
ECE 4960
Integrated Systems Design II

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Course Description: ECE 4960 is a laboratory/design project course which brings together electrical and computer engineering students with varying specializations to work on a specified design project. Each team will independently develop and implement an engineering project by leveraging the team members' knowledge and skills. This course is designed to highlight the transition from academic analysis to industrial goal-oriented engineering practice. The students, as a team, are expected to acquire resources, make design decisions, and implement and verify the solution. In particular, students will find that effective technical communication is essential within the team, with information resources (experts, vendors, peers, etc.), and between the team and the instructor. The team grade, and ultimately each individual's grade, depends upon the full completion of the project and its final demonstration.

This course seeks to encourage a principled design approach. Design decisions should be, so far as possible, backed up by empirical data, theoretical calculations, or (even better) both. The performance of your system and its subsystems should be characterized as fully as possible, both qualitatively (e.g. raw video footage, written observations, etc.) and quantitatively (e.g. measurements, performance metrics, etc.). Performance data should be actively collected throughout the semester, not just when deliverables are due. Presentations and written reports should support all performance claims with appropriate data and/or analysis. In the final report, you will be asked to highlight specific elements of your project that illustrate a principled design approach.

Common Policies: See the ECE Common Course Syllabus for policies that apply to all ECE courses at Clemson University.

Web Resources: Canvas course management site, <http://www.clemson.edu/canvas>

The class section number: 400

Office hours: By appointment.

Prerequisites: EE prereqs: ECE 3210, 3710, 3810, 4090 and 4950.

CpE prereqs: ECE 3270, 4090, 4950.

Project Funding:

Lab equipment and tools are provided, but the projects themselves are self-funded.

Class, Project Group, and Team Meetings

We will meet as follows during the semester. Further information, including specific dates, will be posted on Canvas.

- We will meet as needed via WebEx. The time of the meeting will be set later to match everybody's schedule.
- Special Events (Week 13/14) – The poster session is held during the last week of class. .

Dual Role of Instructor:

The instructor serves in dual roles in ECE 4960.

Technical Supervisor/Consultant: During weekly meetings, office hours, etc., the instructor acts as a technical consultant and/or supervisor. Weekly meetings will be used to monitor progress and provide feedback. Technical questions are welcomed. In general, the instructor will not give you “the answer,” but point you in the appropriate direction to figure out an answer. In this role, the instructor is a collaborator.

Customer: While evaluating milestones, written reports, presentations, etc., the instructor acts as the customer. The customer will actively search for problems with your design and implementation and will demand evidence to back up claims about your system. In the role of customer, you should assume the instructor has no knowledge of the interactions that occurred while the instructor acted as consultant/supervisor.

Grading:

For each team deliverable (listed below), roughly half the score will be based on meeting the requirements and half on *performance*. The performance component will take into account raw performance on specified metrics as well as the approach to design and testing, planning for contingencies, display of creativity, etc. The team task scores are relative and do not correspond directly to letter grades.

Final Team Score (FTS) is determined by a weighted average of the team task scores, using the percentage weights provided in the table. The FTS will be scaled and shifted (i.e. curved) to give the numeric Final Team Grade (FTG). The team grade curve is designed to capture the following qualitative attributes

TG=	60.00-69.99	D	Failed to complete a substantial portion of the project
	70.00-79.99	C	Met majority of project requirements but failed to overcome some obstacles that could have been reasonably surmounted
	80.00-89.99	B	Met project requirements. Overcame all obstacles that could be reasonably surmounted

90.00-100.0 A Exceeded project requirements. Demonstrated high degree of engineering competency and creativity.

Each individual is assigned an Individual Grade Modifier (IGM). The IGM reflects your individual contribution relative to the average level of contribution from your team. The IGM is based on the instructor’s evaluation of contribution and participation (from milestone post-mortems, attendance, participation, ability to answer questions about the project in private and public forums, activity in lab, etc.) and peer evaluations. The more uneven the participation is in your team, the broader the distribution of the IGMs. IGMs are **positive or negative** and are assigned such that the sum across the whole team is zero. If some members have positive IGMs, other members must have negative IGMs.

The Final Individual Grade (FIG) is the sum of the Final Team Grade and the Individual Grade Modifier, $FIG=FTG+IGM$. Thus, the Final Team Grade will be the average of the Final Individual Grades of the team members. (The Final Individual Grade may be penalized, for example, for unexcused absences from required meetings and events and for failing to submit required individual deliverables such as the milestone postmortems and peer evaluation. In case of such penalties, the Final Team Grade will be higher than the average of the Final Individual Grades.)

The Final Letter Grade is determined by truncating (not rounding) the Final Individual Grade and applying the standard grade boundaries, as listed for the Final Team Grade above. Thus, a Final Individual Grade of 89.99 is still a B.

It is **critical** that each team member contribute substantively to the project and that other teammates are aware of and understand the individual’s contributions. Peer Evaluation Forms will be collected after the final report is submitted. Peer Evaluations allow each individual to characterize his or her teammates’ contributions and performance.

The list of deliverables and weights is provided below. Deadlines and detailed requirements for each deliverable will be posted on Canvas as the semester progresses.

Team		
Team Tasks	Deliverable	% team grade
Preliminary Report - Document analyzing the system requirements, presenting initial measurements or results, and proposing a design solution.	PDF document	10
Milestones - Specified milestones to be demonstrated during the semester	Live demo, held in lab	10
Project Demonstration – Final in-lab demonstration of project performance for instructor and/or performance competition.	Live Interactive Demo	50

Poster Session – Poster presentation and live demo for jury and public audience	Poster, Oral Presentation, Demo	10
Final Report – Document presenting the final design and its performance.	PDF Document	10
Design Video –Short video (~4min) presenting the design project, targeted roughly at first year engineering students.	Post to Youtube and provide video file	10
Individual		
Individual Task	Deliverable	
Milestone Postmortems – individual description of your team’s milestone performance and your individual contribution	PDF document (due after each milestone)	
Peer Evaluation Form – feedback on how performance and workload was distributed across the team	PDF document (due during finals week)	

Lab Etiquette:

A bench will be assigned to our group both in Clemson and Charleston. Do NOT touch equipment from a bench that is not assigned to you. The senior design labs are a frequent stop for visitors to the department, and the appearance of the labs reflects on you, on the department, and on the university. Keep your bench clean and tidy throughout the semester. Please throw away trash and tidy up your work area on a regular basis. If you are doing anything that generates a lot dust or dirt, take precautions to protect equipment (e.g. covering with a cloth) and clean up after yourself (a shop-vac is available). Wood should be sawed outside.

Important Dates:

<https://www.clemson.edu/registrar/academic-calendars/calendars.html?year=2020&semester=spring>

- Last Day to Add a Class: Tue, Jan. 14, 2020
- Last Day to Drop a Class without “W” Grade: Jan 22, 2020
- Last Day to Drop a Class without a Final Grade: March 13, 2020

Changes to Syllabus: The instructor reserves the right to make changes to this syllabus during the semester. Students will be given adequate notice in class of any changes.

Agreement: If you disagree with any of the policies or procedures spelled out above or cannot accept the demands of the course (i.e., the amount of time and work required), you need to drop the course as

soon as possible. By staying in the course, you agree to comply with all the policies and procedures described in this syllabus