Student Guidelines and Procedures for Senior Design

WHAT IS SENIOR DESIGN?

Senior Design at CSUN is made up of two courses: ECE 492 and ECE 493. Near the end of their time at CSUN, EE and CE students are required to take these two courses to graduate. Both ECE 492 and ECE 493 involve the student applying all that they have learned about their field to a project over the course of two semesters. Senior Design is also an opportunity to gain real world engineering experience that is attractive to potential employers.

There are strict requirements and course pre-requisites for students to take senior design. Students should include these in their course planning.

Projects

Senior design has evolved at CSUN to a structure that allows students to join projects that interest them that are run by a faculty member in the College of Engineering. These projects may be in the EE, CE or ME departments. The projects will have an EE and/or CE component that the student can work on, or may be entirely EE/CE related. Most projects involve multi-disciplinary aspects. Examples of past and current projects are listed below.

The projects are run by a faculty member and the students work under the supervision and guidance of the faculty. The projects may involve pure research where students build and test proof-of-concept prototypes to test various principles or theories. Projects may also involve the design, construction, test and deployment of a real world engineering application. Projects may also involve the design, construction and test of a device or system that will be used in a competition.

The projects may be run over the course of two semesters or may be part of a long term effort extending over several semesters or even years.

Many of the projects are funded by the government, military or industry. These projects often involve interaction with engineers in these sectors and provide a stepping stone into jobs there.

The Student Experience

Students in senior design can expect to be working on the same project for two semesters. Students enroll in ECE 492 for their first semester. During this semester they will be assigned tasks by the faculty running the project to be completed during the semester. Some projects are organized in teams with team leads assigning the tasks based on instructions from the faculty.

Students can expect to work on their tasks for eight or more hours per week. There are also regular meetings to present progress and problems to the faculty. There may also be other meetings scheduled by the team leads. Students may be expected to write and present reports and documentation on their work to accomplish assigned tasks.

The goal here is to give the students the experience they would expect to have when joining a company as an engineer. This not only includes technical engineering skills, but also soft skills such as writing and speaking.

At the end of the semester, students receive a grade from the faculty member on the project, which is sent to the faculty of record for the ECE 492 course, who officially records the grade. The student is then permitted to enroll in ECE 493. IMPORTANT: It is not allowed to take ECE 492 and ECE 493 in the same semester.

Some projects also involve work over the summer and winter breaks. This work is typically at a lower intensity than during the semester.

In ECE 493, students will continue their work on the same project they worked on in ECE 492. In the rare cases where a project has ended while they were still in ECE 492, the students may join other projects. The faculty of record for ECE 492 and ECE 493 will help in ensuring that the student does not lose a semester and assist them in getting a place on another project.

In ECE 493, students will typically find themselves in a more responsible position as team leads and helping new ECE 492 students integrate into the project.

A requirement for ECE 493 students is participation in the Senior Design Presentation and Paper Contest. All ECE 493 students are required to participate in writing a technical paper covering their work during that semester. This paper will be due three to four weeks before the end of the semester. ECE 493 students are also required to prepare and present a ten minute report on their work. The presentations are scheduled to occur one evening one to two weeks before the end of the semester. Both the paper and presentation will be judged by judges from industry. The judges will also ask questions for five minutes after each presentation. The scores from the contest will be tallied and the top three paper/presentations will be recognized.

It is recommended that students in ECE 493 begin work on their paper and presentation early. Start gathering materials such as photos, schematics or data immediately. Assemble a rough draft and keep updating it.

ECE 492 may assist in the preparation of the paper and presentation to gain experience. However, the bulk of the work is to be done by ECE 493 students.

HOW DO STUDENTS GET INTO SENIOR DESIGN?

Students should start looking at senior design as soon as they begin their upper division courses – about two years before they intend to graduate. The steps to follow are:

1. Ensure you will meet all the course pre-requisites for ECE 492 by the semester BEFORE you intend to take ECE 492. Students are not permitted to meet any of these pre-requisites in the SAME semester they are taking ECE 492.

These pre-requisites are:

MATH 250

MATH 280 or ECE 280

ECE 340 and ECE 340L (all of the pre-requisites for this course must also be met)

ECE 350

At least two (2) 400 level ECE courses (and their labs, if required with the course)

2. Investigate the current projects for senior design early. Talk to the faculty sponsors. Some projects even accept volunteers (for no course credit). Do not wait until the last minute to find a project. Your completion of Senior Design may be delayed or you may be on a project that you are not interested in. It is a good idea to have a fallback project in case the project you want is full.

3. Prepare a resume. Getting into a project is like getting a job. Some faculty require a resume and interview of prospective students.

4. Talk to the faculty sponsor of the project you are interested in the semester before you wish to take senior design and apply for a position on the project team.

5. As soon as your registration for the semester you wish to take senior design in opens, send your DPR to the faculty member of record for ECE 492. They will verify that you have met the pre-requisites for senior design and issue you a permission number. Enrollment in ECE 492 is by permission only.

6. After you are enrolled, be sure to ask the faculty member on the project about meeting times and any preliminary work or meetings that may occur before the start of the semester.

7. Send an email to the faculty of record for ECE 492 to inform them of what project you are on.

ECE 493

When the enrollment for the semester you will be taking ECE 493 opens, request a permission number from the faculty of record for ECE 493. Enrollment in ECE 493 is by permission only. Provided you have passed ECE 492 or received an RP, the permission number will be issued.

PAST PROJECTS

This is a sample of Senior Design Projects in the last five years. Some of these projects are still on-going.

Formula One Electric Race Car – Mechanical Engineering Department. EE/CE students work on control and power systems. The race car is entered in a competition.

Robot for Ultrasonic Inspection of Airframes – Mechanical Engineering Department. EE/CE students work on the signal processing and control of the robot.

Search and Rescue Robot – Mechanical Engineering Department. EE/CE students work on the sensors, communications and controls of the robot. This is a long term project.

Autonomous Robot for Sanitizing Clean Rooms. Electrical and Computer Engineering Department. EE/CE students are designing, constructing, programming and testing a robot to sanitize clean rooms used for constructing spacecraft. Sanitization is to prevent contamination of other planets explored by these spacecraft. This is a long term project.

UAV Helicopter. Electrical and Computer Engineering Department. EE/CE students are designing, constructing and testing an autonomous helicopter that will be entered in a competition. This is a long term project.

Smart Antennas for Spacecraft. Electrical and Computer Engineering Department. This is a series of projects to research computer controlled antenna arrays for small satellites. EE and CE students will perform simulations and build proof of concept prototypes that can be tested in CSUN's microwave lab.

Biomedical Research. Electrical and Computer Engineering Department. This is a series of projects to research sensors and devices to be used in the human body. It also involves powering and communication with these devices. EE/CE students will design, construct and test proof of concept prototypes.

CSUNSat1. Electrical and Computer Engineering Department. This was a long term project that was completed in 2018. EE/CE and CS students designed, built, tested and flew a small satellite carrying a JPL experiment over the course of four years. The satellite was launched in 2017 and successfully completed its mission. Currently, CSUN faculty are pursuing other space related projects.

Optical Communications for Small Satellites. Electrical and Computer Engineering Department. This is a long term project to develop a high-speed optical communications system for use in space. EE/CE students are developing this system. The ultimate goal is to build this system and test it in space.