

Syllabus – Integrated Systems Design II (ECE 4960) Spring 2020

Instructors: Richard E. Groff
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Office Hours: Available without appointment during scheduled office hours. See “Syllabus” tab on Canvas for scheduled office hours. Any temporary changes in office hours will be posted on Canvas, so please check Canvas before coming in.
Also available by appointment outside of scheduled hours. See Canvas for instructions on how to schedule an appointment.

Teaching Assistants: Available by appointment arranged via email.
See TA Contact Information on the Syllabus tab on Canvas. .

Meeting Time: Monday and Wednesday 4:40PM - 6:40PM
Mandatory weekly team progress meetings with Instructor (Meeting times TBD)

Classroom: Olin Hall, Rm 200 (used for class and project group meetings and some tutorials, but not for team meetings)

Laboratory: Riggs Hall Rms 29 (bench assignments will be posted on Canvas)

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>

Prerequisites: EE prereqs: ECE 3210, 3710, 3810, 4090 and 4950.
CpE prereqs: ECE 3270, 4090, 4950.

Course Description:

ECE 4960 is a laboratory/design project course which brings together electrical and computer engineering students with varying specializations to work as a team on specified design projects. The class is divided into teams of size 4, 5, or 6, depending on enrollment. 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. sensor 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.

Project Funding:

Lab equipment and tools are provided, but the projects themselves are self-funded. In lieu of requiring a textbook, each student is expected to contribute funds to their team's project, up to the cost of a senior level technical text (~\$75/individual).

Class, Project Group, and Team Meetings

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

- Whole class (Week 1,2) - for the first two (or three) class periods, the entire class meets during the normal class period. Typically these meetings are 1-1.5hrs.
- Project Group Meetings (all teams working on a specified project) (Week 2,3) - After projects are assigned, the instructor meets with project groups separately to cover detailed specifications, background material, etc. associated with the specific project. Each project group will have a slot (~1hr) scheduled within the normal class period.
- Team Meetings (Week 4-13) - Team meetings are short **mandatory** meetings involving a single team and the instructor, held in the instructor's office. Team Meeting time slots (15-30 min. long, depending on the semester) are assigned when projects are assigned. So far as possible, team meetings are scheduled within the normal class period and are grouped so that all teams on the same project meet within a single block of time. The Team Meeting times are also used for certain deliverables (milestones, project demos). During most weeks of the semester, the team meeting is the only required contact between students and the instructor. See the separate document, posted in the General Requirements module on Canvas, for further information about Team Meetings and the Status Report.
- Special Events (Week 13,14) – The poster session is held Monday or Wednesday during the last week of class. The poster session is several hours long, extending beyond the scheduled class time. Attendance is **mandatory**. Additionally, other mandatory events may be scheduled near the end of the semester for some projects, e.g. the air hockey tournament.
- Tutorials – Typically several tutorials are offered near the beginning of the semester (typically in weeks 2-5) on topics that might be useful for the projects. These tutorials are typically led by the TAs and are often offered during time slots within the regular class period. Attendance is not required, but it is highly recommended that you send at least several members to relevant tutorials.

Email Contact:

Please adhere to the following guidelines for all email communication regarding ECE4960. The guidelines will ensure that your message is properly routed by my email filter.

The subject line of all emails must start with the prefix

"ECE4960-<teamID>: "

Note that the only space occurs after the colon. The identifier "<teamID>" should be replaced appropriately with the team identifier assigned after project selection. For example, if the team identifier is AH3, the subject prefix would be "ECE4960-AH3:". Note that "<" and ">" do not appear in the prefix! (Team identifiers are assigned when projects are assigned. Teams are initially assigned a number, but you should cease to use the number once the team identifier is assigned.) After the prefix, include a short subject description. For deliverables, the subject line will be specified.

The group email address for instructor and TAs is clemson-ece4960-support@googlegroups.com. This address should be used, for example, to request lab assistance, to request input on problems, to report equipment failure, to set up a laser cutter appointment, etc. The email list forwards to the TAs as well as the instructor. This helps ensure that we can track commonly occurring issues across teams and that everyone's issues are addressed in a timely manner. Please do not email individual TAs directly. The instructors' individual email addresses are regroff@clemsion.edu and hraza@clemsion.edu. This address should be used for direct inquiries to Dr. Groff or when specified (e.g. for submission of status reports and some deliverables).

We will attempt to answer all email inquiries with 48 hours.

Team Structure:

All team members must participate both in the technical design work as well as in written and oral reporting. **It is not acceptable for individuals to be involved in only technical tasks or only reporting/management tasks.**

Each team must select a point of contact. The point of contact is responsible for submitting the weekly status reports, written reports and other deliverables throughout the semester.

Otherwise, the team structure and organization is up to you. Teams often choose a team leader either explicitly or implicitly. This may or may not be the same person as the point of contact. Each individual is responsible for finding ways to contribute to the team effort, and each team is responsible for determining how to fully utilize all members. The most successful teams generally feature willing, diligent participation from all members.

Note that individual effort is taken into account through the individual grade modifier, which is based on instructor observation and peer evaluations.

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:

Grading takes into account team as well as individual performance. For each team deliverable (listed below), roughly half the score will be based on meeting the requirements and half on *performance relative to the rest of the teams*. 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:

Bench assignments will be posted to Canvas. 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 of 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.

Reporting Faulty Equipment: Make note of any malfunctioning equipment and report it via email to clemson-ece4960-support@googlegroups.com. (See section on Email Contact for further information.) Your report should include a description of the tests you performed to verify that the equipment is malfunctioning (Poorly fabricated cables are found to be the source of many equipment malfunctions). DO NOT SWAP LAB EQUIPMENT WITHOUT PERMISSION FROM TAs or INSTRUCTOR.