San José State University
Electrical Engineering
EE110L, Continuous and Discrete Time Systems Lab, All, Fall, 2021

Course and Contact Information

Instructor: RAHUL SHAH
Office Location: Engineering Building 258
Telephone: 669-204-9125
Email: rahul.v.shah@sjsu.edu
Office Hours: Friday: 4:00PM to 6:45PM
Class Days/Time: Friday: 6:45PM to 7:45PM
Classroom: Online Zoom Meeting, or ENGR 258, or ENGR 290
Prerequisites: EE 098 and MATH 33A or 33B, (with grade of "C-" or better), Co-Req EE110
Instructor: David Parent

Course Format

Technology Intensive, Hybrid, and Online Courses:

This is laboratory is in person. All the software required is PC based and is free, and available in lab. Software and computers are available in the lab, ENGR 258 or ENGR 290, so the student does not have to buy anything, although having the software on a laptop is recommended.

Online (Pending University changes): Students are required to have an electronic device (laptop, desktop or tablet) with a camera and built-in microphone. SJSU has a free equipment loan program available for students. Students are responsible for ensuring that they have access to reliable Wi-Fi during tests. If students are unable to have reliable Wi-Fi, they must inform the instructor, as soon as possible or at the latest one week before the test date to determine an alternative. See Learn Anywhere website for current Wi-Fi options on campus. Make sure to install LTspice and Python 3.7 before the first lab. (We follow the Anaconda release of Python.) You will have less issues if you use a Windows based machine.

Face to Face lab (Subject to change)

- Must have record of which day, time, and who are in the building. Students need to apply with the lab instructors at least 2 weeks in advance.
- Students need to complete the COVID-19 training course in order for the request to come to campus to be approved by lab instructor. Direct link is at: https://sjsu.instructure.com/courses/1409553
Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on Canvas Learning Management System course login website at http://sjsu.instructure.com. You are responsible for regularly checking with the messaging system through MySJSU at http://my.sjsu.edu (or other communication system as indicated by the instructor) to learn of any updates.

Course Description

LTspice, and python used to solve realistic continuous and discrete time signals, circuits and systems problems. Application to passive and active circuits, to basic control, communications, and bio systems.

Course Goals

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

1. SLO1: analyze continuous-time signals and LTI systems in the time domain using convolution with Python
2. SLO2: simulate LTI systems in terms of the frequency response and Bode plots using Python and LTspice
3. SLO3: analyze passive and active filter circuits using LTspice and Python.
4. Model real-world continuous time or discrete time system.
5. Evaluate CAD software in terms of functionality, learning curve, and cost.

Course Learning Outcomes (CLO)

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

1. CLO1: utilize the Laplace transform to analyze LTI system functions, poles and zeros, and relation to the impulse and frequency responses with Python
2. CLO2: utilize the Laplace transform to calculate the transient and steady-state response of LTI circuits and systems with Python
3. CLO3: analyze simple control, communications, and bio systems
4. CLO4: analyze the function performed by simple discrete-time filters using Python

ABET Student outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics 5
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors 0
3. an ability to communicate effectively with a range of audiences 3
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts 0
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives 3
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions 5
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Required Texts/Readings

Textbook


Course Requirements and Assignments
SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at [http://www.sjsu.edu/senate/docs/S12-3.pdf](http://www.sjsu.edu/senate/docs/S12-3.pdf).

