

ECE490: Design Lab I

Spring 2026 – Sections: 7884, 3 Credits

Dates/Time: Mondays & Wednesdays from 1:10 – 2:30pm

Class Location: EN-104 (CNSE downtown)

Professor: Jonathan Muckell

Email: jmuckell@albany.edu

Office: EN-305B

Professor: Mustafa Aksoy

Email: maksoy@albany.edu

Office: EN-305F

Office Hours:

Students are encouraged to seek help early and often.

| Prof. Muckell's Office Hours | Prof. Aksoy's Office Hours |
|--|----------------------------|
| <ul style="list-style-type: none">• Mondays: 3 - 4pm in EN-305B (Prof. Muckell)• Tuesdays: 3 - 4pm in EN-305B (Prof. Muckell)• Wednesdays: 3 - 4pm in EN-305B• Thursdays: 3 - 4pm in EN-305B <p>Schedule an Appointment: https://calendly.com/jonmuckell/30min</p> | <i>See Brightspace</i> |

ECE490 - Course Description

Part one of a two-semester-long capstone design experience that provides the opportunity for teams of students to propose, prototype/design, build, test, demonstrate, present and fully document a working prototype of a sophisticated electronic system. In this first part, student teams interact with industry sponsors and/or faculty to develop a proposal for a system, component or process to meet desired needs and specifications within constraints. Student teams will identify opportunities, develop requirements, perform analysis and synthesis, generate multiple solutions, evaluate solutions against requirements, consider risks, and make trade-offs.

ECE490 Prerequisites

All three of the following are required prerequisites: ECE300 *Introduction to Electronics*, ECE371 *Signals & Systems*, and ECE442 *Systems Analysis & Design*. In addition, you must have taken at least one of the following courses: ECE310 *Engineering Electromagnetism* or ECE334 *Programming Hardware Systems*.

Learning Objectives

After successful completion of this course, students will be able to:

1. Develop practical, creative ideas to solve organizational problems by treating innovation as a design process.
2. Employ information gathering skills to develop requirements consistent with the stakeholder's global, economic, environmental, and social mission.
3. Apply oral and writing communication skills to describe proposed engineering solution(s) for a range of audiences and the relevance of the solution to meeting organizational requirements/objectives.

4. Work as a member of a team, effectively collaborate to balance varying skillsets to meet deliverables and craft solutions.
5. Apply technical, mathematical and engineering competencies to review prior work, identify gaps in current solutions, and craft a useful, unique solution balancing constraints.
6. Demonstrate ethical principles throughout the engineering design processes and application of a complex engineering project.

Required Material:

- **Laptop (Required):** All Electrical and Computer Engineers majors are required to have a personal laptop (Chrome book is not sufficient). Additional Details are available here ([University at Albany Laptop Program](#)).
- **There is no textbook required for this course:** Although there is no required textbook you will be required to locate, read, and synthesize articles through a review of background literature related to your specific problem domain area and to evaluate potential solutions. Details will be discussed in class.

Grading Policies

Letter Grade and Scale:

| A | A- | B+ | B | B- | C+ | C | C- | D+ | D | D- | E |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 100-95 | 94-90 | 89-87 | 86-83 | 82-80 | 79-77 | 76-73 | 72-70 | 69-67 | 66-63 | 62-60 | 59-0 |

Grading Rubric: Detailed grading rubric is posted at the end of the syllabus.

Although most course work is completed as part of a team, final grades are based on your individual contributions. There is not a single team grade given to all members of the team.

All members of a team may receive different final class grades. You will receive feedback on your performance throughout the semester. However, to enable students to adjust to mistakes or changing project circumstances, as well as to incentivize continuous improvement and design iteration, grades will not be finalized until the end of the semester. If you are unsure how you are performing, you are encouraged to talk to the professor well before the end of the semester.

To receive credit for your individual contributions, your contributions must be documented and verifiable.

It is your responsibility to make sure that evidence of your contributions is documented throughout the semester and adequately communicated to the professor. All students are required to make substantial contributions to engineering-related tasks. Details on how to capture this evidence will be provided in class.

