

Physics 361 Course Syllabus, Fall 2014 - Electronics Laboratory I

Class Meeting Times: TR 12:40 – 3:25

Class Meeting Location: Nielsen Physics Building, Room 605

Instructor: Dr. Stuart Elston

Email: selston@utk.edu

Office: 216 Nielsen Physics Building

Office Hours: TR 11:00 – 12:00, or by appointment

Course Structure: 3 Credit hours; 6 hours laboratory/discussion per week.

Course Schedule: A detailed schedule of the semester activities is posted separately. That schedule is tentative and subject to change to accommodate the pace of activity and the course objectives.

Course Objective: To provide instruction and acquaintance with electronic devices and instrumentation techniques important in the modern physics laboratory.

Course Grade Weighting:

Component of Grade	Weight
Lab Notebook Reporting	50%
Homework	20%
Midterm Exam	10%
Final Formal Lab Report	10%
Lab Participation	10%
Total	100%

Each of the grade components above are discussed in some detail later in this syllabus.

Course Grade Cutoffs:

	+		-
A	n/a	93-100	90-92
B	87-89	83-86	80-82
C	77-79	73-76	70-72
D	67-69	63-66	60-62
F		0-59	

Grades will never be curved downward – if everyone in the class does well, everyone can get an A. The above grade cutoffs are guaranteed in the sense that the dividing lines will never be raised. Depending on circumstances, they dividing lines may be lowered, making a specific grade easier to achieve.

Textbook: Curtis A. Meyer, *An Introduction to Electronics for Science Students, Second Edition*, self-published by Meyer and printed by Lulu.com. This text is available for \$50.07 (on August 15, not including shipping and handling) at www.lulu.com. Shipping via relatively slow USPS media rates (5-15 days) is about \$4. You can get quicker UPS or FedEx ground shipping (2-5 day delivery) for about \$9, and expedited 2-day delivery for about \$17.00. Note that Lulu is an “on-demand” printer: when they get your order, they print the book within ~ 3 to 5 days (probably depends on how much business they have at the moment), then ship it – so you need to add the delivery and printing times. On August 14, there were about 8 new copies available at the UC Bookstore for \$62.95, so for about the same cost as the two-to-five-day-shipping-plus-three-to-five-day-printing-time cost, you get a book immediately. The UC Bookstore quotes a used book price at \$47.20, but I did not see any used copies when I stopped by on August 16.

Other required material: One lab notebook. While I am flexible about what notebook you get, the way we will use lab notebooks dictates a few requirements. The pages in the notebook should be stitched to the cover, not glued or spiral bound. This is the only binding method that will withstand the constant use and abuse that it will be subjected to. It should have quadrille ruling (aka graph paper ruling) – this will help you draw neat and legible diagrams and rough graphs. It should have reasonably heavy paper (20# is good). It should be a bit smaller than $8\frac{1}{2} \times 11$ inches so that you don't need to worry about everything getting photocopied onto a standard page of copier paper. Many if not most of your reports will contain photocopied pages from your notebook, so if you use exactly $8\frac{1}{2} \times 11$ and write to the edges, it may be difficult to capture everything without using reduction features or holding your mouth just right when you photocopy it.

The UC bookstore has two notebooks that meet this requirement - both by Roaring Springs (they have so-called marble covers). One (the "best") is Roaring Springs #77475 (80 pages, 7.875" x 10.25") and costs \$3.89. Another one is Roaring Springs #77227 (80 pages, 7.5" x 9.75") and costs \$2.49. I think the larger size is worth the extra dollar and a half.

I am not specifying any of these as absolutely required. If you can find something equivalent somewhere else, go for it. But do try to get something quadrille-ruled – the ruling will help you when it comes to drawing sketches and diagrams.

Lab Work and Lab Notebook Reporting: The major component of this course is the lab work. Most of that work contributes to your course grade through scoring of your lab notebook, in which you record and report that work. The intent is that you should be able to do the majority of the work needed for the reporting phase of the lab during the four to six hours of lab time. We meet for six hours per week, and some time is needed to organize and discuss the underlying material – hopefully we can keep this to one to two hours per week *if* you read the background text material and the lab handout (and print the handout before coming to class), and do any prelab exercises and homework problems, *before* coming to lab.

You should analyze your data as you acquire it. Typically, this might mean a rough graph and rough (possibly approximate) analysis to get a “feel” for the results, then more detailed work with (for example) an Excel spreadsheet and graph. All of this is entered into the lab notebook. More about the specific notebook reporting requirements appears below/later.

