

Physics 335
Electric Circuits Laboratory II
Spring 2014

Instructor: David B. Pengra

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Technical Supervisor: Jason Alferness (alf@phys.washington.edu), Room B256.

Class Hours: Lecture: Physics/Astronomy Building, Room A118,
Tuesday & Thursday, 10:30–11:20.

Labs: Physics/Astronomy Building, Room B280
Monday (AE) 2:30 - 5:20 pm (note late start)
Tuesday (AA) 1:30 pm - 4:20 pm
Wednesday (AB) 1:30 pm - 4:20 pm
Thursday (AC) 1:30 pm - 4:20 pm
Friday (AD) 1:30 pm - 4:20 pm

Texts: Required: *Electronics with Discrete Components*, Enrique J. Galvez, (John Wiley & Sons, 2013) ISBN 978-0-70-88968-8. Much assigned homework and reading will come from this text.

In addition various materials will be posted on the course website as the term progresses, such as user manuals, data sheets, and notes. You will be expected to become familiar with all posted materials.

Recommended: *The Art of Electronics*, 2e, Paul Horowitz and Winfield Hill (Cambridge University Press, Cambridge, 1989). *Student Manual for The Art of Electronics*, Thomas C. Hayes and Paul Horowitz (Cambridge University Press, Cambridge, 1989).

IMPORTANT: The course material will be primarily distributed from the course website, not handed out in class. This is the case for homework assignments and solutions, lab notes, exam study sheets and exam solutions.

Website: <http://courses.washington.edu/phys335>

Overview

This is a combined lecture/laboratory course, with the emphasis on the laboratory aspects. The goal is to provide you with skills in electronics and an understanding of electronic instrumentation

that can be used in modern research. This course is very intensive, and you must be prepared to spend a considerable amount of time outside of class in order to complete the assignments. Do not allow yourself to get behind; lab work takes *time* and the work *cannot* be easily made up later, since the lab itself is used for other sections.

I do not accept late work. Period.

Course Structure

Attendance at all regularly scheduled class hours is mandatory. Homework will be collected at the *beginning* of the lecture period. It will not be accepted at any other time.

On lab days plan on being in the lab until 4:20 (5:20 for Monday). You may, of course, leave early if you finish early.

Labs and Lab Reports

Labs meetings start the second week of the term and will run through the last week of class (Ending June 6). Lab groups will consist of two persons if possible. There will be no groups larger than two unless there is no other option. You may work alone if space allows.

Notes and additional instructions for the labs will be posted on the class website. You should read through the lab notes before coming to lab since time is limited.

Simple lab reports are required. **Each report is due at the end of that lab.** Your reports should have these features:

- Use engineering paper (the green stuff with graph ruling on one side), or plain (not lined) white paper. Put your names (yours and partner's), lab number and section (AA or AB), and date at the top.
- Subdivide the report into the corresponding sections in the Lab (e.g., 1-1, 1-3, etc.).
- Draw a single line through mistakes, or erase if using pencil.
- Draw a neat circuit diagram for every *new* circuit you build (a drawing is not required for small changes). Often you can copy the one in the instructions, *but you must note any differences that yours has; for example, if you use different resistors, your circuit diagram should indicate that fact.*
- Plots or sketches of oscilloscope traces, where needed, should be done neatly by *hand*.
- Record data in tables (if appropriate), and show all calculations.
- Answer the specific questions raised in the text of the lab instructions with one or two sentences. Don't get carried away—concise is best here. Remember: you want to finish the lab by the end of the period.

The lab part will count for 40% of the final grade.

Each report subsection will be graded with about half the grading weight given to the criterion of *completeness*: every section has been honestly attempted with all data taken and all questions answered, and about half the grading weight given to *correctness*: the work shown is correct. Note that work *not* done can not be correct! Some lab reports will be worth more than others, depending on how many subsections there are to complete.

