University of Nevada, Las Vegas
Department of Electrical and Computer engineering

EE 320 Electronics I

Laboratory

Prepared and Updated by

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Overview

Class meets: 1001: Thursday 11:30am ~ 2:15pm at TBE-B350
1002: Monday 10am ~ 12:45pm at TBE-B350
Class materials website: http://eelabs.faculty.unlv.edu/

Instructor: Dr. Ming Zhu
Contact: (Email) ming.zhu@unlv.edu (Phone) 702-895-0995
Office/Hours: TBE-B338, walk-in/email appointment

TA: 1001/1002: Leonardo Ledesma leonardo.ledesma@unlv.edu
Office hours: Monday 2:30-3:30p, Tuesday 12-1p, TBE-B310

Introduction

This lab course introduces you to the fundamental Integrated Circuit (IC) principals and components through circuit with relatively low complexity (e.g., PN junctions, diodes, BJTs, MOSFETs, and their characteristics under various DC/AC configurations), helping you better understand what you have learned during corresponding lecture classes. You will be introduced to different circuit design, simulation and implementation techniques and tools/software, as well as the applications of various IC designs. Finally, you would be required to build a final project with simulations and physical implementation on breadboard/printed circuit boards (PCBs).

Course Outcomes

Upon completing EE 320L, students will be able to:

1. Analyze and design basic op-amp circuits including inverting, non-inverting, integrator and differentiator topologies
2. Identify the currents, and how they change with applied potentials, flowing through a semiconductor, diode, and transistor
3. Understand the movement of electrons and holes in a semiconductor device under various operating conditions
4. Analyze and design diode circuits including: clipping/clamping, rectification, and regulation circuits
5. Analyze transistor amplifier circuits including: operating point, small-signal gain, and large-signal operating range
6. Design transistor amplifier circuits for a required gain, input/output impedance, and/or operating voltage
7. Use SPICE to simulate the operation of diode and transistor circuits

Grading:

Prelab	20%
Attendance & Completion of Experiments	30%
Postlab	30%
Final Project	20%
Total	100 %

Lab Topic & Schedule

Week (Date)		Lab #	Topic
1	01/20/25	MLK Day	
2	01/27/25	0	Lab Safety & Equipment Use Tutorial
3	02/03/25	1	Review of Circuit Analysis
4	02/10/25	2	Operational Amplifier Circuits
5	02/17/25	President Day	
6	02/24/25	3	Circuit Frequency Response
7	03/03/25	4	Diodes and Rectifiers
8	03/10/25	5	Clippers, Clampers and Voltage Regulators
9	03/17/25	Spring Break	
10	03/24/25	6	PCB Layout Design
11	03/31/25	7	Bipolar Transistor Characterizations
12	04/07/25	9	MOSFET Transistor Characterizations
13	04/14/25	10	Final Project
14	04/21/25		
15	04/28/25		Presentation & Demonstration of Final Project
16	05/05/25	Study Week: JDC	
17	05/12/25	Final Exam Week	

Requirements

This class is comprised of 11 laboratory exercises, as scheduled above. Instruction videos will be uploaded at WebCampus Panopto Recordings so that you can watch videos any time in the week if the lab is remotely instructed, or prior to the class if in person.

Most labs require two laboratory write-ups (i.e., **Prelab** and **Postlab**). Prelabs include *screenshots and/or photos of critical steps* (e.g., hand calculations, circuit diagrams, simulation results, descriptions and analysis) required in each "Prelab"; while Postlabs include the *screenshots, photos and descriptions of the outcomes* of the "Lab Experiment" (e.g., program running outcomes, physical experiment outcomes, etc.) and answering the questions at the end. In the manuscript when you are asked to *"observe" the signals and/or "read" the values*, you are **REQUIRED** to take photos or write them down. Both Prelab and Postlab reports should be able to work as your future references and remind you of the key principles/operations in

the experiment. Course syllabus/contents and guidelines for the lab reports are posted on the class website. You ***must*** follow the guidelines and use templates for Prelabs (if required) and Postlabs, if you wish to get the credit for the lab report. The Prelab is due the day before the lab class, while the Postlab is due one week after regular lab hours. For example, since EE 320L is scheduled on Monday or Thursday, the Postlab is due on the **upcoming Monday or Wednesday midnight 11:59pm**. You ***must* attend the class and complete the experiments** in class before submitting the Postlabs.

A course/lab related **final project** is required by the end of the semester. Presentation and demonstration should be performed during the study week by in person.

Carefully read lab experiment handouts prior to start of the lab. Any ambiguity encountered must be brought to the attention of the instructor and TA immediately.

All lab reports are due within a week after the experiment in softcopy (only .doc, .docx, .pdf are accepted) through UNLV Webcampus. Full grade for each report is 10pts. Late submissions will receive 1 pt off every week, as in the following table. Submissions after the Friday of the study week will NOT be accepted and will be counted as 0 pts.

Exceptions: If UNLV Webcampus is down or proper reason is justified, please submit reports to TA through email and copy to me. No hardcopy is necessary.

Submission	Grade for each Postlab report (maximum, not counting bonus)
On due	10
Late within 1 week	9
Late within 2 weeks	8
Late within 3 weeks	7
Late within 4 weeks	6
By the Friday of study week	5
Afterwards	0

Prelabs/Postlabs file names syntax:

EE320L_RebelMailID_postlab_X.pdf. X is the number of the lab the Postlab is related to. All letters lowercase. Similar rule applies to prelab naming syntax. Example for John Smith's Postlab for Lab 1:

EE320L_smithj_postlab_1.pdf

If the submission instruction states that the project files are required in the submission, then either:

- zip all the files and attach the project files as one zip archive
- zip all the files and send the link to the shared folder (such as Dropbox, Google Drive, etc.)

Zip file with project files must follow the same naming convention as PDF files.

Examples of inappropriate submissions:

- Incorrect format, no template: -20% of points (2pts)
- Incorrect file name: -10% of points (1pt)
- Unreadable content: -70% of points (7pts)

- Screenshots/Pictures without reasonable explanation/descriptions -30% of points (3pts)

Help

TA is available through emails and WebCampus to answer all questions regarding the labs and should be utilized often. In addition, Lab Directors are always available to answer any questions. We usually check our emails at least once a day. Online resources (e.g., Google, Wikipedia, etc.) and fellow students are also useful sources of information and help. However, all report work, including Prelabs and Postlabs ***must*** be performed and turned in **individually**. Make sure you complete the lab experiments before submitting the Postlab reports. We do **NOT** allow **plagiarism**. Copied works will be counted as 0 pts for both submissions.

On rare occasions, it may be necessary to miss a lab class. With a valid excuse, a make-up session can be arranged.

To help facilitate your learning process, please provide written feedback in a timely manner to help us modify lab experiments as necessary.

Public Health Directives

- Face coverings are currently optional for all faculty and students in the classroom.

- Students must follow all active UNLV public health directives while enrolled in this class. UNLV public health directives are found at Health Requirements for Returning to Campus. Students who do not comply with these directives may be asked to leave the classroom. Refusal to follow the guidelines may result in further disciplinary action according to the UNLV Student Conduct Code, including being administratively withdrawn from the course.