

Caltech

Physics 5/105 — Fall, 2021-2022

http://www.sophphx.caltech.edu/Physics_5/

Contacts

Course instructor

Frank Rice Lecturer in Physics

Office Hours (in the lab): Tuesday 3–5PM; Friday 1:30–3PM, 4–5PM
(626)395-3660 rice@caltech.edu 202 E. Bridge; M/C 103-33

Course TAs

Sophie Li shli@caltech.edu David Oliveira doliveir@caltech.edu
Lorenzo X. Van Muñoz lxvm@caltech.edu

Recitation and Lab Sessions

All sessions will be held in the lab, 202 E. Bridge

Recitation Sessions

Time:	TAs:
Mon 9:00AM-10:00AM	Lorenzo
Mon 3:00PM-4:00PM	Sophie
Wed 2:00PM-3:00PM	David

Lab Sessions

Time:	TAs:
Wed 8:30AM-11:00AM	Lorenzo
Wed 3:00PM-5:30PM ‡	Sophie
Thur 8:00AM-10:30AM ‡	David

‡ session is full

Schedule

Experiment 1.....	4–8 October
Experiment 2.....	11–15 October
Experiment 3.....	18–22 October
Experiment 4.....	25–29 October
Experiment 5.....	1–5 November
Experiment 6.....	8–12 November
Experiment 7.....	15–19 November
Experiment 8 (Final project)	
Design, assembly, testing.....	22–23, 29–30 November; 1–7 December
Presentations.....	8 December

Course Text

http://www.sophphx.caltech.edu/Physics_5/

http://www.sophphx.caltech.edu/Physics_5/Physics_5_105_Intro.pdf

Recommended (not required): [Horowitz and Hill, *The Art of Electronics*](#)

ATTENTION! ATTENTION! ATTENTION!

Each week's experiment *including Experiment 1* will require **at least two or three hours of preparation and completion of a homework set** prior to coming to recitation and lab. Make sure you budget your time each week wisely so that you are prepared for lab! Make sure that you have **studied the lab procedure section** of the experiment notes before coming to lab!

Course Structure and Conduct

Students will be assigned to lab sections of no more than 10 students each at the course organizational meeting. Each lab section will meet once a week for 3½ hours on a day and time to be determined at the organizational meeting (we will try to set up sections so that each meets in the afternoon, 1:00 – 4:30PM or thereabouts, but we may need a morning section).

The first hour of the lab section will be a lecture and discussion (“recitation”) session led by the course instructor. During this time everyone will go over the course material for that week's lab work and review the prelab exercises found in the course notes. ***Students will submit their solutions to these exercises using Canvas before the beginning of the recitation session.***

Following a short break, each student will then perform the in-lab portion of the section which will involve the construction and testing of various circuits, including some circuits of the student's own design. Each student will work independently with occasional help from the course instructor and the section TA and assistant TA. Each student will be required to keep brief notes of the circuits constructed and the tests conducted on them, including oscilloscope screen captures, frequency response measurements, and possibly photos of the setup. Each student will turn in their lab notes to the section TA for grading a couple of days following the section. Most of the lab results should be recorded during lab, so you should need very little time to finish them before handing in your work for grading. Your TA will provide specific instructions regarding when lab results write-ups will be due and where they should be turned in.

Experiments 1 through 7 will each require one lab session (week) of work. The Experiment 1 session begins the second week of the term (see the schedule on the first page of this document). Experiment 8, work on which begins Thanksgiving week in November, is a final project of the student's own choosing and design. All student projects will be presented during a “marathon” final lab session (combining all sections) just before finals.

Ask questions during recitation and during the lab! Don't just sit and stare helplessly at a circuit or piece of test equipment which stubbornly refuses to cooperate! The experiments cover much new material each week, and, probably, not all of it will soak in sufficiently on a first reading without some help from the lab instructor and TAs.

Grading

Graduate students are encouraged to take Ph-105 Pass-Fail!

The course grade will be based on the number of points a student achieves out of a maximum total of 100 for the entire suite of 8 experiments. The final course letter grade assignment will be on a curve, but will roughly follow the traditional scheme that 93 or above is an A, 90-92 A-, 87-89 B+, etc. The curves for the various sections will differ so that all letter grades are assigned equitably. An A+ may be awarded to one or two students whose performance is truly exceptional.

Because each student starts the course with a different background and preparation in electronics and circuit design, **the assignment of numerical grades for each experiment (including the project) will be tailored to each individual student.** Hard work and notable improvement in your skills with circuit design and lab work will ensure that you get a good grade regardless of how advanced your classmates may appear to be.

Each of the Experiments 1 through 7 is worth 10 points: 4 for the student's preparation before lab, including the solutions to the prelab exercises, performance during the recitation portion of the lab, and preparedness to conduct the in-lab experiments; the other 6 points are awarded based on the student's progress during the experiment portion of the lab, effectiveness at completing the lab tasks and measurements, and understanding of the circuits as indicated by their performance in lab and their recorded results.

Experiment 8 (the final project) will be worth a maximum of 30 points. The more that the circuit's design includes original work done by you, the more points you may expect; the greater the variety of concepts adapted from the previous weeks of experiments, the more points you may expect. More details concerning project grading will be provided as the time for it approaches.

Following the project presentations (Experiment 8), the course instructor and TAs will meet to discuss each student's final grade; at this meeting **letter grades will be balanced and normalized among the various sections** so that everyone is evaluated fairly and assigned the appropriate letter grade.

Collaboration Policy

Students are encouraged to study the experiment materials together in preparation for lab. Help each other to understand the concepts and circuits being presented and discuss how to approach the prelab exercises.

Each student must write up solutions to the prelab exercises independently, however, and may not consult another student's solutions when attempting to solve them. You may not refer to solutions from a previous year or solutions posted online.

During lab you are encouraged to **occasionally** assist your fellow students with use of the lab equipment (such as the oscilloscopes) or software as well as in understanding their results. Give them a chance to use the equipment themselves, however, and to learn from their mistakes. Do not fail to complete your own work because you are "babysitting" a fellow student's efforts!

Students must complete their lab write-ups independently, but they may discuss their results with fellow students and get help interpreting them. Any questions concerning this policy should be directed to your TA or the course instructor.

The policy for collaboration with other students during the final project phase will be discussed with the lab instructor when the projects begin.

Late Policy

You must attempt to answer all prelab exercise questions before attending that lab's recitation. You may not attend recitation first and then complete the exercises, nor wait to attempt an exercise during recitation.

Students are required to successfully complete all 8 experiments to complete the course. If a lab session must be missed, then the student should inform his or her TA beforehand and work out a schedule for completing the missed experiment. If at all possible, the student should arrange to attend a different lab session the same week, or, as a last resort, the recitation portion of such a lab session.

You must show up to lab session on time — failure to do so will result in a loss of some credit for that experiment. Repeated late arrivals will result in an ever-increasing penalty. If you cannot submit your lab write-up for an experiment on time, you must arrange this beforehand with your TA (an email to your TA in the wee morning hours doesn't count!). Unexcused failure to turn in your lab write-up will result in a loss of some credit. Repeated failures to submit work on time will result in an ever-increasing penalty.

If you become ill or you must quarantine due to COVID exposure, let the course instructor know as soon as you can. We'll work something out to help you keep up with the course material!