Physics Senior Lab – PH 3480
Spring 2004
General Plan, Approach and General Guidelines

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Purpose
The purpose of this course is to give students a sense of what physics is all about from an experimental perspective. The subject matter of the experiments is important and is supposed to reinforce theoretical knowledge the students may have acquired in various courses, and also introduce students to new ideas they may not be familiar with. But equally important, this course is designed to give students a sense of what doing physics is all about from an experimental perspective. Thus exploration is particularly encouraged since this is a key aspect of physics. Novel approaches and interesting new measurements are also encouraged. No recipe book approach! The essence of this course is that of guided exploration.

Notebooks and Grades
Each student is supposed to keep a laboratory notebook. In it students should take detailed notes of all the measurements they do and all ideas, plans, and conclusions they come up with. Detailed summaries of experimental results are a must. These must go into the notebook. Neatness is absolutely essential.
Notebooks will be checked regularly by the instructor and grades will be based on
1) The student’s work in the lab.
2) The quality of the notes, summaries, conclusions, ideas, as detailed in the notebook.
3) Neatness of the notebook.
4) Discussions with the instructor in the lab.
5) Level of enthusiasm and initiative of the students.

Course Plan - Syllabus

1) Hall Effect in metals.
2) Hall Effect in n-type and p-type germanium.
3) Resistivity and Hall Effect measurements in CdSe.
   Set up and implementing the Van der Pauw technique for resistivity and Hall Effect measurements.
   -Prepare Van der Pauw numerical table.
   -Take resistivity measurements of CdSe at LN temperature, Room temperature and 50 C. Extract activation energy if possible. If activation energy is obtained, it should be compared with band gap measurements done by optical means using the spectrometer.
   -Make Hall Effect measurements in CdSe using the van der Pauw method.
4) Optical transmission measurements in the 400nm to 1000nm wavelength range with spectrometer on yttrium iron garnet. Analyze and extract information about absorption bands.

5) Optical transmission measurements on CdSe in the 400nm to 1000nm wavelength range – Analyze to extract information about the band gap. Compare with resistivity data.

6) Make Faraday rotation measurements on the same yttrium iron garnet. Explore the effect of different magnetization directions on the rotation angle (especially parallel and anti-parallel to the direction of propagation). Describe the connection between absorption bands and Faraday rotation.

7) Franck-Hertz experiment.

8) SQUID/superconductivity experiment once the new set up arrives.