DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

# EE4810/EE4820 ECE Capstone Design

Syllabus

**Instructor**
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**Prerequisites**
Per the catalog description perquisites are :

4810 Senior Design I (3) Prereq.: EE 3220, EE 3751, senior standing in the College of Engineering, and one of EE 3410, 3530, 3610, or 3755. 2 hrs. lecture, 2 hrs. lab. Senior design projects.

4820 Senior Design II (3) Prereq.: EE 4810. 6 hrs. lab. Continuation of senior design projects from EE 4810. Construction and test.

**Schedule**
*4810*
Lecture: 3140 PFT - TTH 10:30-11:30
Lab: Not Applicable

*4820*
Lecture: Not Applicable
Lab: 351/326 Engineering Research and Development Building

The 4810 semester consists of lectures on topics including engineering design, effective communication, and select technical topics. Students dedicate the 4820 semester to construction and testing.

**Overview**
The ECE Capstone course is designed to offer a culminating design experience for undergraduate students. The course consists of two semesters of lecture and design. Students work in multidisciplinary teams to complete a sizable engineering design that is fully documented and prototyped.

The ECE course is certified as communication intensive by LSU's CxC advisory council. Courses meeting the requirements devote a substantial amount of effort to improving the written, oral, and visual communication skills of the students.

**Materials**

*Text*

"Design for Electrical and Computer Engineers" by Ford and Coulston will be the primary text for this class. It is recommended that all students purchase this book.

*Design Notebook*

You are required to purchase a bound lab notebook for this class. Do not purchase a spiral bound notebook or reuse some older notebook. Purchase a quality hardcover "book style" lab notebook. You will likely want the large engineering variety with graph paper style pages. This book will contain all of your design notes and observations. Do not lose the notebook!

**Primary Engineering Outcomes**

Satisfactory completion of this course will indicate some proficiency in the following abilities.

Performance in multidisciplinary design teams

Practical system integration and test capabilities

Technical communication, written and oral

An ability to analyze design goals and apply previous knowledge towards a technical solution

The capacity to prioritize and trade customer requirements

Familiarity with modern design tools and components

**Grading**

There are no exams in this class. Grades will be allocated based on written and oral work in addition to some performance based marks. Due dates are approximate.

| Semester | Assignment | Allocation | Due |
|---|---|---|---|
| 4810 | Conceptual Design Report | 10 | Mid Semester |
| | Conceptual Design Presentation | 10 | Mid Semester |
| | Lab Notebook | 15 | |
| | Bi-Weekly Progress | 10 | |
| | Preliminary Design Presentation | 15 | End Semester |
| | Preliminary Design Report | 25 | End Semester |
| | HW/Participation | 15 | |
| 4820 | Construction Milestone I | 10 | 1/3 Semester |
| | Construction Milestone II | 10 | 2/3 Semester |
| | Final Design Report/Poster | 30 | End Semester |
| | Final Design Presentation | 10 | End Semester |
| | Lab Notebook | 10 | |
| | Bi-Weekly Progress/Participation | 10 | |
| | Performance Outcomes | 20 | |

Each assignment will be accompanied with a grading guide dictating the point allocation for each aspect of the assignment. Please review documents related to each course. Assignments are listed roughly in the order they are due during the semester.

**Tentaive Class Schedule**

| Week | Class Event | Extra | |
|---|---|---|---|
| 1 | Introduction | Read Ch 1 | Register on CATME |
| | Project Review | | Register on CATME |
| 2 | Introduction to Engineering Design | | |
| | Problem Definition | Ch 2 | Announce Teams |
| 3 | Requirements | Ch 2 | |
| | Intro to CDR and supporting documents | Project Selection Due | |
| 4 | Requirement Specification | Ch 3 | |
| | Intro to Engineering Communication Studio | Boz Present | |
| 5 | Requirement Specification | Chapter 3 | |
| | Team Dynamics | | |
| 6 | Affinity diagrams and generating requirements | | |
| | Concept Generation | Chapter 4 | |
| 7 | Assessing Concepts | Chapter 4 | |
| | Concept Generation - Choosing an advising concept | Chapter 4 | |
| 8 | Mardi Gras Holiday | | |
| | CDR Preparation | Ch 12 | |
| 9 | Conceptual Design Review | | |
| | Conceptual Design Review | | |
| 10 | Conceptual Design Review | | |
| | Intro to PDR, Functional Decomposition part 1 | Moodle PDR docs Chapter 5 | |
| 11 | Functional Decomposition Example | Ch 5.4 | |
| | System Behavior Models | Ch 6 | Functional Decomp Due Prob 5.7 |
| 12 | Ethics and Professionalism | Ch 11 | |
| | Guest Speaker | | |
| 13 | Budgeting and Cost analysis | Ch 10.4 | |
| | Engineering Economics, Patent and Legal | | |
| 14 | Preliminary Design Review | | |
| | Preliminary Design Review | | |
| 15 | Preliminary Design Review | | |
| | Preliminary Design Review | | |
| 16 | Exam Week | | |
| | Preliminary Design Review | | |

