

Syllabus: ENGIN 296 Capstone Project

Units: 5 Units (2 Units for Fall semester; 3 Units for Spring semester)

Course Description

This is a project-based course required of all students in the Master of Engineering program. In this course, students work in teams of 3 to 5 to solve a real-world problem through integration of the depth of knowledge from their technical coursework, with the breadth of knowledge from the M.Eng. leadership courses (ENGIN 271 and ENGIN 272). The capstone projects require teams to develop a solution that meets an industry, market or social need through the use of a new technology or a new application of an existing technology.

There are 3 basic capstone project models, differentiated by the advising, as well as the source of resources used on the project.

- University Project. (Open Project): Students work directly with a UC Berkeley faculty member, typically on a project related to technology developed in the faculty member's lab. These projects may also involve collaboration within UC Berkeley or the UC system (e.g., UCSF). The faculty advisor is the primary project advisor.
- Industry-University Collaboration (Open Project): These projects are typically proposed and led by UC Berkeley faculty in collaboration with an existing industry partner. The faculty advisor is the primary project advisor, and the industry advisor is the secondary advisor.
- Industry-Led Projects or "Virtual Internships: (Closed Project): The Industry advisor sets the scope of work and direction, and the company supplies all resources needed for the project. The industry advisor would be the primary project lead, and paired with a faculty advisor who would sign off on the project and assign the grade at its completion. Note that these types of projects may require students to sign Non-Disclosure Agreements with the participating company.

Course Format/Instructors

There is no formal classroom instruction. The main activity is open-ended project work under direct supervision of the team's faculty and/or industry advisors. Separate sections of the course are created for each faculty advisor, and students enroll in their advisor's sections.

Overall coordination of the course is the responsibility of Dr. Don Wroblewski through his role as Director Capstone Projects in the Fung Institute for Engineering Leadership.

Course Deliverables

Reporting Deliverables:

There are 3 required reporting deliverables for the course,

- Capstone Expo Exhibit: Each team creates a display/exhibit that describes their project and demonstrates their progress to date. Teams are expected to create a dynamic and creative display that will attract people's attention and effectively communicate their work.
- Capstone Showcase Presentation: Each team presents the results of their capstone project in a 10-minute presentation followed by a 10 minute Q&A session. Teams are also required to create 1-minute video pitch that highlights their work.
- Final Project Report: Each student submits an individual final report to the faculty advisor or faculty liaison. This report is a program-level requirement for the Masters of Engineering degree, requiring signatures from the faculty advisor/liaison and from a 2nd Reader indicating a passing grade. The 2nd reader must be a faculty member from the student's department. See details of the final report below.

Project Deliverables:

In addition to the reporting deliverables, teams are expected to submit 3 interim project deliverables and a final project deliverable to their project advisors. The interim deliverables are due in the middle and end of the Fall semester and in the middle of the spring semester, and the final project deliverable is due by the end of spring semester.

The nature of these deliverable will depend upon the type of project. Specification of the deliverables and their specific due dates will be a required assignment in the Project Management module of ENGIN 271, and will be determined by consultation between team members and their advisors.

The final project deliverable could take on several forms: a prototype of a potential product, either physical, digital, or some combination; a tool, such as an app or a subsystem that could be integrated with existing products; a proof of concept, that shows that a specific idea or solution is feasible; or a technical assessment of a new technology in terms of the industry, societal, or market need that it addresses.

Student Learning Outcomes

The learning outcomes of the capstone project include students gaining experience with the following:

- Integration of broad-based business/leadership skills with in-depth technical skills.
- Identification of stakeholders (those affected by solution) and the competing interests of different stakeholders
- Formulation of industry/market or societal need that can be addressed by new technology or new use of existing technology

- Generation of an engineered solution to address the need in the form of a work product that creates value for stakeholders
- Coordination of the project through planning and team management
- Communication of project outcomes to stakeholders providing evidence of value of solution

Grading

Faculty advisors or faculty liaisons are responsible for assigning grades, with separate grades for each individual on the project team. For fall semester, advisors must assign an IP grade (In Progress). For spring semester, they assign a single final project grade that will count towards the entire 5 units.

