standing or permission of the instructor. To provide students with the guidance to choose a capstone design topic and advisor and to prepare the design proposal. The course introduces the student to the definition of design as well as introducing issues of intellectual property, bioethics and safety, and professional societies. This portion of the project includes library research, time and cost planning, oral and written reports, as well as construction, troubleshooting and demonstration of a working prototype.

LEARNING OUTCOMES:
By the end of the course you will be able to do the following:
1. Project Implementation: Define the development of a biomedical engineering technology-based project. Develop engineering documentation for the selected project.
2. Use effective research and critical thinking skills while also developing an understanding of ethical issues in research and design.
3. Perform multi-disciplinary teamwork, including written and verbal communication skills, while monitoring project progress using planning and milestone management.

TOPICS:
- Design specifications development and traceability
- Design reviews
- Industrial design, ergonomics, performance, aesthetics
- Reliability and performance testing
- Test plans
- FDA
- Regulatory issues
- Ethics in biomedical engineering

COURSE OUTLINE*:

Wk#, Tuesday	Lecture (Tuesday)	Status (Thursday)	Deliverables This Week
1: 1/21	Review of Course - Stretch to 2:20 - Development Projects - Forming a Team Presentations - Reports - Research	- Customer Needs - Design Concepts - Advisor Agreement Team Work	TBD
2: 1/28	- Development Projects - Forming a Team	Faculty Presentations	TBD
3: 2/4	Faculty Presentations	Team Work	**Team Membership (T)** **Selected Project (T)**
4: 2/11	Evaluation of Design Concepts Researching your Design	Team Work	**Customer Needs (T)**
5: 2/18	Using the Library	Team Work	**Advisor Agreement (T)** **Three Design Concepts (T)**
6: 2/25	Plagiarism	Team Work	**Evaluation of Designs (T)** **Background & Market Research (T)**
7: 3/4	Midterm Presentations	Team Work	**Background & Market Research (T)**
8: 3/11	Midterm Presentations	Team Work	**Background & Market Research (T) Technical Research (T)**
Spring Break			
9: 3/25	-Plan of Work and Scheduling Status Reports	Midterm Presentations	**Technical Research (T)**
10: 4/1	- Design Requirements Design Reviews Human and Animal Testing	Wellness Day: No Classes	**Last Technical Research accepted (T)**
11: 4/8	How to develop a final presentation	Team Work	**First Draft of Functional Requirements (T)**
12: 4/15	- - How to develop a final presentation - Plan for the Summer break -	Team Work	**IRB application (T)** **Human Subjects Testing (I)**
13: 4/22	- How to develop a final presentation - Plan for the Summer break	Team Work	**Next Draft of Functional Requirements (T)**
14: 4/29	- How to develop a final presentation - Plan for the Summer break	Team Work	
15: 5/6	**Final Presentations Thursday Schedule**		**Final Presentation and Final Report emailed Presentation eve 8pm MAY 6**

***The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course outline and schedule verbally and via the website schedule.**

Assignments and guidelines for deliverables will be made available via email and the website throughout the term. You are responsible for monitoring your email for timely messages.

GRADING:-

- 25% - Midterm Presentation (Individual and Team grade)
- 10% - Final Report (Executive Summary) (Team grade)
- 30% - Final presentation (Individual and Team grade)
- 35% - Quizzes/HW, Performance Review, Attendance, Team Assessments from Instructors and Customer (Individual)

Additional Information on Grading

- Quizzes are unannounced and may cover any information covered in class.
- Final Reports are due at the start of the final presentations.
- Teams are expected to invite customers to all presentations and demonstrations.
- Teams must get customer approval for all demonstrations **before** they are presented to instructors.
- CUSTOMER FEEDBACK FORMS ARE REQUIRED AND PART OF YOUR GRADE.

Honor Code Violations/Disruptive Behavior:

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted.

No eating or drinking is allowed at the lectures, recitations, workshops, and laboratories. Cellular phones must be turned off during the class hours.

BME 495: Learning Outcome Summary

Strategies and Actions	**Student Learning Outcomes**	**Outcomes (a-m)**	**Prog. Object.**	**Assessment Methods/Metrics**

ABET Outcomes expected of graduates of BME BS program by the time that they graduate:

(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, social, political, ethical, health and safety, manufacturability, and sustainability
(D) an ability to function on multi-disciplinary 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 life-long learning
(J) a knowledge of contemporary issues
(K) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
(L) an understanding of biology and physiology
(M) the capability to apply advanced mathematics (including differential equations and statistics), science, and engineering to solve problems at the interface of engineering and biology
(N) an ability to make measurements on and interpret data from living systems
(O) an ability to address problems associated with the interaction between living and non-living materials and systems