

To: UMMS Faculty with an interest in student mentoring and medical product innovation

From: Katherine Luzuriaga

Director, University of Massachusetts Center for Clinical & Translational Science
(UMCCTS)

Bryan Buchholz
Chair, Biomedical Engineering, UMass Lowell

Re: Preparing Engineers for Professional Practice: Interdisciplinary Senior Design Projects

Purpose

Undergraduate engineering majors at UMass Lowell complete a senior design project (two semester course) as a capstone to their degree. The purpose of this course is to give students skills in carrying out a project in a multidisciplinary team for a designated client, just as practicing engineers. This project requires the integration of skills developed throughout their undergraduate studies to solve the problems defined in the project. The developed solution(s) in this major design experience must adhere to engineering standards as well as the problem's constraints. The solution must consider all relevant economic, sustainable, ethical, social, environmental, health and safety, political, and legal issues, as they pertain to the problem. These factors should be addressed and documented as appropriate. Thus, students also acquire additional experience in delivering presentations and technical writing.

Project Definition

To provide realism to this course, we invite UMMS Faculty to provide problem statements for the students to solve in this course. The problem statement will identify a pressing health care/laboratory problem, and if a project is selected, the faculty sponsor will be invited to help mentor the student team over the two semesters.

Format

Teams of 4 to 6 students composed of Biomedical, Chemical, Computer, Electrical, Mechanical and/or Plastics will be formed and assigned to the project. Each student is expected to spend 10-12 hours per week on the project, which should include quantitative and qualitative aspects. All project groups meet with the instructor weekly throughout the semester for topics such as project management, process improvement, dealing with clients, and technical communications, as well as relevant technical topics. They also meet weekly with their faculty coaches for specific project topics, either in person or virtually.

Project team requirements

- Weekly update memos detailing project progress.
- Preliminary Report to define the problem and objective in the first semester.
- Problem Clarification Report and Presentation due at midterm of first semester.
- Solution Proposal Report and Presentation due at the end of first semester.
- Project Update Report and Presentation due at midterm of second semester.
- Final Report and presentation due at the end of second semester.

Course Support

We invite our UMMS faculty to support this program, as this course is fully supported by funds from the UMCCTS and gifts from our friends and partners. Donated funds are used to support materials and equipment required to complete the projects. Note that any gift is not considered

a contract for deliverables, but merely support for the educational and professional development of our students.

Application Process

Faculty Name, Title and Contact Information (Phone and Email):

This person serves as the faculty sponsor at UMMS.

Statement of the Problem:

Provide a ½-1 page problem description. Be sure to describe the health care/laboratory problem, unmet need/gap in care, and how it's handled today. Note that the project should be scoped for a team of 4-6 students each working 10-12 hours per week over two semesters (20 weeks), or 800-1200 hours.

Expected Solution:

Although the students will develop the solution, describe the expected form of the solution (prototype medical device, software program, etc.) to provide guidance to the team in terms of expected outcomes.

Required Team Skillset:

Describe the relevant skills that are necessary to complete the project, including any software expertise. Historically projects have focused on medical devices, biomanufacturing, and imaging- however projects from all areas are welcome. For the team of 4-6 students, define the ideal composition of Biomedical, Chemical, Computer, Electrical, Mechanical and/or Plastics Engineering students (if known). Additional details and examples of previous projects can be found at <https://www.uml.edu/engineering/experiential-learning/capstone/>. The links on the left will take you to the individual projects from the past few years.

Project Restrictions:

Note any project restrictions that may limit the assignment of students to the project, such as citizenship requirements, access to restricted data or equipment, etc. UMass shall not assume responsibility for export control compliance without proper notice, and written consent from its Office of Institutional Compliance.

Email completed project proposals to:

Nate Hafer, UMCCTS Director of Operations

nathaniel.hafer@umassmed.edu

Key Dates

Problem statement due date: Fri August 6, 2021

Project Selection: Fri August 27, 2021

Course begins: September 2021

Course end: May 2022