

Senior Project Guidelines

All seniors will take a “capstone senior design experience” course in their senior year. This course is required in all ABET-accredited engineering programs. This document describes criteria for the selection of a project and team structure.

Projects may address the design of hardware, processes or analysis. In all cases it is necessary that the project be oriented towards design. But the object of that design can vary considerably, just as fields of engineering vary substantially.

The primary engineering results delivered in Senior Design will be a set of rational decisions, where the rationality of those decisions will be supported by the appropriate analysis and testing. The quality of the design will usually, but not always, be reflected in a prototype of either the hardware or software system. In some cases (particularly large industrial systems) the end point will be a finished detail design with supporting analysis. In the case of process design the result may be a detailed process description coupled to a demonstration which verifies the design.

Major Criteria for a Senior Design Project

1. The project should provide an opportunity to integrate and apply the academic material previously covered in the B.S. program

To meet the first criterion, the project needs to have significant engineering content. If the project can be carried out without recourse to engineering calculation, it is unlikely that the project will serve well. One should critically examine potential projects that are comprised of interesting and challenging fabrication and assembly of known designs. In many cases such projects lack sufficient engineering content to be suitable.

2. The project should provide the opportunity to practice the professional disciplines of engineering and ET.

Most projects will meet the second criterion if the scope of the project lies within the control of the student. But care must be taken when senior projects are carried out in conjunction with an outside entity. In these cases it is important to establish that there is sufficient discretion in the student team to actually drive the execution of the project. If insufficient progress on the part of a student team would lead to intervention on the part of the outside entity, the project is probably not suitable. While we strongly discourage project failure, it is important that project failure is understood to be at least a theoretical possibility.

3. There should be a reasonable expectation that the project can be executed successfully.

The third criterion relates to the availability of sufficient resources to complete the project. The primary resources to consider are student time (is the scope sized to match the available time of the students for the design), student knowledge (can the engineering be done by someone with B.S.-level skills), availability of prerequisites (are mating parts, interface specifications, necessary personnel for interviews, company-supplied equipment or facilities, etc. available?) and financial support for required activity of the project team. Where resources will be supplied from the outside, it is particularly important to have a realistic understanding of the magnitude of the required resources and the reliability of the source for the full length (two semesters) of the project.

Potential Risks

The most common sources of problems (outside of student performance) relating to senior projects are inappropriate technical scope (both too much and too little) and unrealistic support expectations (both internal and external). It is very important that students not place their successful progression to a bachelor's degree at risk by taking unnecessary risks with their senior project.

Team Structure

The following list describes the preferred makeup of Senior Design teams based on best practices:

1. The ideal senior design project would be one identified, supported and funded by industry. Therefore, a technical representative from the supporting company must be identified at the start of the project and be available for consultation throughout the two semester life of the project.
2. All projects must have a faculty mentor/coach, and preferably a stakeholder outside of the university if the project is not supported by industry.
3. Teams should be multidisciplinary.
4. Team size should be a minimum of 3.
5. Single person projects should be discouraged and, in the limited case where they are warranted, managed outside of the COE SD program (see document titled Proposed Policy for MEES Fall 2011 revA).

Date	Revision	Author	Comments
8/12/10	Original	S. Patterson	Original Senior Design project description
3/20/11	A	D. Hoch	Integrated team structure based on SD committee input.
4/13/11	B	D. Hoch	Referenced <u>Proposed Policy for MEES Fall 2011 rev A</u> document.