

Syllabus
Electronics and Instrumentation for Chemists
Chemistry 424/524/425/525
Spring 2009

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Office Hours: Monday, Wednesday 9:30 – 11:00 a.m.

Grading: A single combined grade will be assigned for the lab and lecture. The lab portion of the grade will be based on the lab exercises (10 points per exercise) that you complete. You do not have to complete all of the exercises, but you are expected to attend all of the lab sessions. Missing 20% of the laboratory sessions will result in automatic failure. The lecture grade for the class will be based on two tests, as explained below, that will comprise 30% of the total grade weight in the class.

The Lab: The whole reason for this class is to give you practical experience with electronics as it is applied in chemical instrumentation. You will become adept at working with the common tools of electronics. You will understand the basic concepts of many key circuits, with the emphasis on understanding, rather than design. My hope is that you will acquire the confidence to work with basic circuits as they are applied in the instrumentation that is an integral part of chemistry. NONE of this will be true if you do not actually do the experiments yourselves. If you are working in teams (due to limited availability of equipment) make sure that you do at least half of the work, including construction and testing of the circuits and analysis of the results. Be sure to indicate on the lab report that you worked as a team and make separate report copies for both partners (see below.)

Lab Reports: This lab is an ongoing experiment in paperless coursework. The lab manual/ lab reports will only exist electronically inside of the computer. (You are encouraged NOT to print them out.) You will set up a file folder in your name on each computer that you use during the term (hopefully you'll only have to use one.) When you start one of the Laboratory Exercises, you will make a copy of the Word document into your folder and you will answer any applicable questions by typing directly into the document. This will allow you to answer some questions with words, some with tables of data, some with circuit diagrams, and some with drawings. When you finish for the day (and actually as you go along!) you will save a copy of the document, which now constitutes the lab report. At the end of the term, I can email you all of your work for your future reference, if you wish. Other advantages of working on the computer include the ability to switch between the lab manual and the schematic design and circuit simulation software and Excel to “cut and paste” your results directly into your report document and in some cases to take data with the computer (using the PMD’s A/D for example) and directly import it to Excel or Word.

The Lecture: Aside from the two tests, the lecture is designed to support the lab. Background information will be provided (hopefully ahead of the applicable lab) on the work that will be done in the lab. Concepts will be discussed that are too lengthy to talk about in the lab manual. Any general questions that you have will be answered.

The Texts: There are three recommended texts for the course, but you should either choose the set of two by Barnaal or the Horowitz and Hill book (**not both** and none are required.) The Barnaal books are a little cheaper and are easy to read and shorter. The Red book on analog is the most important. The first half of the Purple book on digital is very good but the second half is totally useless. If you have some experience with electronics already, or you think that you will do some electronics in the future (graduate work in experimental physical or analytical chemistry) the book by Horowitz and Hill is a better, more comprehensive book. I suspect that you could make it through the class without either text, but people seem to like to have something to review for the test and you might find them useful for reference in the future.

The Tests: Since the lecture is all about providing supporting information for the lab, the tests will be about probing your understanding of that information. There will be a midterm at the end of the Analog/Digital sections and a final during Finals Week. Both tests will be written at the level of basic understanding of key concepts. If you have completed the labs and come to the lectures, that should be an adequate level of preparation.