Grading Information

Determination of Grades

Grading Percentage Breakdown

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>95 to 100%</td>
</tr>
<tr>
<td>A minus</td>
<td>90 to 94%</td>
</tr>
<tr>
<td>B plus</td>
<td>87 to 89%</td>
</tr>
<tr>
<td>B</td>
<td>84 to 86%</td>
</tr>
<tr>
<td>B minus</td>
<td>80 to 83%</td>
</tr>
<tr>
<td>C plus</td>
<td>77 to 79%</td>
</tr>
<tr>
<td>C</td>
<td>74 to 76%</td>
</tr>
<tr>
<td>C minus</td>
<td>70 to 73%</td>
</tr>
<tr>
<td>D plus</td>
<td>67 to 69%</td>
</tr>
<tr>
<td>D</td>
<td>64 to 66%</td>
</tr>
<tr>
<td>D minus</td>
<td>60 to 63%</td>
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<tr>
<td>F</td>
<td>Less than 60%</td>
</tr>
</tbody>
</table>

Grading:
- Lab activities and reports: 100%
Classroom Protocol

You are required to attend every lab meeting, for the full length of the lab meeting, unless you have a personal emergency. Midterms and work for example, are not considered emergencies. While it is true that many things can be done outside of the lab time, you need to work during the lab time, so that if you run into trouble the TA’s can mentor you. If you leave early and then have questions that were covered in lab, the TA’s might not be able to help you in a timely manner. If you have a true emergency, contact the TA and you can get help during office hours. There is a grade for active participation that can be lowered significantly if you do not come to lab, or leave early. Of course, if you have finished your work, you may leave.

You need to work in groups with a maximum of two students. If there is an odd number of students in a lab section, then one and only group can be made up of three students.

Eating and drinking are not allowed in lab.

University Policies (Required)

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs’ Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

EE110L, Continuous and Discrete Time Systems Lab Course Schedule

Course Schedule

<table>
<thead>
<tr>
<th>Lab Number</th>
<th>Date</th>
<th>TOPIC</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/20/2021</td>
<td>Class meets for review circuits review</td>
<td>Notes</td>
</tr>
<tr>
<td>2</td>
<td>8/27/2021</td>
<td>Introduction Signal Generation with LTspice and Signal Processing with Python</td>
<td>Chapter 1,2</td>
</tr>
<tr>
<td>3</td>
<td>9/3/2021</td>
<td>Time Domain Convolution techniques</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>4</td>
<td>9/10/2021</td>
<td>Frequency Domain Convolution techniques</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>Week</td>
<td>Date</td>
<td>Assignment</td>
<td>Chapter</td>
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</tr>
<tr>
<td>5</td>
<td>9/17/2021</td>
<td>Bode Plots and Simple Filter Design</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>9/24/2021</td>
<td>Testing RC circuits</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>10/1/2021</td>
<td>Synthesize transfer functions</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>10/8/2021</td>
<td>Synthesize 60Hz Notch Filter</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>10/15/2021</td>
<td>Synthesize 60Hz Notch Filter</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>10/22/2021</td>
<td>Application of the Fourier Transform</td>
<td>9</td>
</tr>
<tr>
<td>11</td>
<td>10/29/2021</td>
<td>Application of the Fourier Transform</td>
<td>9</td>
</tr>
<tr>
<td>12</td>
<td>11/5/2021</td>
<td>Final Project</td>
<td>10</td>
</tr>
<tr>
<td>13</td>
<td>11/12/2021</td>
<td>Final Project</td>
<td>10</td>
</tr>
<tr>
<td>14</td>
<td>11/19/2021</td>
<td>Final Project</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>11/26/2021</td>
<td>No Lab</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>12/3/2021</td>
<td>Automated PWM DAC testing</td>
<td>11</td>
</tr>
</tbody>
</table>

**Additional Rules for Fall 2020 EE Laboratories**

**Code of conduct while in labs on campus**
• Students attending in-person labs are required to wear face coverings, regularly sanitize/wash hands, and maintain 6 feet (about 2 arms’ length) distance between each other at all times while in the building. Check SJSU Health Advisories website for updated information about university requirements and rules [https://www.sjsu.edu/healthadvisories/](https://www.sjsu.edu/healthadvisories/)

• Students need to check with the lab instructor about the process to get on campus.

• Students must only work in designated stations at all times.

• Disposable masks will be provided if forgotten.

• If attending in person lab 2 days in a row, washed/clean cloth masks or new disposable masks must be worn each day.

