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### Course Information

**Course Credits:** 4 credit hours  
**Class Time:** Mondays & Thursdays: 2:00PM to 3:50PM  
**Class Location** SAGE 4510  
**Course Website:** <https://ecse.rpi.edu/courses/S25/ECSE-1010/>

### Teaching Staff

#### Prof. Alex Patterson

Contact information: [pattea5@rpi.edu](mailto:pattea5@rpi.edu)  
Office Hours: Wednesdays: 10:00AM to 12:00PM, on WebEx or in JEC 6020

#### Teaching Assistants (TA's)

Name	Email	Hours	Open Shop Hours	Open Shop Location
AFM Saif	<a href="mailto:saifa@rpi.edu">saifa@rpi.edu</a>	10	Th: 6pm – 8pm	Mercer XLab (JEC 6 <sup>th</sup> Floor)
Alex Elias	<a href="mailto:eliasa3@rpi.edu">eliasa3@rpi.edu</a>	10	W: 6pm – 8pm	Mercer XLab (JEC 6 <sup>th</sup> Floor)

#### Undergraduate Student Assistants (UGSA's)

Name	Email	Hours	Open Shop Hours	Open Shop Location
Jimin Lee	<a href="mailto:leej64@rpi.edu">leej64@rpi.edu</a>	3	M: 4pm – 6pm	Mercer XLab (JEC 6 <sup>th</sup> Floor)
Allen Paily	<a href="mailto:pailya@rpi.edu">pailya@rpi.edu</a>	6	M: 6pm – 8pm Fr: 4pm – 6pm	Mercer XLab (JEC 6 <sup>th</sup> Floor)

### Online Tools

The following online tools will be used to support this course. **If you do not have access to any of these tools, please inform the instructor as soon as possible.**

1. **WebEx Teams:** [WebEx Teams](#) for this class will be created for group work outside of class, office hours, and open shop hours. Make sure to download the app on your desktop or Smartphone. *Note:* the browser doesn't have as much functionality as the desktop version. Please check to see if you've been added to an [Intro to ECSE WebEx Teams](#) Space.
2. **Gradescope:** All Labs, activities, problem sets and quiz submissions and grading will be done through this platform. If you aren't familiar with this tool, we'll go over submission in class.
  - Link to Gradescope site: <https://www.gradescope.com/courses/932714>
  - Entry Code: G3RB44

### Course Description

The overall goal of this course is to help EE and CSE students build a broad analysis skill set so that through experimentation, simulation and the application of science, mathematics and engineering fundamentals, they can develop useful systems models that enable engineered solutions addressing a broad array of societal needs. Additionally, broader topics such as planning a course of undergraduate study, engineering ethics, learning from failure, the importance of quality documentation, and the variety of career options in ECSE disciplines are covered.

### Course Text

None

### Supplemental Reference

See <https://sites.ecse.rpi.edu//courses/S25/ECSE-1010/>

### Required Software

(Installation instructions in the [Skills Development Document](#) from the [Proof of Skills](#))

1. LTspice (circuit simulation)
2. Scopy (if using ADALM2000, also known as M2K) or Waveforms (if using Analog Discovery 3)
3. Matlab (numerical analysis, Simulink and Simscape)

### Student Learning Outcomes

1. **Experimental Methodology:** Students will be able to build and make reliable time-dependent measurements of simple analog and digital circuits, export data to display and analysis tools (e.g. Excel, MATLAB), demonstrate understanding of results by describing key data features and comparing with simulation and analysis, and extract useful information from component datasheets.
2. **Simulation Methodology:** Students will be able to create circuit simulations using a commercial SPICE program and produce reliable voltage and current plots (functions of both time and frequency), export simulated data to display and analysis tools and demonstrate understanding of results by describing key data features and comparing with experiment and analysis.
3. **Mathematics and Analytic Methodology:** Students will be able to apply precollege circuit knowledge to real circuits, analyze simple circuits based on voltage dividers and inverting/non-inverting op-amps, apply phasor analysis to simple combinations of R, L and C components, apply all analysis skills to demonstrate understanding of experimental and simulated data for simple circuits, and apply the basic matrix arithmetic used in circuit analysis, circuit simulation and in the display and analysis of data using tools like Excel and MATLAB.
4. **Design Methodology:** Students will be able to modify existing circuit designs for specific applications and fully characterize the operation of the circuit using experimental, simulation and analytic methods.

