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## ECE 4950/60 - Integrated Systems Design ME 4010 - Internship in Engineering Design

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### Meeting Information:

**Meeting Time:** GWC-404/Zoom/WebEx/, Thursdays 11 AM – 12 Noon or as scheduled

**Course Modality:** Hybrid in-person, or as designated in CANVAS / IROAR

**Class Location:** GEC-404/Zoom/WebEx, or as designated

**Instructor:** Prof Johan Enslin

**Email:** jenslin@clemson.edu

**Office:** GEC 109

**Office Hours:** Per appointment

**Office Phone:** 843-730-5117

**Course Description:** ECE 4950/60 and ME 4010 is a laboratory/design project course which brings together electrical, computer and mechanical engineering students, and other disciplines like computer science, with varying specializations to work as a team on specified design projects. The class is divided into teams of size 4 to 5, 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. 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. Approximately 600-900 man-hours for this project is required.

**Common Policies:** See the Common Course Syllabus for general policies, academic integrity and Title IX (Sexual Harassment) that apply to all courses at the departmental and Clemson websites.

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

### Project Description:

CAPER Senior Design Project - Fall 2021 - Clemson at Charleston - Problem Statement & Deliverables

## References:

Course Guide to ECE 4950/60, Integrated Systems Design and ME 4010, Internship in Engineering Design. Prepared and updated each semester by the ECE and ME Departments.

**The class section number:** 843 (Charleston CURI campus)

**Office hours:** By appointment.

**Prerequisites:** EE pre-reqs: ECE 3210, 3710, 3810, 4090 and 4950; CpE prereqs: ECE 3270, 4090, 4950.

ME Prerequisites: All required 300-level ME courses with C or better. Corequisites: ME 4021.

## Project Funding:

Lab equipment and tools are provided, and the project is funded from Duke Energy. Personal tools and equipment are self-funded by individual students. In lieu of requiring a textbook, each student is expected to be self-sufficient with basic tools and computer equipment.

## 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.

- Our group will meet every week in North-Charleston or via Zoom/WebEx. The time of the meeting will be set for a time that works for all.
- Special Events:— A poster and presentation session is held during the CAPER meeting in Charlotte NC, during the progress update at the CAPER Workshop. Attendance and a professional presentation and poster are **mandatory**. Additionally, other mandatory events may be scheduled near the end of the semester for some projects. (See Project Description)
- Tutorials – Typically several tutorials and industrial advisor interactions and technical visits are offered during the semester on topics that might be useful for the projects. Attendance is recommended and industrial advisor interactions are required.

## 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 project manager (PM). The PM is responsible for submitting the weekly status reports, written reports and other deliverables throughout the semester.

Otherwise, the team structure and organization are up to you. 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 considered 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 4950/60 and ME 4010.

**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 interface to the customer (Duke Energy in this case). 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 considers team as well as individual performance. Evaluation and Grading:

- |    |                              |      |
|----|------------------------------|------|
| 1. | Homework and Projects =      | 0%   |
| 2. | Design Projects and Report = | 100% |
| 3. | Tests =                      | 0%   |
| 4. | Final Exam =                 | 0%   |
| 5. | Laboratory Reports =         | 0%   |

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 is described in the Project Description. Deadlines and detailed requirements for each deliverable will be posted on Canvas as the semester progresses.

## Lab and Office Etiquette:

The general work area is the GEC building and office cubicles are assigned to the team. Computers are required for modeling and design and available at GEC. Keep your work area, lab clean and tidy throughout the semester. 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 are available on Clemson CANVAS Website**

## Attendance Policy

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Hybrid in-person synchronous classes: Meetings, including presentations and workshops are scheduled during the published meeting times with the following:

1. Synchronous in-person mode will be in the form of a workshop where each student needs to be prepared to discuss his/her progress.
2. Online attendance is mandatory with team participation. Notification of Absence needs to be sent via email to the instructor.
3. In the event of a class being cancellation, a CANVAS notification will be sent out.

## Additional Policies

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**ACCESSIBILITY STATEMENT:** Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to a class should let the instructor know and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848 or by emailing [studentaccess@lists.clemson.edu](mailto:studentaccess@lists.clemson.edu). Students who receive Academic Access Letters are strongly encouraged to request, obtain, and present these to their instructors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: <http://www.clemson.edu/campus-life/campus-services/sds/>.

**TITLE IX STATEMENT:** Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972.

**SAFE CAMPUS:** Clemson University is committed to providing a safe campus environment for students, faculty, staff, and visitors. As members of the community, we encourage you to take the following actions to be better prepared in case of an emergency:

- a. Ensure you are signed up for emergency alerts (<https://www.getrave.com/login/clemson>)
- b. Download the Rave Guardian app to your phone (<https://www.clemson.edu/cusafety/cupd/rave-guardian/>)
- c. Learn what you can do to prepare yourself in the event of an active threat (<http://www.clemson.edu/cusafety/EmergencyManagement/>)

**ACADEMIC INTEGRITY:** As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a ‘high seminary of learning.’ Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately to charges of violations of academic integrity. Further information on Academic Integrity can be found in the Undergraduate Announcements and in the Graduate School Policy Handbook.

**COPYRIGHT STATEMENT:** Materials in this course are copyrighted. They are intended for use only by students registered and enrolled in this course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Teach Act. Students should be reminded to refer to the Use of Copyrighted Materials and “Fair Use Guidelines” policy in on the Clemson University website for additional information: <https://clemson.libguides.com/copyright>.

**MODIFICATION STATEMENT:** The instructor reserves the right to modify any aspect of the syllabus at any time during the semester for reasons including but not limited to COVID-related situations.

**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.