

Spring 2024 Physics 361 Electronics Laboratory

Class Hours: Tue & Thu 1:10 - 3:55 PM

Class Location: Lab - Nielsen 605,
Lecture – Nielsen 203 (Tue), 207 (Thr)

Credit Hours: 3

Instructor: Joon Sue Lee

Office: 515 Nielsen

Office hour: Immediately after every class or by appointment

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Learning objectives of the course

- 1) Learn the mathematical foundation of electronics.
- 2) Learn to assemble and characterize common electronic circuits. Learn to use instruments (oscilloscopes, function generators, digital multimeters, DACs etc). Learn NI DAQ.
- 3) Develop good laboratory habits on data collection, laboratory logbook, and how to write a well-structured experiment report.

Textbook

Main: Curtis A. Meyer, An Introduction to Electronics for Science Students, Second Edition

Reference: Practical Electronics for Inventors, Fourth Edition, published by McGraw-Hill Education

Learning Environment

The laboratory is a collaborative environment. It is important that everyone respects each other, as well as the health and safety rules in place to protect all of us. Students typically work in pairs. You are expected to collaborate with your lab partner in almost all aspects of the course except writing a final report. Being able to collaborate with others effectively is an important skill.

Experiments

Lab1 - DC Elements and Measurements

Lab2 - Digital Logic (Combinatorial Digital Logic)

Lab3 - Introduction to Data Acquisition (DAQ)

Lab4 - Oscilloscope and Function Generator Operation

Lab5 - RC, RL, and RLC circuits

Lab6 - Operational Amplifiers

Lab7 - Capstone Project (choose a project by 3/7)

Assignments

The assignments for this course are 1) lab reports, 2) final report, and 3) final presentation. In addition, you need to turn in notes from each lab.

1) Lab reports

For a report, you and your lab partner alternating in reporting. **You earn 100% of points from reports where you are the lead author. You earn 25% of points from reports where your lab partner is the lead author.** You are strongly encouraged to help your lab partner write the reports where you are not the lead author. **Lab report is due by the beginning of the next experiment.** Use electronic software such as MS Word and LaTeX to prepare lab reports. **All lab reports (pdf format) must be uploaded on Canvas.**

Report should consist of the following parts:

1. **Title.** List the course name and number, name of the experiment, the date performed, your lab partner.
2. **Introduction.** A paragraph stating the goals of the experiment (keep it short and to the point). Give a brief explanation of the formulae you will use and how you will use them but do not re-derive formulas from the textbook.
3. **Methods.** A diagram of the experiment with all the associated instrumentation and wiring. Explain briefly data acquisition procedures.
4. **Results.** Present the raw data (can be copied from lab notebook). Graphs of all data and analysis of data.
5. **Discussion and conclusions.** This section should give a concise listing of the major findings of the experiment. Discuss your results and theoretical expectations.

2) Final lab report

There will be one in depth formal report due at the end of the semester. Each student will submit a separate report. Specific experiment will be chosen by students. The formal lab report should contain the same sections as all other lab reports but have in depth Introduction, Methods and Discussion sessions. You should format your report as a scientific paper and follow formal writing style that is common in (technical) scientific papers.

3) Final presentation

1. Presentations will be at the end of semester. All students will attend the presentation session.
2. The presentations will be given in pairs. Each student will contribute equally, typically the time is split evenly between students.
3. Each presentation will be 15 minutes, with approximately 2-5 minutes for questions.

4) Notes from labs

Students are required to bring a laboratory notebook. A hardbacked notebook is recommended. Do not use a piece of paper. Electronic notebooks/notepads are also accepted.

Note-taking in laboratory is an important skill. Your notes do not need to look nice but it must be detailed allowing you or somebody else to reproduce the experiment later and/or to troubleshoot

problem if something went wrong. You should draw detailed experimental schematics and record data to notebook.

You should submit these notes even if you are not the lead author responsible for the report on this lab. Two different components of note-taking will be evaluated: 1) theoretical preparation and concepts for the lab, 2) notes taken during the experiments. You should scan these notes and submit them after each lab period via Canvas.

Missed deadlines

Missed deadlines for reports and notes will be reviewed with 10% penalty within a week after the due date. Additional 10% penalty will be cumulatively applied every week.

Attendance

Attending labs regularly is important to be successful in this course. If you have to miss a lab, contact the instructor. Every unexcused absence will lead to cumulative 10% penalty to the lab report of the missed lab. No penalty is applied to the lab partner who attended the lab.

No exams: There will not be midterm and final exams.

Grading distribution

Lab reports 60%

Final report 20%

Final presentation 10%

Notes 10%

Grading scale

90% and above A

87% - 90% A- 83% - 87% B+ 80% - 83% B

77% - 80% B- 73% - 77% C+ 70% - 73% C

67% - 70% C- 63% - 67% D+ 60% - 63% D

57% - 60% D-

In final grades scaling may apply. Scaling will not lower your grade.

Announcements: For announcements check Announcements on Canvas regularly.

Additional information

Please see the Campus Syllabus, which contains information that is common to all courses at UTK, such as academic integrity and addressing disability needs. <https://teaching.utk.edu/the-syllabus/>