There are no formal rubrics for assigning the letter grade, but advisors are expected to assign a grade that reflects the overall quality and quantity of work that the student performs throughout the 2 semesters. To some extent, that can be partially gleaned from the Final Project Report, but the assessment should also consider the following metrics:

- Quality and timeliness of the 3 interim and final deliverables.
- Extent of contribution of the student to the overall project outcome.
- Consistency of effort throughout the two semesters.

Coordination with M.Eng. Leadership Curriculum

In ENGIN 296, teams focus mainly on the technical aspects of the problem solution, working directly with their faculty and/or industry advisor. Leadership and business aspects of the projects are accomplished mainly by integration with leadership curriculum in several ways:

- Addressing specific aspects of the project through written assignments in the various modules of ENGIN 271 and ENGIN 272-- accounting, finance, marketing, intellectual property, organizational behavior and technology/industry strategy.
- Coordination of the projects through assignments in the project management module of ENGIN 271 and ENGIN 272, including development of team contracts, project deliverable specifications, project plans, and regular status updates of projects.
- Creation and refinement of reporting deliverables through assignments in ENGIN 295, Capstone Integration.

Final Report

The final reports for the capstone projects are individual deliverables, as opposed to team deliverables. However, sections of the report will be common among team members. These common sections will be summaries of written assignments from ENGIN 271 and ENGIN 272 that deal with the business aspects of the project. They will serve as introductory chapters that set up the main body of the report. The main body will be individually written, covering the technical work and outcome of the project, specifically focused on that team member's unique

contribution project effort. This overall structure of the report and the format for the technical contribution section will be described in detail in E295.

Company-Proprietary Material

Students working on industry projects should meet with their industry advisor at the beginning of the project to discuss whether they will be working with company-proprietary material. Some companies may ask students to sign Non Disclosure Agreements (NDA) to protect their confidential information. If a company requires an NDA, then please inform your faculty advisor and the Director Capstone Experience (dewroblewski@berkeley.edu) before executing these agreements.

Regardless whether an NDA is signed, all students are expected to behave in a manner that protects any company confidential material. This may include excluding specific details from reports and presentations. When in doubt, always discuss with your industry advisor.

Plagiarism:

To copy text, photos, drawings or any other ideas from another source without appropriate reference is plagiarism and will result in a grade penalty for the project up to and including a failing grade. The latter would prevent you from graduating. In addition, there may be further disciplinary action as well. For additional information on plagiarism and how to avoid it, see, for example:

- <http://www.lib.berkeley.edu/instruct/guides/citations.html#Plagiarism>
- <http://gsi.berkeley.edu/teachingguide/misconduct/prevent-plag.html>

Schedule 2015-16

Friday 9/4/15	Team rosters are set.
Friday 9/11/15	Team rosters finalized. All students must be signed up to the proper E296 section by this date.
Week of 10/26/15	Project Deliverable: <u>First interim project deliverable</u> due to advisors. Specific date to be mutually set by student team and advisors.
Week of 12/7/15 (RRR week)	Reporting Deliverable: <u>Capstone Expo</u> ; date and time TBA.
Week of 12/14/15	Project Deliverable: <u>Second interim project deliverable</u> due to advisors. Specific date to be mutually set by student team and advisors.
Week of 2/29/16	Project Deliverable: <u>Third interim project deliverable</u> due to advisors. Specific date to be

	mutually set by student team and advisors.
4/13/16 (tentative)	Reporting Deliverable: <u>Final Project Reports</u> due to faculty advisors and 2 nd readers. Advisors and 2 nd readers will review reports and can suggest changes and edits.
Week of 5/2/16 (RRR week)	Project Deliverable: <u>Final project deliverable</u> due to advisors. Specific date to be mutually set by student team and advisors. Reporting Deliverable: <u>Capstone Showcase</u> ; Date and time TBA
5/13/16	Last day to file signature page and Final Project Reports with department.