

**CECS 490B - Syllabus**  
**Computer Engineering Senior Project II**  
**Fall 2021**  
**Instructor: Eric Hernandez**

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<b>Office Hours:</b>	T/Th 12:30-1:30 P.M. via Zoom or by appointment
<b>E-mail Address:</b>	eric.hernandez@csulb.edu
<b>Course Website:</b>	<a href="http://www.engreric.com/">http://www.engreric.com/</a>
<b>Lecture:</b>	Sec: 1, Class #: 5915, Mon., Wed., 12:30 P.M. to 1:45 P.M. via Zoom

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### **A. Description**

Second of a two-semester capstone senior project in computer engineering that fulfills GE integrative learning capstone. Student teams will build, program and verify operation of project started in prior design course. Student teams must submit a written report, give an oral multimedia presentation and provide a working demonstration. Letter Grade Only (A-F).

### **B. Introduction**

In the CECS Department we define a Computer Engineering Senior Project as an extensive project planned and carried out during the senior year of college as the culmination of the school experience. Computer Engineering Senior Design projects require higher-level thinking skills, problem-solving, and creative thinking. They are often interdisciplinary and may require extensive re-search. Projects culminate in a final report and presentation of the project to a panel of people, usually faculty and community mentors, sometimes students, who evaluate the student's work at the end of the year.

### **C. Computer Engineering Senior Project Requirements**

- A project can be a research project, a software project, hardware project, or any combination of these.
- Fifty percent of project must involve original circuit design as determined by the instructor
- Seventy five percent of programming must be original (not from open source or libraries)
- Programming languages or HDLs (Hardware Descriptive Languages) used should be applicable to industry and not of a hobbyist grade, i.e. C, C++, Java, Python, Verilog, VHDL etc... would count toward the 75% original code requirement, but Node-RED, Matlab - Simulink and other GUI based code generators would not. These code generating tools may be used, however, they must not comprise a large percentage of the project
- A project can be either a student project or a team project. A team may consist of up to four students. The project difficulty is expected to increase with the number of students on a team. It is preferred that all projects are team projects.
- There should be a well-defined beginning and end to the project
- There should be clearly-defined criteria for success or failure

- The student or team is directly responsible for the project's success or failure
- The project should require some investigation before implementation
- The project should require creativity.
- The project should not be able to be done by a high school student
- The project should be more complex than any project in prior courses
- The solution should not be obvious
- Computer Engineering majors require a two semester senior project
- Projects are selected by the student or team in their area of interest
- Projects selected by the student or team must be approved by the instructor to be certain course requirements are met
- CECS 490B must be taken immediately following the CECS 490A course
- The student or team will be expected to develop their project according to standard engineering lifecycle practices beginning with requirements definition and analysis, followed by systems design, detailed design, implementation, prototype test, function test, and concluding with demonstration and reporting
- There will be considerable emphasis placed on testing and analyzing the developed product, and demonstrating its correct operation
- A 30-minute oral presentation is required at the conclusion of the project/semester
- A comprehensive, minimum of 50 pages, written report is required at the conclusion of the semester

## **D. Textbook**

Materials to be handed out in Class

## **E. Skills**

### **GE Integrative Learning Capstone**

Students at CSULB must complete upper division GE capstone requirements. There are several types of courses that can satisfy these requirements. There's a category that is named [Integrative Learning](#). The goal of courses in this particular category is to “recognize and respond to complexity of problems or issues by making reasonable and innovative connections across multiple perspectives and frameworks”

To meet the goals of Integrative Learning, this course reinforces knowledge and skills that are part of a general education. This course emphasizes the following GE Essential Skills.

### **Written Communication**

Writing is taught in class and through the process of outlining, researching, writing, and evaluating a variety of credible sources; these will include the documentation of the whole design process from the project motivation to the embodiment design results with critical review and conclusion.

### **Critical Thinking**

Because this is a design course, students will be regularly and actively engaged in the critical thinking process. This course will require you to participate extensively in different formats and forums for developing critical thinking skills (including demonstrations, smallgroup activities, and oral presentations). A variety of writing assignments will require analysis, synthesis, and evaluation of engineering design.