**Course Assessment Measures**

<b>Assessment</b>	<b>Due Date</b>	<b>Learning Outcome #s</b>
Quiz 1	<b>February 10<sup>th</sup></b>	1, 2, 3, 4
Quiz 2	<b>March 20<sup>th</sup></b>	1, 2, 3, 4
Final Exam	<b>Time and Location: TBA</b>	1, 2, 3, 4
Proof of Skills	See course calendar for deadlines	1,2,3
Laboratories	After lab planning days: daily except quiz days	1, 2, 3, 4
Problem Sets	When indicated (on course calendar)	1, 2, 3

**Grading Criteria**

<b>Category</b>	<b>Percent</b>
Quizzes	30%
Final Quiz	15%
Laboratories	30%
Proof of Skills	15%
Problem Sets	5%
Attendance and Participation	5%

## Assessment Policies

### Quizzes:

- All students are expected to take Quiz 1 and Quiz 2 during the semester.
- The Final Quiz will be an option if students meet all criteria for Omega Exploration Objectives (see [Alpha Experiments – Omega Lab Explorations](#)).
- The quizzes will be on quiz days specified in “Course Assessment Measures” section above.
- The duration of each quiz will be 1 hour 50 minutes.
- Logistical details about quizzes will be provided before quiz days and the content covered by each quiz is [listed on the course website](#).
- Quizzes are individual assessments, and each student is expected to work through them independently.
- All quizzes are open book, open notes, however all notes must be printed out or handwritten. Only non-communicating calculators are allowed.
- Students are expected to take quizzes on the scheduled dates located in the table above and on the course website, unless arrangements are made with the instructor ahead of time. ***Although RPI no longer requires a written excuse from Student Health Services for absences of 5 days or shorter, you are still required to communicate with the instructor prior to missing a scheduled assignment or exam.***
- Students may leave the exam room to use the restroom, but must ask the instructor for permission and must leave all electronic devices in the exam room. Violations of this course policy will be considered violations of the code on academic integrity.
- If you require adjustments for learning disabilities, letters from the Dean are to be submitted at the beginning of the semester.

### Proof of Skills:

The goal of Proof of Skills is two-fold:

1. To ensure that all students have the necessary skills for completing the laboratory assignments. Labs are a central learning activity of the course that teaches students fundamental skills through applying knowledge from the lecture material to hands-on problems.
  2. To teach students the skill of self-directed learning. Self-directed learning is a vital skill for all engineers, as much knowledge and many skills that are acquired during one’s career must be self-learned. Students will acquire the needed skills through using the provided resources (Self-Directed Skills Guide and Proof of Skills Rubric) and seeking assistance from course staff.
- All students must **actively** participate in the Proof of Skills Days at the beginning of the semester in-class and prepare outside of class. It is their only homework during this time!

- Students should prepare for their in-class work **before** coming to class to help the learning community This is a part of the participation grade and IS a skill!
- Students may iterate to get the maximum points throughout the semester. Students can use proof of concepts in their labs to fulfill Proof of Skill content after the Proof of Skills days are done. At certain points during the semester, opportunities will be provided for students to submit updated Proof of Skills documentation to potentially gain more points – these assignments are called “optimizations”.
- ***These skills WILL be used in the labs throughout the course AND in future courses. Strive for 100% competency!***
- ***Students are encouraged to work on Proof of Skills together, but they must submit their own, individual work. Submissions between two or more students that consist of identical images will be considered academic dishonesty. The involved students will face consequences as outlined in the section “Collaboration and Academic Dishonesty” below.***

### Laboratories:

Labs begin after the Proof of Skills and Alpha/Omega Planning Days and teach students fundamental skills through applying the lecture material to hands-on problems. Each lab consists of multiple “Core” sections that all students complete regardless of their plans for an Alpha Lab or Omega Exploration, followed by a section in which students choose to complete an Alpha Lab **or** Omega Exploration.

The Core Sections of the lab guide students in applying course material to specific hands-on examples to teach individual concepts. Students must then **prove** that they have mastered that concept by completing a “Proof of Concept” for each concept in that section (see instructions below). Alpha Labs and Omega Explorations, which are contained in the final section of each lab, have students apply what they learned in the Core Sections of the lab to solve a design problem. While Alpha Labs offer a more guided experience, Omega Explorations are more open-ended, providing students with a set of design goals to fulfill. As with the Core Sections of the lab, students must **prove** via their Alpha Lab or Omega Exploration that they have mastered the section’s concepts by completing Proofs of Concept.

