

To: UMass Chan Faculty with an interest in mentoring and medical product innovation

From: Katherine Luzuriaga
Director, University of Massachusetts Center for Clinical & Translational Science (UMCCTS)

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Re: Bridging Engineering and Medicine (BEAM): Interdisciplinary Senior Design Projects

Purpose

Undergraduate engineering majors at UMass Amherst, UMass Dartmouth, and 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 do. 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

We invite UMass Chan 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 student design teams will develop a proposed solution, including a prototype, over the two semester course.

Format

Teams of 3 to 6 students composed of Biomedical, Chemical, Computer, Electrical, Mechanical and/or Plastics Engineering will be formed and assigned to the project. Each student is expected to spend 10-12 hours per week on the project, which will include both quantitative and qualitative aspects. All project teams meet with the course instructor weekly throughout the semester for topics such as project management, process improvement, dealing with clients, and technical communications, and other relevant technical topics. They also meet regularly with their faculty sponsors for specific project questions and discussion of progress, either in-person or virtually. Students are expected to be independent in designing the proposed solutions, but they will seek feedback from their faculty sponsor regarding the medical / device problem and specific constraints of a solution.

The Project Team will provide:

- Weekly update memos detailing project progress.
- Preliminary Report to define the problem and objective in the first semester.
- Solution Proposal Report and Presentation due at the end of first semester.
- Final Report and presentation due at the end of second semester.
- A solution prototype, if appropriate for the project

Course Support

We invite UMass Chan faculty to participate in this program, which 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 UMass Chan.

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 3-6 students each working 10-15 hours per week over two semesters (28 weeks), or approximately 300-450 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. 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.

Clinical Observation:

Sometimes a picture is worth a thousand words. Clinical observation related this project may be an invaluable way for students to understand the problem. Are you willing to have student observations in the clinic? The CCTS will work with you to generate the appropriate student clearances.

Project Restrictions:

Note any project restrictions that may limit the assignment of students to the project, such as citizenship requirements, access to restricted data (human subjects research) 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:

Rachael Sirianni, Director, BEAM, UMCCTS

Rachael.sirianni@umassmed.edu

Key Dates

Problem statement due date: August 26th 2024

Course begins: September 3rd/4th 2024

Project selection: mid-September 2024

Initial solution proposal: end of Fall term (December 18th/20th 2024)

Final solution proposal: end of Spring term (May 8th/9th 2025)