### **Teamwork**

Teamwork in the computing field is vital to becoming a respected and successful professional. Functioning software/hardware development teams need members with a broad set of talents including creativity, communication, leadership, technical knowledge, planning and organization. A team's performance level may be determined by the interactions between individual attributes, communication, and the team's ability to effectively complete project tasks. For this course, the team will work on design project leading to development of a computer engineering application. Collaborative tools such as Google Docs, Piazza, and similar tools will be used to enable students to work in groups (both asynchronously and synchronously). Tools such as Google Hangouts, Skype or GoToMeeting are also encouraged for virtual meetings.

### **Course topics:**

1. Hardware construction, prototyping and rapid prototyping
2. Hardware testing and using software to test hardware
3. Designing testing aids into hardware/software
4. Hardware and software verification.
5. Hardware versus software design considerations
6. Select design components based on functionality and price
7. Altium, Circuit Maker, and Orcad schematic capture. PCB (Printed Circuit Board)/PWB(Printed Wiring Board) layout and creation.
8. Power management, power supply types and design, battery management and power budgets.

### **Course Objectives:**

1. Apply principles of computer engineering theory, problem solving techniques, and practical laboratory knowledge to design, implement, test and bring to completion your design project from your Computer Engineering Senior Projects I course.
2. Demonstrate sufficient written communications skill
3. Demonstrate sufficient oral communication skills

### **Course Goals:**

This course will require the students to successfully complete the first half of a 6-unit, two-semester computer engineering senior project course. This will give the student the opportunity to put into practice all of the technology and skills they have learned. Taking an idea from a conception to actually producing a working engineering prototype will require the student to fully understand the product development cycle. It will engrain into the student the need to have a concrete understanding of a problem before a preliminary specification can be made. It will require

the student to search for possible solutions and to then use fundamental engineering analysis to come up with an efficient and economical design proposal.

### **Course Objectives:**

1. Apply principles of computer engineering theory, problem solving techniques, and practical laboratory knowledge to design, implement, test and bring to completion your design project from your Computer Engineering Senior Projects I course.
2. Demonstrate sufficient written communications skill
3. Demonstrate sufficient oral communication skills

### **Learning Activities**

To achieve the objectives of the course, students will carry out several activities:

1. **Readings:** The lectures will follow the topics as provided by the instructor and as supplemented by the class web page, online resources and class handouts. The reading assignments will elaborate on information presented in the lectures. Each student is responsible for reading all related material prior to each lecture. This is a senior level class and students are expected to learn independently as much as needed in order to complete the project.
2. **Class meetings:** students are required to attend every class meeting; this is where the course material will be discussed and where other learning activities will take place. Class participation is highly encouraged and is part of your grade. The technologies required to be applied in the project will be presented in the lectures via examples from books and/or handouts. Class meetings will take place in a computer lab and some of the meetings will be set aside for students to meet and/or work on the project.
3. **Assignments:** homework will be assigned so that students may practice and apply the knowledge and skills that will be required for a successful completion of the project.
4. **Exams:** there will be no exams. Most of the grade in this class is based on the quality of your work in the project and on assignments tied to the project and/or skills that are required for the project.
5. **Project:** Projects will be either individual or team with a maximum of four members per team. Team size will be dependent upon the complexity of the project and the skills of the team members. Projects will be selected by the student with guidance from the course coordinator. Students will be encouraged to select projects that can be entered into existing design competitions (e.g. IEEE's Computer Science International Design Competition; Microsoft's ChallengeE; Circuit Cellar's yearly Design Competition; etc.) Contracts will be created that define the scope and expectation of the student's project. The contract must be specific and must contain expected outcomes to be met before the project is completed. The contract must specify intermediate reports dates and requirements. Upon completion of the project a working engineering prototype must be presented to the faculty advisor at an open, semi-formal presentation. The student must submit his/her final report and be prepared to defend their design.