Lab attendance & Make-up labs

Each set of lab topics in physics 335 build on those that are explored in previous labs. Because of this, it is not reasonable to make up an earlier lab later in the term. If you miss a lab, you must

1. Contact the professor (Pengra), and explain the situation.
2. Plan to come in as soon as possible to make up the missed work so that you keep up with the course.
3. Obtain permission from the professor or TA to attend another session to complete missed work.

Attendance will be taken at every lab session. You will not be allowed to attend any lab session that you are not registered for without express prior permission from the TA or professor.

TA/Instructor Evaluation

A large part of your lab grade (30%) will come from the observations of the TA and myself. It is quite easy after a few weeks of the course to learn who is on top of things and who is not just by talking with them and seeing how they progress in the lab. *The evaluation will be based mainly on our perceived level of your engagement and preparedness.* It is not an assessment of talent. For example

- Have you read through the lab notes by the time class starts, or are you looking at them for the first time?
- Do you ask questions if you are confused, or do you wait until the TA notices that you are not making progress or are doing something wrong?
- Are you trying to figure out problems on your own, or are you letting your partner (or neighbors) do all of the thinking?
- Do you come to class on time and stay focused until you are done, or do you drift off, looking at your phone?

Towards the middle of the term, we will post preliminary TA/Instructor evaluation grades. You will then have the opportunity to meet with one of us to discuss strategies for improvement if you are dissatisfied with your preliminary score.

Homework Assignments

Homework will be assigned throughout the term. At the beginning of the course an assignment will be due at the beginning of *every lecture period* (Tuesday and Thursday, 10:30 AM).

The homework will be graded cursorily: “0” means nothing was turned in or less than half of the assigned problems were attempted (or what was turned in is basically blank). “1” means an honest attempt was made to do at least half of the homework. “2” means an honest attempt was made to do *all* assigned problems. “3” means *all* problems were attempted, and it appears that at least *most* are done correctly. Apart from the score, there will be no comments made on the homework. If you have questions about the homework problems, you should meet with the TA or the instructor to get your questions answered.

Homework should be neatly done on separate pieces of engineering or plain white paper. Don’t crowd your work. Remember, it is your job to make the solutions easy to follow and grade; illegible or unclear solutions will receive low marks, even if you “did the problem right.”

Note: The main cause of low final grades is insufficient attention to homework assignments, in spite of the low grade weight assigned to it. Poor performance on homework usually corresponds to lack of sufficient engagement with the course, which will be noted by the TAs, and lack of preparation for the exam wherein many of the same ideas and techniques are covered.

The homework will count for 10% of the final grade.

Exam

There will be one exam, worth 20% of the final grade. It will be given about midway through the term, shortly after we begin the series of labs on microcontrollers.

The exam will be *closed book and notes*; the only items you will be allowed to have with you during an exam are a pencil and an eraser (you won’t need a calculator). The exam will cover the theoretical parts of course, and draw heavily from the assigned homework. There may also be qualitative questions which will depend on your understanding of the laboratory exercises. A study sheet with representative questions, important formulas to commit to memory and study advice will be provided a week before the exam, posted on the course website.

Make-up exams will not normally be allowed, except for those same conditions that would make me accept late lab work: circumstances beyond your control. Should a make-up exam be given, it will be an oral exam. The student will make an appointment to visit me in my office, and I will ask various questions on the material until I am satisfied that I know the student’s level of mastery.

Equipment

You will be assigned a work station which is equipped with all the necessary parts and tools. Please follow the lab instructor’s instructions regarding care of parts and equipment. Remember that people in another section also use the same gear, so you must keep it in order. It is very easy for the parts to become disorganized.

Grading

The grades are figured as follows:

Lab reports	40%
TA evaluation	30%
Homework	10%
Exam	20%
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Total	100%

In addition to the above, in order to pass physics 335, you must have attended all scheduled lab sessions, or completed them as a make-up.

This course is not graded according to a curve. However, I do consider the difficulty of the exam and the other assignments when making the final grade calculations. In the past, the mean grade in the class has been 3.3.