Senior students apply engineering skills they have acquired during their undergraduate years by tackling technical problems for sponsors in a real-world environment while mentored by UConn Engineering faculty and an engineer from the sponsoring organization. Senior design is a cost-effective solution for sponsors to address a technical challenge and the opportunity to collaborate with, cultivate and evaluate undergraduate students as prospective employees.

Overview of the Program

The Senior Design Program is a hallmark of success for engineering seniors. Students are co-mentored by faculty from their department as well as engineers from the sponsoring organization in a two-semester senior design capstone course. The students are exposed to design principles, ethical issues, and matters involving intellectual property and communication practices in the workplace. All projects selected for the senior design program meet the ABET (Accreditation Board for Engineering & Technology) Design criteria.

The Senior Design program has two complementary elements for the students. The academic element focuses on their application of fundamental engineering theory and principals consistent with the ABET objective; “Students must be prepared for engineering practice through the curriculum culminating in a major design experience...” The additional element is the investigation and development of solutions to relevant problems that are important to the sponsor.

All projects have a mentoring engineer from the sponsoring organization, a faculty member and a student team consisting of one or more students.

The students make oral presentations, conduct a peer design review, prepare a formal written report at the conclusion of each semester and demonstrate their final solution at the May Senior Design Demonstration Day. During the fall semester, students travel to the sponsoring organization to view and better understand the process/problem. Students communicate with the mentoring engineer monthly at a minimum, but normally every two weeks. The team of students meets regularly with the faculty advisor and with their team.

During the fall semester, the students are expected to develop a problem statement, research the product/process, brainstorm potential solutions and identify the analytical and experimental elements of their approach. By the end of the fall semester, the students are to have the two or three best solutions to the problem. In the spring semester, the team must determine the best solution within the project constraints.

A departmental Senior Design leader meets with the student teams regularly for a progress report. This provides an excellent method of monitoring progress and of determining where students may be having difficulty.
Sponsorship

A modest fee is expected to support senior design fund for each project. The project sponsorship fee should be considered a grant and not a contract. Multi departmental projects require a slightly larger fee.

In addition to the sponsorship fee, sponsors are expected to cover project costs (components, specialized equipment, etc.). Sponsors may provide these parts directly or UConn can invoice for them at the conclusion of the project. All components, equipment, etc. will be provided back to the sponsor at the end of the project.

The project team’s guaranteed deliverables are design reports at the end of each semester. Any other project deliverables cannot be guaranteed.

Billing – typically, sponsors are billed in October for the project fee; however, flexible payment scheduling can be accommodated by prior arrangement.

An estimate (Rough Order of Magnitude – ROM) is provided to sponsors during the fall semester for costs associated with the build-out of prototypes and validation testing. Sponsors may set a dollar ceiling on these costs as one parameter for the project. Actual costs are totaled in April and sponsors are billed for these costs in May.

Project Timeline

<table>
<thead>
<tr>
<th>Month</th>
<th>Activity</th>
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<tbody>
<tr>
<td>May – June</td>
<td>Provide one-page project summary to UConn.</td>
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<tr>
<td>Early Sept</td>
<td>Teams are selected and assigned to projects.</td>
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<tr>
<td>Mid - Sept</td>
<td>First team meeting with sponsor.</td>
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<tr>
<td>Sep – Dec</td>
<td>Team does initial research and prototype design.</td>
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<tr>
<td>Late Oct – Nov</td>
<td>Proposal presentations.</td>
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<tr>
<td>January – April</td>
<td>Team completes design and working prototype.</td>
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<tr>
<td>Late April</td>
<td>Team’s final presentation.</td>
</tr>
<tr>
<td>End of April – Early May</td>
<td>UConn School of Engineering Senior Design Demonstration Day.</td>
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Overview of Roles

1. Faculty Advisor

The Faculty Advisor will assist and guide the team in understanding a structured design and analysis process and approach in addressing the customer's problem. The faculty advisor is responsible for ensuring the student team meets the academic and project goals.

- Meet with the team weekly. You have both an academic advisor and project oversight role.
- Meet the sponsor, if possible visit the facility.
- Participate in phone calls between the team and sponsor.
- Use your academic and technical expertise to guide the team in developing an approach to the problem, help them think through the problem.
- Assess the feasibility of their schedule, making sure the team is getting real work done each week.
- Critically assess their ability to hold schedule but support reasonable requests to change requirements if milestones cannot be met.
- Critique and challenge their ideas and results consistent with theory and academic principals.
- Help the team with software learning and issues. Recommend other resources (TAs, Grad students, and other faculty) that have knowledge related to the project.
- Review, critique and approve presentations.

2. Student Team

The student team will meet sponsor’s project goals by regular interaction between team members, the Organization Sponsor Advisor and the Faculty Advisor. The team is required to develop a detailed project schedule and work diligently to produce project deliverables on time and of the highest quality. The team will regularly monitor material costs and get sponsor approval prior to any expenditure. Depending on departmental requirements, each project’s scope may take between 400 and 800 hours. Assuming a team of three, each team member is expected to spend approximately 10 to 15 hours on the project per week. This time can include weekly general lectures.