• Disinfecting wipes are provided in each lab, and students are expected to wipe down their stations before and after each use.

• Students are strongly encouraged to bring a personal mouse or keyboard to avoid using shared devices.

• Please keep in mind drinking fountains are not available, so plan accordingly.

Component Pickup Procedure

• Necessary components and devices will be provided to students by the department.

• Students living within a 60 miles radius from campus will receive a designated time to pick up their components.

• Those living further than 60 miles can have their components and/or devices mailed in which a return label will be included.

• Prior to picking up or mailing, students must fill out the Docusign form including the designated receiver’s information.

• If a student would like to designate someone else to pick up on behalf of them, there will be an option on the Docusign.

• In the case components are lost or broken, students must contact the department as soon as possible to avoid an incomplete grade and/or registration hold.

• Students will have to come on campus a second time to pick up the ADALM 2000 should a course requires it. Unfortunately, the shipment for the devices will arrive sometime after school has begun.

Dropping Course after Receiving Components

• Students must return components to the EE department either in person or through mail using the provided return label.
- Components and devices must be in the office by September 8th to avoid an incomplete grade and/or registration hold.

**Adding a Course**

- If a student has completed a Docusign form for a course, but components have not been picked up mailed yet, and they choose to add another course, an email can be sent to ee-techsupport-group@sjsu.edu to amend their previous form.

- If a student has their components or devices already, an additional Docusign form will need to be submitted prior to adding a new course.

- If multiple courses need to be added, students need to wait until enrolled before submitting one Docusign for all the courses.

- Please submit these forms prior to September 8th to receive new components or devices.

**Returning Components and Devices**

- Detailed instructions on returning procedure will be provided to students later in the semester.

- Students need to return components and devices in working condition to avoid an incomplete grade and/or registration hold.

- Course of action will be discussed on a case by case basis for any broken or missing components at the time of return.

- Components and devices need to be returned no later than December 8th.

- Please plan to drop off or mail components at an appropriate time, as those returned past the deadline will not be accepted and will result in an incomplete grade and/or registration hold.

**Other class policies:**

- This course or portions of this course (i.e., lectures, discussions, student presentations) will be recorded for instructional or educational purposes. The recordings will only be shared with students enrolled in the class through Canvas. The recordings will be deleted at the end of the semester. If, however, you would prefer to remain anonymous during these recordings, then please speak with the instructor about possible accommodations (e.g., temporarily turning off identifying information from the Zoom session, including student name and picture, prior to recording).

- Students are not allowed to record without instructor permission. Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings. Materials created by the instructor for the course (syllabi, lectures and lecture notes, presentations, etc.) are copyrighted by the instructor. This university policy (S12-7) is in place to protect the privacy of students in the course, as well as to maintain academic integrity through reducing the instances of cheating. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office. Unauthorized recording may violate university and state law. It is the responsibility of students that require special accommodations or assistive technology due to a disability to notify the instructor.
• While it is best to turn your camera on, during the lecture there is no requirement to do this.
• the Accessible Education Center (AEC), and the instructor.

**Zoom Classroom Etiquette**

• Mute Your Microphone: To help keep background noise to a minimum, make sure you mute your microphone when you are not speaking.
• Be Mindful of Background Noise and Distractions: Find a quiet place to “attend” class, to the greatest extent possible.
  o Avoid video setups where people may be walking behind you, people talking/making noise, etc.
  o Avoid activities that could create additional noise, such as shuffling papers, listening to music in the background, etc.
• Position Your Camera Properly: Be sure your webcam is in a stable position and focused at eye level.
• Limit Your Distractions/Avoid Multitasking: You can make it easier to focus on the meeting by turning off notifications, closing or minimizing running apps, and putting your smartphone away (unless you are using it to access Zoom).
• Use Appropriate Virtual Backgrounds: If using a virtual background, it should be appropriate and professional and should NOT suggest or include content that is objectively offensive or demeaning.