Time Management

For every credit hour that a course meets, students should expect to work 3 additional hours outside of class every week. For this three-credit course, you should expect to work 9-12 hours every week including inside and outside of regular class-time. **To be successful in this class, it is critical to properly manage your time throughout the semester.**

Course Policies

Team Sizes

To ensure that all team members are engaged in all critical aspects of the project, team sizes will be kept small and manageable. The typical team-size consists of three students.

Email Communication

Email will be a vital channel for important course communications to the class and project teams. These messages may include reminders about upcoming deadlines, clarification of expectations, tips for improving work quality, and updates on any changes to the course.

Students are expected to read and be aware of the information in professor emails within **one business day** (defined as a day when classes are in session). If any part of the message is unclear, students should reply promptly with questions. This ensures that everyone has the information needed to stay on track and meet course expectations.

Withdrawal from the course

Check the university's academic calendar (<https://www.albany.edu/registrar/academic-calendar>) to find the last day to drop the course. That is the last date you can drop a course and receive a 'W'. It is your responsibility to act by this date if you wish to drop the course. Grades of "incomplete" will not be awarded to students because they missed the drop deadline.

Incompletes

In accordance with the Undergraduate Bulletin, a grade of Incomplete (I) will be assigned *only* when a student has nearly completed the course requirements but, due to documented circumstances beyond the student's control, is unable to complete the remaining work by the end of the semester.

A student granted an Incomplete must enter into a written agreement with the instructor specifying:

- The remaining work to be completed, and
- The deadline by which the work must be submitted.

The Incomplete will be converted to a regular letter grade on the agreed-upon completion date based solely on the work submitted by that time.

Incompletes will not be granted to students who have failed to meet ongoing course obligations or who request an Incomplete primarily to avoid an unsatisfactory final grade. Requests must meet university criteria and will be evaluated accordingly

Academic Integrity

It is every student's responsibility to become familiar with the standards of academic integrity at the University. Claims of ignorance, unintentional error, or academic or personal pressures are not sufficient reasons for violations of academic integrity. See: http://www.albany.edu/undergraduate_bulletin/regulations.html

Use of Artificial Intelligence

AI tools (e.g., ChatGPT, Copilot, Gemini) can be valuable learning tool and can be useful in brainstorming ideas, checking code, or refining drafts, etc... However, these tools are not a substitute for your own understanding and problem-solving.

You may use AI in this course if:

1. **Understanding:** You fully understand any AI-assisted content you submit and can explain the reasoning, methods, and results without AI assistance.
2. **Accountability:** You are prepared to answer questions about your work in meetings, presentations, or oral checks without AI assistance.

Important: Submitting AI-generated work you cannot explain, that misrepresents your own ability, or that bypasses your own thinking will not receive credit.

Responsible Use of Information Technology

Students are required to read the University at Albany Policy for the Responsible Use of Information Technology, available at: http://www.albany.edu/its/policies_responsible_use_of_IT.htm

General Education Competencies

This course includes material and instruction to help you in the general education competencies of Advanced Writing, Critical Thinking, Information Literacy, and Oral Discourse required for all majors at the university. Descriptions of specific course activities and deliverables related to each general education competency is described below.

- I. **Advanced Writing:** Students will write a detailed engineering design report that will be completed in stages, with feedback and revisions occurring throughout the semester.
- II. **Critical Thinking:** Students will analyze and discuss a problem of critical importance to a project stakeholder, formulate requirements, develop a design to satisfy those requirements, present and defend key decisions.
- III. **Information Literacy:** Students will select an engineering problem, search and cite background information, including possible existing solutions, propose a solution, and evaluate the effectiveness of their solution compared to alternatives.
- IV. **Oral Discourse:** Students will have multiple opportunities to present their work, including a short lightning talk and a more detailed technical deep dive presentation. Presentations will occur across a wide range of audiences including, but not limited to, the class, stakeholders, and department faculty.

Available Support Services

Reasonable accommodation

Reasonable accommodation will be provided for students with documented physical, sensory, cognitive, learning and psychiatric disorders. If you believe you have a disability requiring accommodation in this class, please notify the Director of Disability Resource Center (Campus Center 137, 442-5490). That office will provide the course instructor with verification of your disability, and will recommend appropriate accommodations. In general, it is the student's responsibility to contact the instructor at least one week before the relevant assignment to make arrangements.

