BME 495
Capstone Design I

The Department of Biomedical Engineering

CLASS HOURS
Section 003 and HM3: Fenster 698
Monday 8:30am -11:20 am (Team Work)
Section 001 and HM1: Fenster 698
Tuesday 8:30am -11:20 am (Team Work)
All: Room: GITC 1100
Friday 10:00pm – 11:20 am (Lecture)

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#, Monday	Lab/Status (Monday/Tuesday)	Lecture (Friday)	Deliverables This Week
1: 9/01	- No Monday Class - Tuesday Class ONLY	Review of Course - Development Projects - Forming a Team Presentations - Project Flow - Reports - Research - BME & Makerspace Training	
2: 9/08	Faculty Presentations	Team Dynamics Customer Needs Design Concepts	Completion of Makerspace 101 training
3: 9/15	Faculty Presentations	Development Projects Forming a Team Advisor Agreement Team	**Team Membership (T)** **Three Projects (T)** **Completion of Makerspace 103 training** **BME training 9/20**
4: 9/22	Team Work	Customer Needs Design Concepts Plagiarism Researching your Design	**-Selected Project (T)** **-Customer Needs (T)**
5: 9/29	Team Work	Using the Library	**-Advisor Agreement (T)** **--**
6: 10/06	Team Work	Work Evaluation of Design Concepts Business Conduct	**-** **-Three Design Concepts (T)** **-Background & Market Research (I)**
7: 10/13	Team Work	- Status Reports Plan of Work and Scheduling - MS Project	**- Evaluation of Designs (T)** **Background & Market Research (I)**
8: 10/20	Team Work	Midterm Presentations -Design Requirements -Design Reviews -Typical Requirements	**Technical Research (I)** **Background & Market Research (I)**
9: 10/27	Team Work	Midterm Presentations	**Technical Research (I)**
10: 11/03	Midterm Presentations	Midterm Presentations	**On 11/3: Midterm Presentation by 9pm**
11: 11/10	Team Work	-Human and Animal Testing	**First Draft of Requirements Document(T)**
12: 11/17	Team Work	- Final Presentation -Final Report/Executive Summary	**1) Human Subjects Testing (I)** **2) IRB application (T)**
13:11/24	Team Work/No Class for Tuesday	-11/27 -Final Presentation -Final Report	**Second Draft of Requirements Document**
14: 12/01	Team Work	Final Presentations y	**Draft of final Presentations Monday/Tuesday** **On 12/5: Final Presentation and Final Report emailed by 8pm**
15:12/08	Final Presentations	No Class	**On 12/5: Final Presentation and Final Report emailed by 8pm**

***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 20% (Individual) 15% (Team)

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