## Grading:

Grading will be based on the student's ability to complete their project design. Students will receive both an individual grade as well as a team grade. Each team will name the task that each team member is responsible for. In your presentations and reports you will receive a grade for your contribution to your assigned area as well as a team grade. These will combine to give you your total grade for the course. Each of the two components, individual and team, will be equally weighted. There will be 5 demos to check the work in progress throughout the semester. These demos will be previously agreed on and contractual between the instructor and the team.

## Grade Breakdown

Quizzes / Assignments / Progress Meetings	10%
5 Milestone Demos	30%
Midterm Project Report (group and individual)	20%
Final Written Project Report (group and individual)	20%
Final Oral Presentation	10%
Final Demo	10%

No late work will be accepted.

## Grading Policy

- If you do not agree with the grade on any activity, you may request that the grading of the activity be re evaluated. The request must be made within 48 hours of having received the graded activity. The graded activity must be submitted to the instructor at the time of the request.
- The project will have several milestone submissions throughout the semester; these must be turned in on time and cannot be made up.

## Withdrawal

Students need to check the University website for important registration deadlines. Students may drop classes during the first two weeks of the semester. Starting the third week of the semester, withdraw from a class requires the signatures of the instructor and department chair and will result in a W in your transcript. Typically, students may drop up until the end of the twelfth week of the semester. Dropping classes during the final three weeks of instruction is not permitted except in the case of accident or serious illness occurring during this period. Ordinarily withdrawals in this category will involve total withdrawal from the university and require approval of the instructor, the chairperson, and the dean. Do not wait until the last minute to seek these approvals. You should allow for the possibility that your instructor, as well as the department chairperson, may be unavailable on a given day. Whenever you consider dropping a class you should have a discussion with your instructor and also with your adviser in order to determine the best course of action.

## University policies and information

Be aware of important dates and deadlines as posted by the University: [Spring Term](#) and [Fall Term](#) Key Registration Dates and Deadlines.

## Cheating and Plagiarism

The [University Catalog](#) provides information to students regarding [cheating and plagiarism](#). You may also want to refer to the [official and complete campus policy on cheating and plagiarism](#).

### **Student Academic Honors Pledge**

The CSULB Campus Regulations states the following regarding the academic honors pledge “The Student Academic Honors Pledge was approved by the Academic Senate and Associated Student Senate in 2004. The pledge states, ‘I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination.’ ”

### **Recommended Student Load**

The [CSULB Student Load Regulations](#) state that students are expected to spend, on the average, two hours of preparation and study for each hour of class time. Thus, a three unit lecture or discussion course normally demands a commitment of nine hours per week averaged over the semester, with the class meeting for three hours a week. This may be considered sufficient time to enable a student to do satisfactory work. Students who desire to achieve "A" or "B" grades may wish to spend proportionately more time in their studies.

### **Definitions of Grades and Grading Symbols**

The University Catalog defines the grades to be assigned as follows. Note, this is taken from the CSULB catalog section on [Academic Credit and Regulations, Part One: Definitions](#). The following definitions apply to grades assigned in all undergraduate and graduate courses.

- “**A**” Performance of the student has been at the highest level, showing sustained excellence in meeting all course requirements and exhibiting an unusual degree of intellectual initiative.
- “**B**” Performance of the student has been at a high level, showing consistent and effective achievement in meeting course requirements.
- “**C**” Performance of the student has been at an adequate level, meeting the basic requirements of the course.
- “**D**” Performance of the student has been less than adequate, meeting only the minimum course requirements.
- “**F**” Performance of the student has been such that minimal course requirements have not been met.

## **F. Cheating/Plagiarism/Academic Integrity Policy**

- You can discuss the course material (not the solutions on active assignments) with your classmates, but the work you submit must be your own.
- If sources other than the textbook are used, the student (or team if submitting teamwork) must provide adequate citations to each and every source used, everywhere that it is used, not doing so constitutes plagiarism. Sources could be other books, web sites, instructors, etc. A complete list of references must be provided with the assignment.
- Each student must complete the coursework on his/her own, unless directed to work in teams. Cheating and plagiarism of any form will not be tolerated. Once in teams, each team must complete their own work.

