



DEPARTMENT OF BIOMEDICAL ENGINEERING

BME 495 – Capstone Design I

3 Credits, 5 Contact hours

Instructor: Joel Schesser, Ph.D.

Textbook(s)/Materials Required: Class lecture notes

Description:

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.

Prerequisites by topic:

Senior standing and (BME 372 or MTSE 301 or (Mech 236 and Mech 320))

Course Learning Objectives:

1. Identify a biomedical problem or need and propose the design of a biomedical engineering technology-based project to meet those needs using the engineering design process, using standard engineering methods to document the customer needs/requirements.
2. Students will be able to generate design concepts from customer needs, high level specifications, design specifications and requirements to explore tradeoffs in the design process.
3. Students will be able to generate a competitive analysis and identify constraints that will affect the design, including several relevant fields such as regulatory issues, size, weight, time, cost, safety, testing with animals or human subjects, working with tissues, etc.
4. Student can create and manage project plan with schedule, tasks, budget and risk analysis.
5. Students can use effective research and critical thinking skills while developing an understanding of ethical issues in research and design.
6. Students can successfully perform multi-disciplinary teamwork, including written and verbal communication skills, while monitoring and updating project progress using planning and milestone management.
7. Students act in a professional manner including identification of skills needed to acquire, sharing responsibilities, and professional meeting attendance.
8. Students recognize the need for outside of classroom learning including keeping abreast with industry-wide professional technical engineering documentation skills.

Student Outcomes:

BME 495 Course Learning Outcome (CLO) is - ability to design a system, component, or process to meet needs with realistic constraints

ABET Student Outcome 2 - an ability to apply engineering design to produce solutions that meet specified needs with consideration of **public health, safety, and welfare, as well as global, cultural, social, environmental, and economic**

factorsRelated CLOs: 1,2,3,4,5

BME 495 Course Learning Outcome (CLO) is - ability to function on multi-disciplinary teams

ABET Student Outcome 5 - an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Related CLOs: 4,6,7

BME 495 Course Learning Outcome (CLO) is - ability to identify, formulate, and solve engineering problems

ABET Student Outcome 1 - an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Related CLOs: 1,2,3,4

BME 495 Course Learning Outcome (CLO) is - understanding of professional and ethical responsibility

ABET Student Outcome 4 - an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Related CLOs: 5,7

BME 495 Course Learning Outcome (CLO) is - ability to communicate effectively

ABET Student Outcome 3 - an ability to communicate effectively with a **range of audiences**.

Related CLOs: 6

BME 495 Course Learning Outcome (CLO) is - broad education to understand the effect of engineering solutions in a global, economic, environmental, and societal context

ABET Student Outcome 4 - an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Related CLOs: 1,2,5

BME 495 Course Learning Outcome (CLO) is - recognition of and an ability to engage in life-long learning

ABET Student Outcome 7 - an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Related CLOs: 5,8

BME 495 Course Learning Outcome (CLO) is - knowledge of contemporary issues

ABET Student Outcome 2 - an ability to apply engineering design to produce solutions that meet specified needs with consideration of **public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors**

Related CLOs: 1,2,5

Topics:

Industry Standard Product Development

Identifying Customer Needs

Market and Technical Product research

Teamwork Skills

Design Evaluation

Establishing Product Requirements

Project management and Microsoft Project

Intellectual Property

Animal and human subject testing

Budget and risk analysis

Professional Component: Biomedical Engineering Core Topics