Senior Design Program

Industrial Solutions Laboratory

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Senior Design

The Lee College of Engineering Senior Design program brings together students, faculty, and industry partners in a collaborative environment of research, design, and application. Students work on multi-disciplinary teams to tackle engineering problems. The experience simulates the real world as students manage budgets, deadlines, and conflicting restraints to provide a solution that meets the needs of the industry supporter.

Students benefit from:

- Getting practical real-world experience prior to graduation
- Applying engineering design practices
- Balancing conflicting constraints and requirements
- Developing team problem-solving skills
- Managing projects to complete on schedule and within budget
- Developing specialized fabrication skills
- Meeting customer’s requirements
- Working with engineering professionals
- Interacting with potential employers
- Learning about the engineering workplace

Industry supporters benefit from:

- Initiating elective research projects
- Collaborating with UNC Charlotte faculty
- Creating prototypes of new or improved products
- Improving manufacturing or business processes
- Evaluating the technical and non-technical skills of students
- Screening potential new hires
- Contributing to the academic program
- Networking with students, faculty, and other industry partners
- Promoting their company and corporate name recognition

Expectations

Students are expected to have the necessary technical knowledge to complete projects. They should dedicate 10 – 15 hours per week or a total of 250 hours per student to their project. Besides in-class activities, this time includes planning, research, design, purchasing, fabrication, testing, analysis, evaluation, risk assessment, and oral and written communications. A common basis is used to evaluate student performance across all engineering disciplines. Upon completion of the industry-supported design project, students are expected to better understand real-world expectations and performance requirements and be better prepared to successfully transition into the workplace.

Industry Supporters of Senior Design projects should have a product or project in mind with well-defined requirements and constraints. The scope should be suitable for a multi-disciplinary team of 3-5 students (typical but not limited to this size) working steadily for approximately seven months. Supporters provide a $7,000 tax deductible contribution to help defray the costs of materials and supplies, tooling, off-campus travel, use of campus facilities including engineering shops and laboratories, and administration of the College of Engineering Senior Design program and events. Supporters should also provide regular guidance, feedback, and encouragement to the team through a designated technical representative, so that important design issues are resolved promptly and satisfactorily.
**Projects**

Innovative projects that span the engineering disciplines are encouraged. This gives students an opportunity to experience the multi-disciplinary teamwork they will encounter in industry. Teams may include students from civil, computer, electrical, mechanical, and systems engineering and engineering technology. Projects may begin in August with a completion date of May or in January with a completion date of December.

**Characteristics of Good Projects**

- Projects should be defined by a solid statement of work and requirements.
- Deliverables should be clearly articulated.
- Projects should be multi-disciplinary and capable of being completed within the prescribed work envelope.
- Project goals should allow ample time for prototype testing as appropriate.
- Complex projects should consider large or multiple teams.
- Project prototype must be fabricated using on-campus equipment and facilities or at the industry supporter’s facilities.

**Becoming a Supporter**

1. Complete and submit the Senior Design Project Input document found on the isl.uncc.edu website.
2. Identify a technical representative to work with the team and include them in the input document.
3. Upon approval of scope and staffing of the team, provide tax-deductible corporate donation before the semester begins.
4. Attend the Senior Design Breakfast to meet the project team and articulate initial project requirements.
5. Regularly provide feedback to the team as work progresses.
6. Attend formal design reviews to evaluate progress and results.
7. Attend the Senior Design Expo at the end of each semester.

**Some Recent Projects**

**CB&I Enhanced Geothermal Power Plant**

This CB&I project determined requirements for an enhanced geothermal system to create and improve geothermal resources in hot dry rock through ‘hydraulic stimulation’ to supply hot water needed to produce 100 MW of electric power. A team of four mechanical engineering and one systems engineering students worked on this project. Work included optimizing the steam cycle and specifying major equipment.

**EPRI RF Mesh Spacer Cable Sensor System**

The EPRI project developed and integrated an embedded RF sensor system into cable spacers. This sensor system allows for the detection of a downed conductor and also an indication of the typical current that is passing through the conductors. The team consisted of three electrical, one mechanical, one computer and one systems engineering student. The sensor was designed to easily attached to a distribution line.

**Powerhouse Mechanical Harnessing River Power for Remote Mission Hospital in Zambia - Part II**

The Powerhouse Mechanical Harnessing River Power for Remote Mission Hospital in Zambia project designed a water-powered systems to feed electricity to the 180 bed Chitokoloki Mission Hospital in Zambia. The focus of the project was to test and optimize water wheel generators for installation in the Zambia River. The team consisted of four mechanical engineering students. Testing in the water channel allowed the students to optimize the water wheel efficiency.