ECE 445 - Senior Design

Instructors:

Professor Carney is currently the course director, but other professors have taught the class as well. Starting a few semesters ago, there are now 2 official lecturers for the course. Professors Carney, Singer, Oelze, and Makela have all been in the rotation.

Prerequisites:

The only official prerequisite is senior standing at the university. This requirement may be flexible for Computer Engineers and students with previous project experience. Students in other majors, even outside engineering, are encouraged to take this course with the understanding that their project will have a component catered to their individual specialty. There is an experimental ECE398 course that prepares students for senior design by focusing mostly on the process of brainstorming ideas and generating designs on paper.

When to Take It:

Electrical engineering students must pass either this course, ECE 496/499 (senior thesis) or an approved section of ENG 491 (interdisciplinary design project) in order to graduate. The majority of students take this course senior year, and it is offered every semester.

Class Content:

Students work in groups of 2 or 3 to complete a design project from start to finish. Groups come up with their own project ideas and do the design, fabrication, and validation.

Work:

Most of the time working is spend trying to design, build, and test your project. Weekly meetings are held between your assigned TA and your group to ensure steady progress and express concerns or seek advice. Everything is to be well documented in a lab notebook.

After finding partners, groups must submit a project proposal within the first two weeks of the project. A week after the proposal is due, a more complete proposal is required. This second proposal should contain the objectives of the project, a high level block diagram of the hardware, a list of requirements and verification, a cost analysis, and a work schedule. A couple of weeks after the second proposal, the design review is due. The design review is a complete blueprint for your project. It must contain a fully fleshed out electrical design, including schematics, simulations, more detailed requirements and verification, cost analysis, work schedule, and assessment of ethical issues. This design review contains a substantial amount of writing and documentation. Half way through the semester, each student will have to submit an individual progress report that details his or her specific contributions to the project. Simulations, schematics and diagrams, and quantitative results should be presented. A final demo, which constitutes a large portion of the course points, is held near the end of the semester to showcase the projects. A final presentation is also given to course staff to evaluate the project and discuss the project in a formal manner. A final written report is due at the end of the semester, and is similar to the design review, but updated to reflect the state of the project.

Life After:

Students who wish to continue working on their projects are encouraged to take independent study: ECE396, ECE397, ECE497, or ECE 499.

Professor's Perspective

by Prof. P. Scott Carney, ECE 445 Course Director

ECE 445 is the capstone project course for EE majors. Most EEs take it, although one may instead take Senior Thesis (ECE 497/499), both two-semester classes. Recently we recognized that the workload in the class had grown well beyond the two hours of credit given. As of Fall 2011, the course counts for four hours of credit. The class involves quite a bit of technical writing and so now it also counts as an Advanced Composition class.

Engineers perform a sort of magic. We leverage the great intellectual achievements of the basic sciences and mathematics and turn them into the stuff of the modern world. For most of their undergraduate career, our students spend their time mastering the science and the math necessary to be engineers. In Senior Design they harness the power of the engineering process: that layer on top of the basic science that enables the management of highly complicated designs to produce reliable solutions to difficult problems from start to finish. Good engineering process unleashes the engineer's creativity by providing a system to track, test and incorporate ideas freeing the engineer to focus on inventing solutions to the most intellectually challenging parts of the problem. In ECE 445, we provide the structure for students to produce amazing results. The students provide the content and the creativity.

Students in ECE 445 choose or propose their own projects. Each semester there are projects proposed by mentors from within the department, from other departments on campus, from community members and from industry partners. Many students take the opportunity to follow their own dreams and carry out a project or solve a problem that they bring to the class themselves.
This semester we have students working with Boeing, Rolls Royce, Walmart, and a start-up incubator based in Chile. A few projects are helping to develop a pacing system for the Uni-High swim team. Other projects are developing engineering solutions for wildlife tracking and monitoring for UIUC researchers. Then there are student-proposed projects like the Braille e-book reader, the robotic sidewalk salt dispenser, or a device to help friends find each other in a crowd.

I am happy to discuss project ideas with students not yet enrolled. I hope students will spend their whole undergrad tenure looking forward to 445 and the chance to do an incredible project.

Much more information may be found here http://courses.engr.illinois.edu/ece445/