

Physics 251 Fall 2022 Syllabus

Paul Nakroshis

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Welcome to Physics 251!

Principles of Electronics is a one semester course that covers some of the basics of both analog and (time permitting) digital electronics. The course includes a lab and an important part of the course is the building and testing of circuits in lab. This course is not like other physics courses you have taken where we are interested in a fundamental understanding of nature, but rather how to understand, build, and test working circuits.



Instructor

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Office hours: Tu, Wed 9-11 am and by appointment.

This document

Should you lose this syllabus, an electronic .pdf version of this file (with clickable hyperlinks) is available online at the [course homepage](#) which can be found at <http://portlandphysics.me/phy251>.

Information about other physics courses can be found at the [Physics Department Homepage](#).

Outside Help/Office Hours

In general, if my office door is open and I have time, I am happy to help you, so feel free to stop in and ask questions.

Class/Lab times

Class: Monday 2:00 — 4:45 pm

Lab: Wednesday 2:00 — 4:45 pm

The lab will be available at other times as needed; you will likely need to use more time on some labs.

Attendance/Participation/Missed Exam Policy

You should not miss class or lab or you will fall impossibly far behind. *If you are late to class or miss a class in which a quiz or exam is given, you **will not** be given a makeup except in extraordinarily exceptional cases, or if you have prearranged due to a conflict.*

Required Textbook:

The Art of Electronics, 3rd Ed, by Horowitz and Hill

It is not a standard text, but a reference that will be very helpful in understanding analog and digital electronics. Many sections of the text will be skipped, as there is far more material in this book than can be covered in a single semester.

Assessment

Grades are based on lab work, quizzes, homework and a final exam. To pass the course, all lab work, all quizzes, all homework and the final must be completed.

1. Lab (600 pts)

(a) Lab notebooks (10%) You must keep a notebook of all of your lab work. The notebook is a running record of what you did in lab as well as calculations, circuit diagrams, etc. that you may do before or after lab. You should plan to make rough plots during lab, and these should be kept in your lab notebook. The notebook should be a complete record of what you did including mistakes, dead ends and things that did not work. It is nearly impossible to put anything in your notebook that will lower your grade. But, your grade can be negatively affected if there is too little in your notebook. Things that you might be tempted to put on scrap paper should probably be in your notebook.

(b) Summary Lab Reports (30%) For each experiment, extract the important parts and present a summary. The summary should include relevant circuit diagrams, organized results of tests, organized data, any relevant graphs, and a short discussion of the results. It might include a short introduction, but neither a purpose nor a conclusion is needed.

(c) Project (20%) There will be at least one project assignment for the course. Hand in a short written summary including a final circuit diagram, test results and a circuit description. It is important that you show me your working circuit in action.

2. Quizzes (100 pts) There will be several two or three question quizzes. These will be open book/ open notes quizzes.

3. Homework (200 pts) A few sets of problems will be assigned during the course.

4. Final Exam (100 pts) There will be an open-book, open notes final exam on Wednesday, 14 December from 14:00–16:00 in room 250. Questions will be similar to homework and quiz questions.

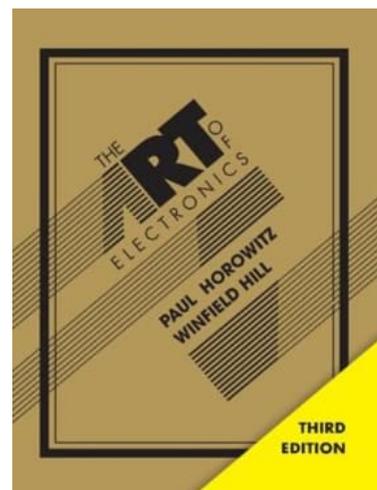


Figure 1: Our text!

Tentative Schedule

| Class | Topics | Lab |
|---------------|---|----------------------------|
| 29, 31 Aug | Basics I — V and I 1.1, 1.2, 1.3 | Basic Measurements I |
| 5 Sep | No Class—Labor Day | |
| 7 Sep | Basics I —review | |
| 12, 14 Sep | Basics II — C L, Diodes, Z 1.4, 1.5, 1.6, 1.7 | Basic Measurements II |
| 19, 21 Sep | Finish Basics, Bipolar Transistors: Simple Model 1.7, 2.1, 2.2 | Transistors I |
| 26, 28 Sep | More about Transistors 2.2, 2.4, 3.1 | Transistors II |
| 3, 5 Oct | Finish FET's, Op Amps 3.1, 3.4, 4.1 | Transistors III |
| 10 Oct | No Class—Indigenous People's Day | |
| 12 Oct | Op Amps, Project Assignment 4.1, 4.2, 4.3, 4.5, 4.6 | No Lab |
| 17, 19 Oct | More Op Amps Chapter 4 | Op Amps I |
| 24, 26 Oct | Finish Op Amps Chapter 4 | Work on Project |
| 31 Oct, 2 Nov | Frequency Filters 6.1, 6.2, 6.3 | Finish Project |
| 7, 9 Nov | Oscillators and Timers 7.1, 7.2 | Filters Lab Oscillator Lab |
| 14, 16 Nov | Voltage Regulation 9.1, 9.3, 9.6 | Oscillator Lab |
| 21 Nov | Extra Topic I | No Lab |
| 23 Nov | No Class—Thanksgiving | |
| 28, 30 Nov | Extra Topics II | Group project TBA |
| 5, 7 Dec. | Extra Topics III | Group project TBA |