PHYS4796 Experimental Physics Spring 2026

This course is entirely based in the laboratory. You will perform a series of experiments over the course of the semester, and submit brief lab reports on each, including revisions.

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WEB PAGE:	https://faculty.cst.temple.edu/~tuf43817/PHYS4796/	
MEETINGS:	SERC 225	Tue & Thu 2:00-4:50 PM

COURSE OBJECTIVES

This course has three different learning goals, all equally important.

- **Learn new physics.** Many of the experiments in this laboratory cover physics that you have not explicitly studied in other courses.
- **Learn how to do experiments.** There is an art to making accurate and precise measurements and you will find the ways that work for you.
- **Learn how to write.** Complete and succinct communication of scientific results is one of the most important things all scientists need to learn.

TEXTBOOKS AND OTHER RESOURCES

We will not follow any particular textbook, and you're not required to buy anything, but I want to point your attention to three things in particular.

- "An Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements", 3rd Ed. (2022), by John R. Taylor
- "Experiments in Modern Physics", 2nd Ed. (2003), by Adrian C. Melissinos and Jim Napolitano
- "Resource Letter ALC-1: Advanced Laboratory Courses", by Walter F. Smith, American Journal of Physics 92, 648–654 (2024)

Links to each of these are provided on the course web page. Taylor's book is excellent, and I strongly recommend you get a copy, particularly given the updates in the third edition. I list the second book only because I'm sure I'll refer to it from time to time. The AJP article has many useful references to books, articles, and report writing.

COMPUTING FOR DATA ANALYSIS

Many of the experiments use computers for data acquisition, and all require computers for data analysis (and report writing). You'll use your own computers for analyzing your data. You are welcome to use whatever applications you like, such as MATHEMATICA or MATLAB, both of which are available through Temple site licenses, or you can do your own programming in PYTHON or whatever language you prefer.

WORKING IN THE LAB

You'll work on the experiments with a lab partner. You can keep the same partner throughout the term, or if you want to switch at some point, tell me and we'll work something out. It's important for you to work together to take the data and record your results. You should collaborate on the analysis, but you will each write your own lab report for each experiment.

The experiments will always be available for you to work on during regular class hours, Tue & Thu 2:00-4:50 PM. If you need access after hours, we can make the necessary arrangements, but in those cases it is absolutely required that there be at least two people in the laboratory.

LAB NOTEBOOK

Please keep a lab notebook. You'll need it to write your lab report. Use it to record settings you had when making measurements, and for recording data and making plots for experiments which do not have computerized data acquisition. I will ask to see your notebook from time to time, especially if you are having trouble getting an experiment to work.

I like paper lab books, for example the National Brand 1-Subject Computation Notebook (Staples Item #567644). The grid lines are useful for making plots by hand as you take data so that you can identify trends quickly. There are also plenty of online options, including OneNote which you can use through Temple's site license, and also share with your lab partner. Or you can use simple apps on a tablet, such as Notability.

LAB REPORTS

Every student needs to turn in their own report on each of the experiments. You will turn in **five lab reports** over the course of the semester. The due dates for first drafts and final versions of these are indicated on the schedule (below). The due dates are strict.

Try to keep your reports under ten pages long, double-spaced in 12-point font with one-inch margins (or the fullpage option in LaTeX), including figures, tables, and references. You can say a lot with a good figure, so as written[1] by William Strunk, "Omit unnecessary words" in the text and figure captions.

A report template is posted on the course website. You are welcome to be creative with this, but some aspects (title, date, lab partner, abstract, reference,...) of it are required. I have also posted the LaTeX files I used to generate the template. You don't need to use LaTeX to write your report, but I recommend it. Most new users use the Overleaf website.

You should also look at some journal articles written by professional physicists. The articles in the American Journal of Physics are generally very well written. See also the research articles in the Physical Review, although articles in Am.J.Phys. are generally better written.

It is important to include references. See how this is done in various journal articles. In the template, I use the BibTeX package, which is useful if you want to build your own reference database, but there are more straightforward ways to add references.

On the specified due dates, you will first hand in a draft which I will critique and also grade, and a week later you will hand in the final report which is graded separately. The reports must be in PDF file format submitted to Canvas.

[1] Strunk & White, "Elements of Style". E.B. White went on to write *Charlotte's Web*.

CLASS SCHEDULE

This class focusses on the laboratory experiments, with at least two weeks allotted for each of the five experiments. There will be no regular lectures, but I will often start class with a discussion about some relevant topic. These are indicated in the schedule below, although the details will likely change over the course of the term.

Week	Tuesday	Experiment	Report Due (by 5pm on Thursday)
1	13 Jan	Lab #1 (The Simple Pendulum)	—
2	20 Jan	Lab #1	—
3	27 Jan	Lab #2 (Basic Passive Circuits)	Lab #1 Draft
4	3 Feb	Lab #2	Lab #1 Final
5	10 Feb	Lab #3 (*Choose an available experiment*)	—
6	17 Feb	Lab #3	Lab #2 Draft
7	24 Feb	Lab #3	Lab #2 Final
Spring Break: No Meetings			
8	10 Mar	Lab #4 (*Choose an available experiment*	Lab #3 Draft
9	17 Mar	Lab #4	Lab #3 Final
10	24 Mar	Lab #4	—
11	31 Mar	Lab #5 (*Choose an available experiment*)	Lab #4 Draft
12	7 Apr	Lab #5	Lab #4 Final
13	14 Apr	Lab #5	—
14	21 Apr	—	Lab #5 Draft
15	28 Apr	*Schedule oral final exams*	Lab #5 Final

Remember: The due dates are strict. If you want to get your draft or final report in earlier, that is perfectly fine, and I will review and grade it sooner.

Details of the experiments are posted on the course web page.

Everyone will do the same first and second experiments. The first is simple physics, but is a good exercise in precision measurement. The second has to do with basic electronics and how to use an oscilloscope to take data.

For the third, fourth, and fifth experiments, you will have your choice of a number of options. (Lidia, Donald, and I will be working on these the first few weeks of the class, to make sure that enough are ready for you.) If more than one pair of partners wants to do the same experiment, negotiate with each other to figure out who goes when.

GRADING

Your grade will be based on your five draft and final lab reports ($5 \times [5 + 10]\% = 75\%$) and an oral final exam (25%) which will be based on your lab reports. There is an obvious subjectivity in grading, so I will only use letter grades with grade modifiers on your reports. I expect to schedule the oral exams during the final week of classes.

Please make every effort to get your lab reports in on time. It is too easy to fall behind far and fast in this course.