Homework: Homework assignments are designed to prepare you for the analysis of lab exercises. Homework assignments are listed in the posted course schedule. They are due on the dates posted there. The assignments are longer at the beginning of the semester; as the labs get harder, the homework will decrease in intensity, but you will have developed the fundamentals through homework done earlier in the semester. All homework problems are from the textbook. You are encouraged to work together on homework, but the work you hand in *must be your own work* – not just in your own *handwriting* – your own *work* will differ in a number of details that may not be important for the final result but which show your own particular understanding and manner of presentation of the problems. Late homework will only be accepted with prior approval, which will generally require some form of documentation of illness, etc. Homework (and quiz scores) will contribute 20% of your final course grade.

Exams: There will be only one exam, at approximately mid-term, on circuit theory and analysis such as is involved in the homework assignments, but may also address lab skills and common problem solving situations like those you will or have encountered while doing the laboratory exercises. In lieu of a final end-of-course exam, there will be a formal lab report assigned; see below. The general idea is that most of the formal and fundamental circuit theory is developed in the first half of the course (but you will be doing lab exercises then, too), and the last half concentrates on the application of those fundamentals to situations of interest in a typical physics lab. Exams are more relevant for testing the theory; notebook work and report writing is more appropriate for testing your understanding of lab work.

Formal Lab Report: Although most reporting will be done via your notebook, there will be one formal report due at the end of the semester on a measurement done somewhat earlier. The specifics are to be announced later, but it will probably be a report based on an interesting measurement done on an operational amplifier circuit.

The formal lab report will constitute 10% of your final course grade. Hence, lab reports in total (including those submitted as notebook copies) will contribute 60% of your final grade.

Participation: 10% of your final course grade will be based on regular attendance and participation in the lab activities. Your lab partner(s) depends on you to be present to help with the measurements; some absences are probably unavoidable due to illness, etc., but to protect your participation score, you should keep both your lab partner and the instructor informed about those unavoidable absences, and you may be asked to document them in some way if they become excessive.

Lab Notebook Reporting: Lab reports submitted as copies from your lab notebook will constitute 50% of your final course grade - regular lab reports will consist of the contents of your lab notebook. When reports are due, you will photocopy the relevant pages of your notebook and hand the copy in so that you have your notebook to work in while your report is graded. The departmental copier outside the main office is freely available for this purpose. Please arrange to do this copying well before class time so that time in class is not impacted. It is critical that your notebook be legible and written so that a photocopy is easily readable – this might not be possible with some pencil entries, so it may be necessary to insist on notebook entries in ink. Legibility will contribute to lab report scores.

The primary purpose of a lab notebook is to accurately document your work. It should contain enough information so that, ideally, another student at your level of ability, or you yourself, would be able to take your notebook and reproduce your measurements at some later time (and get the same results!). Typically, the notebook information will include an identifier that ties the measurement to a specific section of the lab handout, a short statement of purpose, brief descriptions of what you are doing and how, thorough schematic diagrams (which show not only the basic circuit under study, but also the instrumentation used to study it), and the values of all components and quantities needed to analyze the circuits and results.

In addition, each measurement, or group of related measurements, should be followed with a brief discussion of the results: what results were expected, how close did the actual result come to your expectation, what do the results mean in the “bigger picture”, and what might you do to improve the results? It might make sense to leave yourself some space in your notebook following each section of measurement to write your discussion. Be generous with space - there is lots of it in the typical (80 page) lab notebook.

Every page in your notebook should be numbered, and it is a good idea to reserve a few pages at the beginning for a table of contents (which you fill in as you go through the process of recording exercises. A good practice is to record everything that happens during the “bench” phase of a measurement or exercise on right-hand pages (usually odd-numbered pages) and reserve the left-hand (even-numbered) pages for later analysis and discussion.

Resources

Office Hours: Consider taking advantage of my office hours, which are posted at the beginning of this syllabus, if you are having difficulty with course material.

Student Success Center: If you are having academic difficulties beyond what can be handled by visits to office hours, consider consulting with the Student Success Center at 812 Volunteer Blvd. Phone: 974-6641; email: studentsuccess@tennessee.edu; web: <http://studentsuccess.tennessee.edu>.

Disability Services: Reasonable efforts will be made to accommodate students with certified disabilities. For more information, see <http://ods.utk.edu>, phone the Office of Disability Services at 974-6087, or visit their office at 2227 Dunford Hall.