**Grading Curves**

The instructor reserves the right to adjust final grades. No grade will be lowered by a curve. A standard 10 point scale will be used. The following scale represents the spirit of the grade allocation.

| | |
|---|---|
| A | Commendable performance. Designs were very well researched and skillfully executed with ideal outcomes. |
| B | Above average performance. Designs were well researched and executed with good outcomes. |
| C | Acceptable performance. Design effort and outcomes were reasonable. |
| D | Minimal performance. Overall performance was lacking in most respects. |
| F | Unacceptable performance. Little, if any, merit to course performance. |

**Progress Reports**

Progress reports are due every two weeks during 4810 and every two weeks during the 4820 semester. They are graded. A copy should be pasted into your design notebook and reviewed with your advisor. Credit will not be awarded for forms not pasted into the notebook in chronological order. You should typically spend 15-30 minutes on the report and include an appropriate level of detail. Do not record vague entries such as "had meeting" or "built part". The report form will be posted on the class web site.

Teams will also meet with the course instructor on a weekly and bi-weekly basis to track progress.

**Communication Intensive Course Information**

*This course is certified as a "Communication-Intensive Course" and meets all of the requirements explained on the CxC Web site: http://cxc.lsu.edu., including the following: Emphases on formal and informal assignments in written and visual communication, class time spent on communication, 40% of the final grade based on communication projects, revisions after faculty feedback on 2 formal projects (one for each emphasis), and a student/faculty ratio of 35:1. Because it meets these requirements, students may count it toward "Distinguished Communicator" certification on LS*

**Service-Learning – Optional**

Students can elect to take this as a Service-Learning course. Selected projects may allow students to earn credit for this course as a service-learning course bearing educational experience in which students (a) participate in an organized service activity that meets identified community needs and (b) reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline and an enhanced sense of civic responsibility. (Bringle & Hatcher, 1995).

**Service-Learning Objectives**

Course Enhancements Made Possible by a Community-Based Project:

- Students will demonstrate **critical thinking skills** in a service-learning project by:
    - Creating a demonstration that connects STEM concepts to a real system that is interactive
    - Outlining two lectures appropriate for middle school and high school students relating to the STEM concept that meets the Grade Level Expectation (GLE) requirements.
    - Writing a user manual and troubleshooting guide for the system to be used by STEM educators
- Students will demonstrate an ability to communicate effectively, including conveying technical material by presenting two lectures appropriate for middle school and high school students relating to the STEM concept that meets the Grade Level Expectation (GLE) requirements.
- Students will demonstrate an **ability to apply knowledge of mathematics, science and engineering** in a service learning project by designing a real system demonstrating a STEM discipline to middle school and high school students.
- Students will demonstrate **an ability to use techniques, skills and modern engineering tools necessary for engineering practice** by designing a system that potentially can be used in a modern STEM curriculum. One specification requirements is for the system to demonstrate potential for modern applications in society.
- Students will demonstrate and a**bility to design a system to meet desired needs within realistic constraints** by working with community leaders and educators to create a demonstration that meets a set of specification requirements, GLE requirements, and a budget requirement.

**Service Learning Partner**

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**Academic and Professional Integrity**

This course requires you to meet with faculty, industry and other professionals outside of class hours on a regular basis. Students are expected to behave professionally at all times. Failure to comply will result in a reduction in participation points. Students are expected to work in groups and collaboration is encouraged while working on projects. The instructor will announce other assignments to be done individually with no collaboration. These will include the debriefing papers and the ethics assignment.