Course Syllabus

Course Information

Introduction to ECSE  
ECSE 1010  
RPI Spring 2020  
4 credits  
Section 1 Studio  
MR  
2:00PM-3:50PM  
4107/4104 JEC  
Course Website:  https://www.ecse.rpi.edu/courses/S20/ECSE-1010/  
Prerequisites or Other Requirements:  None

Instructor

Professor Jeffrey Braunstein (Section 1)  
braunj4@rpi.edu  
Office Location: JEC 6020  
Office Hours: M/R 10:00AM-12:00PM

Teaching Assistant(s)

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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.

Course Text(s)

None

Supplemental Reference

See https://www.ecse.rpi.edu/courses/F19/ECSE-1010/

Course Goals / Objectives

Develop basic experimental techniques and SPICE-based simulation techniques for circuits and electronics  
Introduce the purpose of the core courses in EE and CSE and prepare for the first major assignments in each course.  
Develop basic competency in the use of MATLAB or similar tools for data display, analysis and simulation of basic analog and digital circuits.
Develop a broad functional understanding of basic analog and digital circuits. Explore approaches to making simple modifications of existing electronic projects to expand their application to specific purposes.

**Course Content**

- Instruments and Protoboards
- Analog Discovery
- Ideal vs Real Circuit Models
- Linear Circuit Properties
- Linear Analysis
- Introduction to Curve Fitting
- Diodes and Linear Approximations
- The Exponential Function
- Capacitive and Inductive Circuits
- Linear Circuits and Sinusoids
- MATLAB
- MATLAB and Data Analytics

**Student Learning Outcomes**

1. **Experimental Methodology:** Students will be able to build and make reliable time-dependent measurements of simple analog and digital circuits, exporting data to display and analysis tools (e.g. Excel, MATLAB), and demonstrate understanding of results by describing key data features and comparing with simulation and analysis. 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), exporting 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 pre-college 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 and apply all analysis skills to demonstrate understanding of experimental and simulated data for simple circuits. 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**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Due Date</th>
<th>Learning Outcome #s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam</td>
<td>3 Per Term</td>
<td>1, 2, 3, 4</td>
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<tr>
<td></td>
<td>2 Per Term</td>
<td>1, 2, 3, 4</td>
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<tr>
<td>Project</td>
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<tr>
<td>Quiz</td>
<td>Daily Except for Exam Days</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Problem Sets</td>
<td>1 for Each Exp</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Experiment</td>
<td>Daily except Exam and Project Days</td>
<td>1, 2, 3, 4</td>
</tr>
</tbody>
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**Grading Criteria**

Quizzes 45%
Experiments 25%
Problem Sets 15%
Attendance 5%
Project 5%
Participation 5%

**Attendance Policy**

Attendance is required and part of the course grade because students are expected to work together in class.

**Academic Integrity**

Student-teacher relationships are built on trust. For example, students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that the assignments that students turn in are their own. Acts that violate this trust undermine the educational process. The Rensselaer Handbook of Student Rights and Responsibilities and The Graduate Student Supplement define various 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. Submission of any assignment that is in violation of this policy will result in a penalty of no credit for the assignment. If you have any question concerning this policy before submitting an assignment, please ask for clarification.

**Contingency Planning**

The course exists in an online format, with existing video lectures. All material is available online on the course website. In the event of a school closure, the class would continue to meet at the regular time, with real time discussion and explanation available via WebEx. Since students are expected to have their own Discovery Board and parts kit, there should be no interruption to their ability to continue experimental analysis. Additionally, regularly scheduled office hours would continue, with contact again being available via WebEx. Existing discussion forums via Piazza would continue, along with the continuous
monitoring by the Instructor. Graded material would continue to be submitted via Gradedscope, requiring no physical contact between graders and students. Quiz assessment would move from class room session, to take home exam which would be uploaded to Gradescope.