

Rhodes College  
Department of Physics  
Physics 415-416 Advanced Experimental Physics

General Instructions

This laboratory course is intended to acquaint the upper level student with a variety of advanced techniques of measurement and interpretation of physical phenomena and in elementary fabrication skills. The experiments are (generally) complicated and the subjects covered are diverse; thus some outside reading is required before the experiments can be carried out, or completed. Specific members of the faculty have assumed responsibility for specific experiments, and those faculty members must be consulted before beginning an experiment.

You **must** use a "Computation Notebook" (size approximately 11" x 9.25"), or similar, bound notebook. They are available in the bookstore. The notebook should reflect **all** that you do on an experiment--or in the shop--using dated entries in the sequence that you do it, with enough detail so that you could accurately reconstruct the experiment or shop effort at a later time. In short, it is to be a detailed record of the work, experimental procedure, calculations, and conclusions.

Use the first page of the notebook for a Table of Contents, with page numbers. Each experiment writeup must include the following material: Title, Purpose of Experiment, Procedure(s), Equipment List (including model numbers, etc.), Circuit or Setup Diagrams, Data, Comments on Problems, Equations for Analysis, Graphs, References and Conclusions. If the effort involves an experiment, the last section should include, at least, a comparison to theoretical or accepted values, percentage deviation, and discussion of errors and uncertainties.

Your grade on each experiment or fabrication will be based both on the results achieved and the thoroughness of your effort, based mainly on your notebook record.

Record all data obtained directly into the notebook; **each** member of an experiment team should record **all** data at the time it is collected. Within one week after completion of an experiment and conclusions, or at an appropriate point in your shop work, notebooks are to be given to the faculty or staff member in charge of an experiment (see experiment schedule pages), and the lab partners are then to meet promptly with that person to go over the notebook and results. The schedule for the completion of the experiments is given on the attached page.

Notebooks are due to be turned in for final grading on the last day of classes for the term.

Each experiment team will be required each term to write up **one** experiment, to be assigned. The style will be consistent with a journal article in the **American Journal of Physics**. This is due one week prior to the start of final examination period, and will constitute 40% of the final course grade. The grade given for the data, notes, discussion of errors and uncertainties in the notebooks, etc., for each experiment will constitute the remaining 60% of the final course grade.

A warning: much of the equipment employed in these experiments is complex and hence, expensive. **Read the relevant sections of equipment manuals and the experiment writeups carefully before beginning the experimental procedures.** If you are doubtful as to how to proceed, consult the person assigned to the experiment or work.

Note that most of the efforts **cannot** be accomplished within a single period of 3-4 hours. The times noted for each experiment assume roughly 5 hours per week effort.

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Schedule Fall Term 1998

1. Experimental Shop Practices (Weeks 1 through 3-Davis)  
Initial work in metal working techniques
2. Infrared Spectroscopy (Weeks 4 and 5-MacQueen)  
Infrared spectroscopic procedures-absorption of laboratory air path-
3. Experimental Shop Practices (Weeks 6 through 11-Davis)  
Continued work in metal working techniques
4. Vacuum Techniques (Weeks 12 and 13-Streete)  
Techniques, pumping rates and thin film generation

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