- Work together as a team
- Create a Project Statement that clearly defines the project objectives and goals.
- Identify one team member as the primary contact point with the Sponsor.
- Publish agendas 24 hour in advance of sponsor meeting.
- Publish minutes within 24 hour of the meeting.
- Maintain a Design Notebook to record decisions, actions, communications, results, etc.
- Provide supporting documents (project statement, RACI, schedule, quad chart, etc.) for Faculty Advisor and sponsor meetings.
- Provide drafts to sponsors and faculty advisors in advance of oral presentations, written reports and Senior Design Demonstration Day display.
- Maintain a summary of expenditures for proposed material of your experimental design.
- Dedicate yourself to make the project successful and benefit from working on an important real world problem.
3. Organization Sponsor Advisor

The Organization Sponsor Advisor plays a vital role in both the successful completion of the project and in the development of students into professionals ready for the workforce. The students will be looking to you as a role model. It is important that they learn how professionals get the job done. The Sponsor Advisor keeps the team focused on the project goals.

- Be prepared to devote up to two hours a week to the project; typically one hour per week is sufficient, but site visits and design reviews may consume four or more hours.
- Learn the names of the project team members.
- Treat the project team as professionals.
- Be available for regularly scheduled teleconference with the project team.
- Identify a backup if unable to attend a teleconference.
- Coordinate team visits to your facility.
- Respond to team e-mails, students should have a single focal point with the sponsor.
- Review deliverables produced by the team and provide timely feedback.
- Reinforce the importance of the project--if it is important to you, it will be important to project team.
- Provide technical feedback; find the expertise in your organization for feedback if you don't personally have the knowledge.
- Assist team in obtaining support items.
- Facilitate the loan of equipment for the duration of the project or the use of the company's facilities for testing.
- Direct team to preferred suppliers and provide assistance when suppliers are unresponsive to student requests.
- Critique and sanitize design review presentations as required prior to public release.
- Provide feedback to director / faculty advisor regarding individuals and team performance

4. Departmental Senior Design Leader

The Departmental Senior Design leader is responsible for the academic, financial, and product development success of the Senior Design program. These goals are met through day-to-day management of the program and ensuring that the teams proceed with their projects through a structured development process. The departmental Senior Design leader represents the Senior Design Program and the University of Connecticut to sponsors and peer academic institutions. The sponsor and faculty advisors may contact the departmental Senior Design leader any time during the project period to discuss any issues or concerns they might have.

Grading – the departmental Senior Design leader is responsible for inputting grades for all students. Grades are based on an assessment of Technical Performance, Professional Performance and Communication and reflect input from the leader (and his assistant), Faculty and Organization Sponsor Advisors.
Whom do I contact if I am not satisfied with the performance of the project team?

In the early phases of the project, contact your project Faculty Advisor. Once you have developed a rapport with the team you should feel free to address this issue directly with the team or the departmental Senior Design leader. Please, do not let this issue fester or grow into a bigger problem.

Whom do I contact if I feel there could be additional engagement by the Faculty Advisor?

Contact the departmental Senior Design leader.

How involved should I be?

This is a judgment call. You should be available for regular teleconferences and for occasional consultations with individuals on the team. You may find that your role changes as the project team becomes more competent in the required technical aspects of the project. If the team believes that from your lack of involvement that the project is not important to you or the sponsoring organization, then they will likely perform poorly.

How much time commitment is involved?

The time commitment will depend upon the complexity of the project. The first semester of the program is devoted to planning and initial analysis/design, which will require more of your availability. The spring semester will likely involve lesser hours of your time.

What facilities are available at the university to support the project team?

The project team has 24 hour access to conference rooms with computers, marker boards, speaker phones, and file cabinets; copiers, fax machines, and printers etc. For certain projects, students are required to take a Shop Safety course and have scheduled access to the machine shop. The School of Engineering has numerous laboratories and centers of excellence. The University and engineering departments have licenses to major software packages (ANSYS, *CCM, NX, Solidworks, etc.)

The project scope seems to be too aggressive for the project team to complete. What can be done?

Frequently the project scope needs to be renegotiated during the execution of the project. This may be the result of new technical or resource challenges discovered by the project team, due to a mismatch between the team's skill set and the refined project goals, an underestimated original project scope, or other reasons. Regardless of the root cause, your concern should be addressed as soon as possible with the project's Faculty Advisor.
The project appears to be headed for disaster. How should I step in?

If you feel the project is headed for disaster, contact the project Faculty Advisor and the departmental Senior Design leader. It may be possible to engage additional resources to help the team complete a challenging deliverable. The project team should be made aware of your concerns. This activity should be treated as an important learning opportunity.

The team and I are having communication problems. What can be done?

Work with the Faculty Advisor and project team to establish communication norms. These norms may include the time for regularly scheduled meetings, advance notice timing for meeting announcements, agenda templates, action item/action register tips, timing for posting of meeting minutes, establishment of a team webpage, and use of collaboration tools.

How should I offer feedback on team performance?

The departmental Senior Design leader will ask you for written feedback on each student and the overall team performance during the year. Constructive criticism is preferable, but do not sugarcoat your statements. You can also provide feedback directly to the students and Faculty Advisor. As you develop a rapport with the project team, you should be able to treat them as you would a coworker or subordinate. One caution: allow the team freedom to develop ideas to accomplish project goals that may be contrary to how you would do it. If it fails, it can be turned into a learning experience.

How is intellectual property handled?

Organization sponsors may, if desired, require students and faculty advisors to sign non-disclosure agreements at the beginning of the project. In general, all project documentation is posted on the senior design website, and students make several public presentations. Sponsors may request to review all material before posting or presentations in order to remove proprietary material. Students are not employees of the university and as such, any intellectual property they generate as a result of the project remains the property of the students. If the sponsor desires, they can request that students sign over rights to the sponsor at the beginning of the project. Students are not obligated to sign these requests, and if so, can be reassigned to other projects. Faculty are employees of the university, and any intellectual property that they provide to the project is the property of the university and must be licensed from the university.