Supplemental Support Services

It is difficult to succeed academically if you don't have enough to eat, a safe place to live and sleep, or are struggling with an unforeseen emergency. Knowing the resources available on your campus to help you succeed is key! If you need help meeting these or other basic needs, please seek assistance from Supplemental Support Services in the Dean of Students Office. View the basic needs assistance offerings at <https://www.albany.edu/dean-students/supplemental-support-services>. While you're there, see the variety of helpful services available to you at the Dean of Students at <https://www.albany.edu/dean-students>. Contact information can be found on these websites

Curriculum Advisement

The College of Engineering and Applied Science (CEAS) has a small team of dedicated advisors that can help you

with decisions related to your major and/or minor. If you have questions about your major or minor, contact the CEAS advisors at CEASAdvise@albany.edu

Writing Center

Students are highly encouraged to take advantage of free writing assistance through the university's writing center. If your team goes to the writing center, please notify your course instructor. This will help us better coordinate writing assistance and consider possible incentives. For details or to make an appointment, visit the writing center website: <https://www.albany.edu/writing/>

See Schedule & Grading Rubric on following pages →

ECE490 - Class Meeting Schedule

Highlighted dates indicate mandatory all-class meetings, and attendance is required. During scheduled class time, students are expected to make productive progress on their project. When no specific activity is scheduled, teams should use class time efficiently for project work and are expected to meet regularly outside of class to maintain steady progress. Some class meetings may be used for team meetings with instructors or teaching assistants.

| Wk | Day | Date | ECE490 | DUE |
|----|-------|-------|---|--|
| 1 | Wed. | 01/21 | All Class Meeting: Course Introduction | |
| 2 | Mon. | 01/26 | Checkpoint #1 – Team Formation: Project Exploration & Stakeholder Pitches | |
| | Wed. | 01/28 | | |
| 3 | Mon. | 02/02 | Checkpoint #1 – Team Formation: Team Project Kick-off | Checkpoint #1 Due |
| | Wed. | 02/04 | | |
| 4 | Mon. | 02/09 | Checkpoint #2: Early Accountability & Ownership Identification of team/individual priorities | |
| | Wed. | 02/11 | | Checkpoint #2 Due |
| 5 | Mon. | 02/16 | Checkpoint #3: Design Development Preliminary design: requirements, constraints & design diagrams | |
| | Wed. | 02/18 | | Checkpoint #3 Due |
| 6 | Mon. | 02/23 | All Class Meeting: Midsemester expectations Attendance required, class updates, discussion, and Q&A | |
| | Wed. | 02/25 | | |
| 7 | Mon. | 03/02 | Checkpoint #4: Design Review Evaluation of design trade-offs, integration of engineering standards | Checkpoint #4 Due |
| | Wed. | 03/04 | | |
| 8 | Mon. | 03/09 | Technical Deep Dive Presentations 25-minute presentations per team outlining design, justification of key decisions, and prototype plan | Midsemester Deliverables I (report, presentations, self evals) |
| | Wed. | 03/11 | | |
| -- | Mon. | 03/16 | Midsemester – Lightning Talks 5-minute presentations per team w/ auto-advancing slides providing a high-level overview of your work, designed for a general audience. | Midsemester Deliverables II Lightning talk, peer evals |
| | Wed. | 03/18 | | |
| 9 | Mon. | 03/23 | NO CLASS – SPRING BREAK! | |
| | Wed. | 03/18 | | |
| 10 | Mon. | 03/23 | All Class Meeting: Midsemester Performance Reviews Snapshot on your team and individual performance thus far | |
| | Wed. | 03/25 | | |
| 11 | Mon. | 03/30 | Checkpoint #5: Design Iteration & Risk Review Response to midsemester feedback, evidence-based modifications to design and semester plan based on most recent relevant information. | |
| | Wed. | 04/01 | | Checkpoint #5 Due |
| 12 | Mon. | 04/06 | Checkpoint #6: Reproducibility Review Extent to which design and preliminary prototype artifacts enable reproduction and continuation by another engineer. | |
| | Wed. | 04/08 | | Checkpoint #6 Due |
| 13 | Mon. | 04/13 | All Class Meeting: End of semester expectations Attendance required, class updates, discussion, and Q&A | |
| | Wed. | 04/15 | | |
| 14 | Mon. | 04/20 | Checkpoint #7: Presentation + Prototype Demo Readiness Review Feedback on final presentation + system demonstration | Checkpoint #7 Due |
| | Wed. | 04/22 | | |
| 14 | Mon. | 04/27 | Technical Deep Dive Presentations 25-minute presentations per team outlining design, justification of key decisions, and prototype plan | Final Semester Deliverables I Deep dive presentations, self evals. |
| | Wed. | 04/29 | | |
| | Thrs. | 04/30 | | Final Semester Deliverables II |
| | | | SHOWCASE DAY – Lightning Talks / System Demos | |

