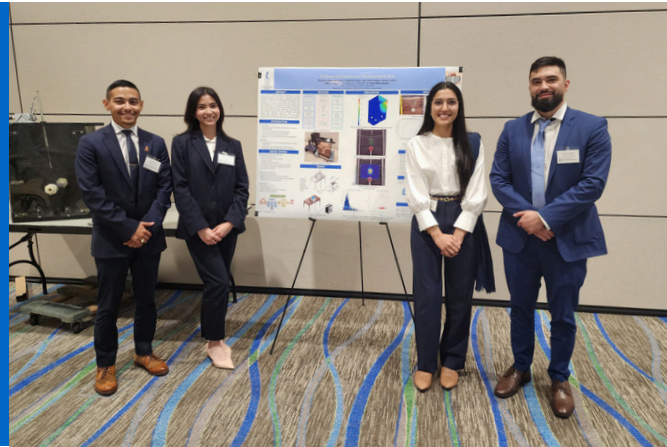


ENGINEERING CAPSTONE PROJECTS FACT SHEET



OVERVIEW

This senior sequence design project is structured around a pair of courses: Project Management (ENGR 4240) and Capstone Projects (ENGR 4370). During the Project Management course, students develop detailed proposals that outline project specifications, timelines, schedules, and budget. These proposals set the groundwork for the subsequent Capstone Projects course where students apply their cumulative knowledge from previous coursework to execute the proposed projects. This includes building, testing, and documenting an approved project, all while adhering to the predefined budget and timeline constraints.

OBJECTIVES

- Identify, design, develop and create a prototype of proposed capstone project based on multiple realistic constraints, and engineering codes/standards with consideration to sustainability
- Create schedules and budgets and use planning and scheduling tools
- Apply ethics codes and standards to engineering case studies
- Analyze, justify, and demonstrate the project design, performance and needed improvements, using modern engineering tools, software, and theoretical formulas
- Create and apply testing schemes to validate product performance and troubleshoot technical problems
- Create and present capstone project status reports
- Practice professional skills to complete the capstone project
- Analyze the social and global impacts and ethical implications of the project
- Develop a patent application for the proposed product
- Develop a business plan based on the capstone project prototype/service

INSTRUCTORS

Hongwei Hsiao, Ph.D.
Professor & Rogelio Roger Benavides
Memorial Chair of Engineering

Jangwoon Park, Ph.D.
Associate Professor of Engineering

TEAMS

Interdisciplinary teams composed of 4-6 students; teams may have students from more than one discipline

MAJORS

- Civil Engineering
- Electrical Engineering
- Industrial Engineering
- Mechanical Engineering
- Mechanical Engineering Technology

JUDGED BY

- Industry experts
- Faculty
- Technical staff

FINANCIAL SUPPORT

If there is no sponsor, College of Engineering and Computer Science supports each team with \$1,000.

PAST & PRESENT SPONSORS

Corpus Christi Army Depot
Engineering Design Services
Lone Star UAS Center of Excellence and Innovation Meyer
Naval Facilities Engineering Systems Command
Port of Corpus Christi
Richard Industrial Group

PROJECT SOLICITATION

We are currently soliciting capstone project ideas from faculty, industry, labs, or other engineering entities willing to sponsor and mentor a project. The instructor will put together the list of projects to be made available to students. The students may choose a project from a list of projects sponsored by faculty, an external engineering entity (industry, government agency, lab) or one that the student team initiates. Students typically prefer well-funded and industry-relevant projects.

COMPONENTS

The topics will require to have the following components:

- Theoretical foundation/analysis/verification
- Modeling (for engineering students only)
- Software Simulations
- Final CAD/circuit/other major-specific design based on standards or codes
- Design of experiments (e.g. for testing, improvements, and validation)
- Working prototype

BENEFITS TO INDUSTRY PARTNERS

- Get innovative design concepts to existing problems
- Obtain a low-cost solution while gaining new perspectives
- Showcase a project at the final capstone project presentation
- Build strong brand equity through meaningful opportunities with students and faculty members of TAMU-CC's Department of Engineering
- Have early access to TAMU-CC graduating engineering students to support company's recruiting initiatives
- Boost the organization's technical employees' leadership skills through mentoring activities

PROJECT DETAILS

Capstone Projects constitute an 8-month endeavor. In Project Management (first four months), the students plan the project's tasks and timeline and identify resources needed for their senior design project. The project design using CAD tools, circuit design tools as well as other major-specific design tools is completed by the end of this semester. In Capstone Projects (second four months), the teams take their design created in digital media, and build, test, and improve it until they create a working prototype. In summary, this 8-month project starts from the idea phase and is finalized with a working prototype.