- All students must follow each lab and at the end of each lab students have a choice between Alpha Experiments and Omega Design Explorations.
- **Omega Design Explorers can choose to opt out of the final if:**
  1. They complete **each** of the following assessments with a grade of 80% or above:
    - Proof of Concepts
    - 5-minute or less Demonstration Video (Presentation)
    - Exploration Map
  2. They complete 100% of Proof of Skills
  3. They complete 2 out of 3 Omega Lab explorations (meaning they can switch to Alpha one time!)
- Three Laboratories are scheduled throughout the semester:
  1. [Lab01: Basic Analysis and Engineering Practices](#)
  2. [Lab02 Part A: Linear Systems and Beyond...](#)
  3. [Lab03: The Signals and the Noise](#)

with checkpoints to keep current with in the course schedule on the website.

- Student groups can decide to switch back and forth between Alpha and Omega between each Lab

### Alpha Experiment and Omega Explorations

Highlighted Differences	Alpha Experiments	Omega Explorations
<b>Learning Approach</b>	Bottom-up, step-by-step, guided experimentation	More open-ended explorations of application ideas
<b>Relationship to Concepts in Class</b>	Automatically written to be directly related	Student must create and show how the design is directly related
<b>Documents/Assessment Required</b>	Proof of Concepts	<ol style="list-style-type: none"> <li>1. Proof of Concepts</li> <li>2. 5-minute or less Demonstration Video (Presentation)</li> <li>3. Exploration Map</li> </ol>
<b>Planning Need</b>	Just keep up with class schedule	Be sure to look ahead and plan for the work over the semester
<b>Benefits</b>	Learn how to apply fundamentals to explore more advanced ideas in ECSE	<ul style="list-style-type: none"> <li>• Learn to design with high risk, failure, more iteration</li> <li>• Get out of final IF all requirements met.</li> </ul>
<b>Portfolio Content?</b>	Yes! Your work belongs in your portfolio. Don't forget to add it!	Yes! Your design belongs in your portfolio. Don't forget to add it!

- You are encouraged to work in groups of 2 or 3 students to complete these labs. You may choose to work by yourself.
- Discussion is encouraged; however, each student group should submit their own experimental findings and analysis.
- Omega labs consist of 26 points each. The grade breakdown is as follows:
  1. Proof of Concepts: 10 points (each lab's Proof of Concepts component is scaled to be out of 10 points)
  2. Presentation: 10 points
  3. Exploration Map: 6 points
- Proof of Concepts, one per group, need to be submitted on Gradescope. **Be sure to add your group members to your submissions on Gradescope. Please be sure to look at the Standards Based Assessments at the end of each lab. This is the Rubric you will be graded against.**
- After the assignments associated with Lab 01 and Lab 02 are graded, students will be able to make revisions to their lab documents based on the feedback they have received from the course staff and resubmit them once to improve their scores. These assignments are termed "optimizations". **You may only submit an optimization for a lab document if you submitted work when the assignment was originally due.**



- Help sessions will be arranged on most weekdays for you to get help on experiments. These help sessions will primarily be during evening times, i.e. after 6pm eastern.

**Problem Sets (PS):**

Problem sets are meant to give you additional practice with the course material outside the examples in lecture and lab assignments.

- Problem sets are assigned and due on Gradescope.
- Problem sets are individual assessments; however, you are welcome to discuss ways to answer with other students in class. Exchanging the answers will be considered academic misconduct.

**Attendance and Participation:**

- **It is important to stay on schedule in this class.** You and your partner work together on your lab. You can use your shared WebEx Teams Space under [S25 Intro to ECSE](#) to work outside of class asynchronously. Please write it as:  
*Last Name 1 | Last Name 2 | Last Name 3 | Alpha or Omega*  
*Corgan | Chamberlin | Iha | Omega*
- The instructor may choose to take formal attendance. We will be monitoring if you are coming to class or not and are working with your partners to complete experiments.

**Participation grade** will depend on your attendance, interactions with the instructors and teaching staff, and completion of in-class activities, project plans, and surveys.

It is based on the following criteria:

- Your instructor will assess your general performance in terms of how much you contributed to the work your group was doing during class time.
- Your TAs will assess your general performance in terms of how much you contributed to the work your group was doing during class time.
- Examples of contributions to the work your group and class do include: (1) Preparation for class; (2) Adding helpful content to the Skills Development document; (3) Well documented good failures and success highlighted in your portfolio; (4) Effectively getting help when needed; (5) Feedback on course materials that were particularly helpful; (6) Providing answers to questions on WebEx; (7) Identifying errors or points of confusion in course materials, including homework; etc. From this list, you can see that participation is just being engaged in the course, helping your partner and other students learn and the TAs and instructor do their job better.