- All students involved in plagiarized work or in which cheating has taken place, or completed by team effort (when instructed otherwise) will receive a zero grade for the activity and their class grade will be lowered by a whole letter grade. Furthermore, the instructor will not approve requests to withdraw from the class by students involved.
- At the discretion of the instructor, any student involved in a plagiarism/cheating incident may be reported to university officials so that further disciplinary actions may be taken. See the CSULB Catalog concerning plagiarism/cheating.
- Do not use other people's work or give your work to others (intentionally or not) as this is considered cheating. E.g., do not leave print outs of code unattended, do not leave your computer unattended and do not forget to log out completely as this can result in cheating.

There is **zero tolerance** for cheating, plagiarism, or any other act of violation of Academic Integrity policy. Work that you submit is assumed to be original unless your source material is documented appropriately, using proper citation. Using the ideas or words of another person, even a peer, or a web site, as if it were your own, is plagiarism. Any individual or group caught cheating on homework, lab assignments, or any exam/quiz will be subjected to full extent of academic actions allowed under University regulations.

**At a minimum**, any student caught *violating the Academic Integrity Policy* will receive no credit for the work concerned, and will receive a reduction of one letter grade from their final course grade.

To learn more about the University policy on Cheating and Plagiarism, visit:

<http://catalog.csulb.edu/content.php?catoid=5&navoid=369#cheating-and-plagiarism>

## **G. CLASS PREREQUISITES**

CECS 490A with a grade of "C" or better

## **H. COE Tutoring Services Available for Major Classes**

The College of Engineering Tutoring Center offers free tutoring for many lower and upper division engineering courses in MAE, CECS, CECM, CHE and EE. Tutors are available Monday through Friday during the fall and spring semesters between the hours of 9:00am-6:00pm in EN2-300.

Visit the following website for detailed tutoring schedules:

[http://web.csulb.edu/colleges/coe/views/essc/academic\\_success/engineering\\_tutor.shtml#asp\\_ETP](http://web.csulb.edu/colleges/coe/views/essc/academic_success/engineering_tutor.shtml#asp_ETP)

## **I. Accommodations:**

Students with disabilities who need reasonable modifications, special assistance, or accommodations in this course should promptly direct their request to the course instructor. If a student with a disability feels that modifications, assistance, or accommodations offered are inappropriate or insufficient, he/she should seek the assistance of the Director of Disabled Student Services on campus.

## **J. Sexual Assault, Rape, Dating/Domestic Violence, & Stalking**

Title IX prohibits gender discrimination, including sexual harassment and sexual misconduct. If you have experienced sexual harassment, sexual assault, rape, dating/domestic violence, or stalking, the campus confidential Victim's Advocate is available to help. Jaqueline Urtez (e: [advocate@csulb.edu](mailto:advocate@csulb.edu), p: (562) 985-2668) can provide free and confidential support, accommodations, and referrals for victims without having to report the assault to campus authorities. While students are welcome to discuss assaults with faculty, both faculty and teaching assistants are mandatory reporters who are required to report all incidents of sexual harassment/misconduct to the Title IX office for follow-up and possible investigation. Students who do wish to report the assault for possible investigation may contact the confidential victim's advocate, who can help them through the reporting process, or they can report the assault directly to the Title IX Office by completing an online reporting form at <https://www.csulb.edu/equity-diversity/title-ix> or contacting the Office of Equity & Diversity at [OED@csulb.edu](mailto:OED@csulb.edu).

## **K. Food and Housing Assistance**

Any student who is facing academic or personal challenges due to difficulty in affording groceries/food and/or lacking a safe and stable living environment is urged to contact the CSULB Student Emergency Intervention & Wellness Program. The website outlining the resources available is [www.csulb.edu/basicneeds](http://www.csulb.edu/basicneeds). Students can also e-mail [supportingstudents@csulb.edu](mailto:supportingstudents@csulb.edu) or call 562/985.2038. If comfortable, students may reach out to the professor as they may be able to identify additional resources.