



# ENGR 4296: Senior Design Project II

## Objectives

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Senior Design Project II is the second course in a two-semester sequence that constitutes the capstone design experience for undergraduate engineers. In the ABET handbook on accrediting engineering programs, it states:

"Students must be prepared for engineering practice through the curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political."

Your design project is expected to address as many of these issues as possible. In this portion of the course, students will be expected to identify a team project, and complete the proposal stage of the project. The course will culminate with a presentation of the proposed project to a design review committee and a detailed design document that clearly documents all aspects of the design process.

In Senior Design II, we focus on implementation and testing. At the end of Senior Design I, students have completed a proposed design for their project. Students have also developed design constraints that characterize the expected performance of the system and, most importantly, designed a series of tests that will verify that their design meets its design constraints.

There are three main components of Senior Design II: implementation, testing and analysis. Students will build their system over the first one-third of the course, conduct the tests prescribed in their design document over the second part of the course, and then analyze these results and explain any discrepancies between their simulations and their prototype. Time-permitting, students will re-design their systems based on the results of their testing and ultimately produce a working prototype that meets their design constraints.

Students often think that the only important goal in Senior Design II is to produce a working prototype. As we know, with enough duct tape and hot glue, an engineer can ultimately produce something that will work long enough to pass a quick demo. Unfortunately, that is not adequate for Senior Design II.

Demonstrating that your prototype meets its design constraints through testing is the essential element of this course. For example, if you have a design constraint that states that the system will be able to operate reliably for one year without maintenance, you must devise and execute an accelerated life test that demonstrates you meet this constraint. You can then discuss what was done in your design to engineer your system to meet this constraint. Projects are encouraged to be multidisciplinary, one of the things that makes our program at Temple somewhat unique. Teams will be expected to consist of engineers from all disciplines, and projects ideally will have components from all disciplines as well.

**Course Learning Objectives (CLO):** Please refer to the [common program outcomes](#) for the College to understand the PO designations below.

1. Understand how to form and manage effective teams (POs D, G)
2. Understand how to propose, analyze, manage and execute a successful project (POs E, K)
3. Explain the motivation for using standards (POs H, J)
4. Classify the cost components in a design and project a realistic price to the customer (POs C, K)
5. Optimize a design for sustainability (POs H, J)
6. Present a professional presentation with strong technical content and audience interaction (POs G, K)
7. Interact efficiently and effectively with faculty advisor (PO F)
8. Formulate a defensible design approach (POs C, E, K)
9. Create an objective, testable design specification (POs C, K)
10. Create and follow a test plan leading to a functional design (POs C, K)
11. Write a professional project report (PO G)
12. Create a professional team Web site (PO G, K)
13. Apply entrepreneurial thinking in the context of a design project (PO H)

Questions or comments about the material presented here can be directed to [steven.ridenour@temple.edu](mailto:steven.ridenour@temple.edu).