### Late Due Date

- Each assignment (excluding quizzes) will have two due dates: a due date and a *late due date*, both of which will be listed on Gradescope.
- The due date is at 11:59pm on the date indicated on the course calendar, while the late due date will be the next day at 11:59pm. While submitting on the due date ensures that you're keeping pace with the class, you will not be penalized if you submit your assignment on Gradescope before the late due date. The late due date gives you some flexibility in the case that unexpected events prevent you from submitting by the first due date. Submissions after the late due date will not be accepted unless an official excuse is provided or special prior arrangements have been made with the instructor.
- If serious circumstances prevent you from completing the course's assignments in a timely manner, please contact the instructor via email.

### Extra-Time Accommodations:

If you require extra time on exams or another form of accommodation, please contact the Dean of Students Office and email me a copy of the DSS note. Please do this early in the term so that we have plenty of time to plan. Arrangements for quizzes are generally to be made a week ahead of the quiz.

## General Course Policy

**Collaboration and Academic Dishonesty:** Intellectual integrity and credibility are the foundation of all academic work. A violation of Academic Integrity policy is, by definition, considered a flagrant offense to the educational process. It is taken seriously by students, faculty, and Rensselaer and will be addressed in an effective manner. If found responsible for committing academic dishonesty, a student may be subject to one or both types of penalties: an academic (grade) penalty administered by the professor and/or disciplinary action through the Rensselaer judicial process described in this handbook. Three relevant academic integrity violations to emphasize include:

**Collaboration:** Collaboration is defined as deliberately facilitating an act of academic dishonesty in any way or form; for example, allowing another student to observe an exam paper or allowing another student to "recycle" one's old term paper or using one another's work in a paper or lab report without citing it as another's work.

**Copying:** Copying is defined as obtaining information pertaining to a graded exercise by deliberately observing the paper of another student; for example, noting which alternative a neighboring student has circled on a multiple-choice exam.

**Fabrication:** Fabrication is defined as the unauthorized falsification or invention of any information in an academic exercise. Examples include the use of "bought" or "ready-made" term papers, or falsifying lab records or reports.

**Plagiarism:** Plagiarism is defined as representing the work or words of another as one's own through the omission of acknowledgment or reference. Examples include using sentences verbatim from a published source in a term paper without appropriate referencing, or presenting as one's own work the detailed argument of a published source, or presenting as one's own electronically or digitally enhanced graphic representations from any form of media.

The [Rensselaer Handbook of Student Rights and Responsibilities](#) defines the full list of forms of Academic Dishonesty and you should make yourself familiar with these. In this class, all assignments that are turned in for a grade must represent the student's own work. In cases where help was received, or teamwork was allowed, a notation on the assignment should indicate your collaboration. If you have any questions concerning this policy before submitting an assignment, please ask for clarification.

Students in this course should be aware that the items emphasized above also apply to the experimental/simulation data, Matlab code generated by each student or student team towards the completion of the experiment report. Tools exist to detect similarities between files and the staff reserves the right to employ such tools to deter code based academic dishonesty.

### **Center for Global Communication + Design (Comm+D)**

Center for Global Communication + Design (Comm + D). If you would like help with writing assignments, visual design projects, or oral presentations, please visit the Center online at <https://info.rpi.edu/comm-d> to find helpful resources or to schedule an appointment. Comm+D is a FREE resource for all members of the Rensselaer community.

### **Covid-19 Related Information**

We are committed to the health and safety of students as well as a high-quality educational experience. Rensselaer continues to monitor new developments regarding covid-19 and determine a best course of action to support student well-being and outstanding education. [Please follow the latest RPI guidelines for COVID protocols.](#)

### **Statement on Diversity, Equity, and Inclusion**

My goal as an educator is to create an inclusive, collaborative, and welcoming learning environment in which every student, regardless of differences (for example: race, ethnicity, gender, religion, ability, sexual orientation, socioeconomic status, nationality etc.), feels comfortable participating in and contributing to the learning experience. I believe that the views and beliefs of all students should be heard and respected, and that a diversity of viewpoints enhances the learning of all students in the classroom. I also understand that each student faces unique challenges in their education and I believe that helping them overcome these obstacles is as important to their learning outcomes as is the course material or format. Please let me know if there is anything I can do to improve the course for you or other students; I welcome feedback and try to improve my courses every time I teach them, based on input from previous students. Additionally, if you feel that experiences inside or outside the classroom are impacting your performance in the course, please let me know, so that we can make arrangements for finding a solution or connecting you with further resources.

RPI is committed to diversity, equity, and inclusion. More details can be found at the following link:  
<https://info.rpi.edu/diversity>.