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|----|------|-------|--|---|
| | | | <i>5-minute lightning presentations per team w/ auto-advancing slides providing a high-level overview of your work, designed for a general audience. System demonstrations at poster session. Team awards.</i> | Lightning talk & system demo. |
| 15 | Mon. | 05/04 | Technical Deep Dive Presentations <i>25-minute presentations per team outlining design, justification of key decisions, and prototype plan</i> | Final Semester Deliverables III Final report, peer evaluation |

See Grading Rubric on next page →

ECE490: END OF SEMESTER GRADING RUBRIC

Final Grade = 60% Team Score + 40% Individual Score

Team Score (60% of Final Grade)

| | |
|--|-------------|
| Oral Communication (Lightning Presentation + Deep Dive) <i>Effective, audience-appropriate oral communication and defense of engineering decisions, including both a general-audience overview and a technical deep dive.</i> | / 12 |
| Written Communication (Engineering Design Report) <i>A technically rigorous written report of engineering design decisions, trade-offs, constraints, and standards, supported by analysis and visualizations that enable understanding and reproducibility.</i> | / 8 |
| Reproducibility (GitHub) <i>Organization and documentation of GitHub repository sufficient for another engineer to understand and continue the project.</i> | / 8 |
| System Design <i>System-level architecture and interface design that demonstrates coherent engineering decisions and effective use of technical visualizations.</i> | / 8 |
| Design Process <i>Application of a structured, iterative engineering design process with professional and responsible stakeholder engagement, including distributing meeting agendas, sending calendar invites, arriving prepared, sending post meeting emails with action items, and posting meeting notes to GitHub.</i> | / 8 |
| System Prototype <i>Quality and functionality of the implemented system relative to the stated design intent and stakeholder objectives.</i> | / 16 |
| Team Score | / 60 |

Individual Score (40% of Final Grade)

| | |
|---|-------------|
| Personal Engineering Impact (depth + ownership) <i>Scope, depth, and criticality of the student's personal engineering contributions, including ownership of key subsystems and evidence-based design decisions</i> | / 8 |
| Systems Thinking & Integration <i>Understanding of the overall system architecture, how student's personal work interfaces with, and supports other subsystems. Awareness of system-level trade-offs and integration considerations.</i> | / 8 |
| Technical Rigor <i>Correctness, quality of reasoning, and engineering judgment demonstrated through verifiable individual analysis, implementation, and testing.</i> | / 8 |
| Traceability & Continuity of Work <i>Evidence that individual work progressed steadily throughout the semester, demonstrated through weekly descriptive GitHub commits and up-to-date and descriptive project management artifacts.</i> | / 8 |
| Professional Reliability <i>Dependability and professionalism demonstrated through regular attendance, punctuality, preparedness for team, stakeholder, and required class meetings, and consistent follow-through on assigned commitments.</i> | / 8 |
| Individual Score | / 40 |

Individual Performance Safeguards

Minimum Individual Contribution Requirement:

A student earning less than 50% of the Individual Score (20/40) will not earn a passing grade, regardless of team score.

Exceptional Individual Contribution Consideration:

A student who demonstrates exceptional individual engineering contribution, as evidenced by high performance in *Personal Engineering Impact*, *Technical Rigor*, and *Traceability & Continuity of Work*, based on documented individual work, may earn a strong final grade even if overall team performance is limited.