PHYS 3870 - Intermediate Laboratory I
Fall Semester 2006

Instructor: Mike Taylor
e-mail: mtaylor@cc.usu.edu
Phone: 797-3919
Office: SER 220C
Office hours: During laboratory time or by appointment
Lab TA: Addison Everett
e-mail: eaeverett@cc.usu.edu
Laboratory Times: 08:30 – 11:20 am, M,W
Location: SER 109
Web Information: www. physics.usu.edu (syllabi/homework/3870)
Error analysis classes: Physics Conference Room 244. 8:30 to 10:30 am
See attached Schedule for dates.
Lab Fee: A lab fee has been assessed for this course to pay for lab materials. It should have been paid at registration.

Laboratory classes:

• Access to the Lab will be via a card reader. Please bring your Student Card to class on Wed 30st Aug. to be scanned in (card will be returned to you by end of class).

• You may access the lab outside of class hours **any time you wish.** Please do not use computers for personal usage. Remember we know who is logged into the lab!

Safety:

Lab environments can be dangerous if you do not take simple precautions and obey common sense rules of good practice when using electrical equipment. Electric shocks can be very serious. Please be very careful as you build your experiment and make your experimental measurements.

Always work with your partner and never perform work alone.

Course Prerequisites:

• General Physics (PHYS 2210 and 2220)
• Introduction to Modern Physics (PHYS 2710)
• Introduction to Computer Methods in Physics (PHYS 2500) or the MathCAD component of PHYS 2710.

Course Objectives:
This course is intended to develop good experimental practices in the laboratory (as identified in the "AAPT Goals of the Introductory Physics Laboratory"). During this semester particular emphasis will be placed on:
• Gaining new experimental and analytical skills
• Learning how to perform quantitative error analysis
• Developing experience with well founded experimental procedures
• Data analysis
• Developing collaborative learning skills through work with your lab partner
• Developing the basics for good written and communication skills.

Course Texts:
J.R. Taylor, An introduction to Error Analysis, 2nd ed. (University Science Books, Mill Valley, CA 1997). **REQUIRED.**
D.C. Baird, Experimentation: An introduction to Measurement Theory and Experiment Design, 3rd ed. (Prentice Hall, Englewood Cliff, NJ, 1995).
AIP Style manual, 4th ed. (Am. Institute of Physics, NY, 1990). (Lab copy).

Recommended Computer Analysis Program:
MathCAD Version 11, (2003) *or* MathCAD Version 6.0 (1998).
Available in SER rooms 109 and 231 (see Shelley in SER 250 for key).

Laboratory Notebook:
A bound Laboratory Notebook is **REQUIRED** for this course. All data, notes, calculations and scratch work **must** be kept in your notebook.

Laboratory Attendance:
This is mandatory for each experiment until it is finished. You may also attend the lab (with your partner) at other additional times if necessary.

PHYS 3870 - Intermediate Laboratory I

Course Grading:

This class is divided into several parts:

Error analysis: (20%)

This will be determined by your three homework scores.

Error Analysis Experiments: (20%)

This will be determined from two basic lab experiments (10% each)

Laboratory experiments: (60%)

This will be determined from your two laboratory report scores.

Note: your Laboratory Lab book will also be inspected during the semester.

Homework:

• Turn in all **EVEN NUMBERED** problems on error analysis listed in the attached "Assignment Sheet" on (or before) the dates specified.

• You are encouraged to use MathCAD to solve these problems.

• Solutions to the odd numbered problems will be made available.

• A penalty will be imposed for late assignment.

Experiment Reports:

• You will perform three experiments, but will write reports on two of them. Each report will count for **30%** of your total grade.

• Following completion of your first experiment your lab book will be inspected (hand in Wed 18 17 Oct, retuned back Monday 23 Oct).

• You will first write a brief report (3-4 pages) on experiment 1 or 2 (your choose which). (Report due Monday Nov.13th before class).

• Based on the instructor's comments you may revise this report and receive the average grade of the two marks for the final grade for this report.

• Your third experiment will also be written as a brief report. (Report due Friday Dec. 8th). (Hand in to MJT in SER 220C by 5:00pm)

• You will be penalized if your reports are late! Your grades may also be reduced if your lab equipment is not kept clean and tidy.

Competency Test:

You must also complete and submit the self-paced competency tests of MathCAD Data Analysis and Science Workshop Computer Interfacing I,II, and III unless you have already completed these in PHYS 2500 and receive a written waiver from the instructor.

Course structure and assignments:

Error Analysis:

• There will be a series of 5 lectures distributed during the first half of the semester.

• Reading assignments and three sets of homework problems are listed on the attached "Assignment Sheet" together with their due dates.

Error Analysis Experiments:

• You will perform **two basis error analysis experiments** to aid your understanding of how to quantify measurement errors. You will summarize your results and error calculations in two short (1-2 page reports) that will be marked.

Laboratory Experiments:

• You will complete **three experiments** on the topics of your choice from the attached "List of Experiments".

• Eight experiments are available to choose from. Each is designed to take about 8 hours for data collection. You have 6 lab periods (~18 hours) to complete each experiment.

• Refer to "Description of Experiments" for details on experiments and consult with TA or Lab Instructor to help with your selection.

• You are also required to choose a **lab partner** for each of the experiments.

• Please complete your "**Lab Selection Sheet"** with a prioritized list of experiments and indicate a preferred partner. Be sure to include at least two alternate experiment selections.

• Lab partners and your experiment selection must be determined during first week. (Hand in your Lab Selection Sheet at 31st Aug. class).

• A "**Schedule of Experiments"** will be posted in the Lab during the second week of classes.

Disability: If you have a disability which requires accommodation in order for you to take this class, please contact me. This disability must be documented by the Disability Resource Center.