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.

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. It is useful to consider the following definition of design:

> Design: The communication of a set of rational decisions to accomplish a particular result under specified conditions.

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.

There are three major criteria for a senior project: 1) the project should provide an opportunity to integrate and apply the academic material previously covered in the B.S. program, 2) the project should provide the opportunity to practice the professional disciplines of engineering, and 3) there should be a reasonable expectation that the project can be executed successfully.

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.

Most projects will meet the second criterion if the conduct of the project lies within the control of the student. 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.

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.

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.