MENTOR

Each team is required to have a mentor/advisor/sponsor (at least one person) who will act as the subject matter expert for the capstone project and team. This person is expected to be available to students for questions and for technical verification of concepts and ideas at different stages of the capstone project. In the second semester, teams are expected to meet weekly with their technical advisor/mentor.

INFORMATION NEEDED FROM MENTORS

If you are interested in mentoring capstone projects and have a project idea, please send the information below to be shared with students:

1. Title of the Project
2. Project description and scope (one-to-two paragraphs)
3. Expected skills to be utilized (this will help form the teams)
4. Deliverables (product/process/service - final prototype)
5. Success metrics (how will success be measured)
6. Expected budget, and if there is any funding and in-kind support available (externally supported)
7. Projects are expected to be funded by the sponsoring entity
8. Number of team members recommended (4-6) and major of students (majors cannot be guaranteed)
9. Technical advisor/mentor expectations from the team, if any

IDEAL INDUSTRY CAPSTONE PROJECT TOPICS/REQUIREMENTS

- Scope of work appropriate for a group of 4-6 senior engineering/engineering technology students
- Feasible to complete within 8 months (excluding holidays) from idea phase to the delivery of a working prototype
- Involves both designing and prototyping with specific criteria and desired outcomes
- Reflect representative problems (challenging but manageable faced by engineers)
- Preferably an independent project and that can be integrated into a larger scale
- Requires a safe working environment

EXPECTED OUTCOMES

- Fully functional working prototype, oral presentation, written reports, and engineering analysis/test/CAD data
- Industry-ready graduates with professional skills, such as working in teams, time management, conflict resolution, and leadership
- Intellectual property needs to be discussed with TAMU-CC Office of Technology Transfer and Commercialization before starting a project

STEPS FOR INDUSTRY-SPONSORED CAPSTONE PROJECTS

Stage 1 - Proposal

Proposed project reviewed by the course instructor in the Department of Engineering.

Stage 2 - Project selection and team formation

The teams have the choice of selecting from a list of projects suggested by faculty members or local industries, or proposing their own idea.

Stage 3 - Project kick-off and scheduling

Project kick-off occurs during the 2nd week of classes (Project Management) and 1-hour meeting scheduled minimum bi-weekly or monthly (depending on instructors requirements) over the duration of the project (Spring and Fall only) with industry sponsor/mentor and team members to discuss, brainstorm, troubleshoot, and track progress.

Stage 4 - Capstone project oral presentations

Final project presentations in early December or early May depending on the semester when the course sequence is completed. Additional presentations (proposal, progress report, etc.) as required by the instructor.

COURSE SCHEDULE (TIMELINE)

August-May Capstone Projects Instructor: Dr. Ruby Mehrubeoglu		January-December Capstone Projects Instructor: Dr. Hongwei Hsiao	
Mid-August (start) August/September September/October	Team formation Project selection Literature review + Ideas for solution	Mid-January (start) February March April	Team formation Project selection Literature review Idea generation + CAD design
November December	Final design Final CP proposal	May	Project justification + BOM
January February March April	Final BOM/procurement Prototyping Testing/Improving Final prototype Validation	August September October November	Procurement Prototyping Testing/Improving Final prototype Validation
Early-May (end)	Final report/presentation	Early-December (end)	Final report/presentation

RESOURCES

- Tools in the machine shop
- Software
- Research/lab facilities
- Engineering faculty
- Industry mentor
- Technical staff

SPECIAL NOTE

Please note that for the purposes of the project management and capstone projects courses, capstone projects are considered students' projects aimed at increasing students' skills and knowledge through practice. As such, the students are expected to take the leadership in coming up with the solution to the engineering design problem at hand, with guidance from mentors. The students are, therefore, expected to be given the freedom to explore their own design solutions, with proper guidance and mentorship from the advisor/sponsor to ensure technically feasible solutions that are within budget and with minimum waste that meet the design criteria including requirements and constraints. Projects must therefore be well defined, and moving targets must be avoided.

If you have any specific expectations from the team, please discuss this with the team at the beginning of the project to come to a mutual understanding to avoid any potential conflict in the 8-9 months to follow.

FACULTY MEMBERS

We have 26 faculty members representing a wide range of fields, backgrounds, and viewpoints

