PHY3802L-0001 Intermediate Physics Laboratory, Class Number: 85410
Fall 2015, MSB 333A, Wednesday and Friday, 12:30-3:20 PM

Instructor: Dr. Lee Chow
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Course Website: www.physics.ucf.edu/~lc/PHY3802.html

No textbook required, the following Reference books can be found in UCF Library:

The Art of Experimental Physics, D.W. Preston, E.R. Dietz, Wiley & Sons, Inc.
Experimental Physics, Modern Methods, R.A. Dunlap, Oxford Univ. Press
Experiments in Modern Physics, A.C. Melissinos, Academic Press
Statistical Treatment of Experimental Data, H.D. Young, McGraw-Hill Book Co.

PHY 3802L COS-PHYS 3(1,5) Intermediate Physics Laboratory
Prerequisites: PHY 3101 or C.I. Laboratory work in basic measurements of physical constants; experiments in electronics, modern physics, nuclear physics, optics, and solid state physics.

Grading:

Quizzes/Interviews	25%
Execution of experiment and record keeping	25%
Writing and presentation of work	25%
Final oral presentation	25%

Grading Scale:

A	85% and above
B	75% to 84%
C	60% to 74%
D	50% to 59%
F	below 50%

± Grades will be given.

Note:
As of Fall 2014, UCF is required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete the syllabus quiz on Webcourse by the end of the first week of classes, or as soon as possible after adding the course, but no later than August 28. Failure to do so will result in a delay in the disbursement of your financial aid.

Course Objectives:
This course will make upper-level students familiar and proficient with modern experimental methods and instrumentation. Along with technical knowledge and skills, the student's ability to clearly and efficiently communicate basic principles of physics and their relations to experimental results will be developed. This ability is absolutely vital for the career of a Physicist. Therefore, lab reports will be graded for quality of writing as well as quality of results. Communication and learning skills will be tested in quizzes to each experiment. Furthermore, each student is expected to give an oral presentation at the end of the semester.

Procedures:
The class will be divided in groups to perform the experiments. The experiments will be weekly circulated among the groups. Each group should obtain a bound lab notebook and record all data in their notebook. At the end of each experiment, the notes have to be presented to the instructor. Include descriptions of the apparatus, data, notes about measurements and their conditions, preliminary graphs, calculations, etc. Also, estimate the precision of each measurement. The instructor will make a 20-30 minute quiz/interview with each group to each experiment.

Reports will be due one week after the last lab period of that experiment. Reports will be submitted in journal submission format (Applied Physics Letters, Journal of Vacuum Science and Technology, Physical Review Letters, Nuclear Instruments & Methods, etc.). Public computer labs are available across campus for word processing, graph creation, curve fitting, and figure presentations.

In general, regardless of the journal format you choose, the following elements should be present in your report:

1. Title and Abstract. The abstract is part of the title page of the report, but it is a good idea to write it last. It should be a succinct summary of what the reader will find in the report. State in 3 or 4 sentences what you did and what the main findings were.
2. Introduction and Background. State briefly what the experiment is about. Give historical background or place it in context of current research. Outline the basic concepts the reader should know about, or point the reader in a direction that he/she can follow the discussion of the experiment. The theory behind the experiment should be fully outlined.
3. Apparatus and Procedure. Describe the apparatus used. Use figures and diagrams. Explain exactly what measurements were made and how they were made.
4. Data. Give a narrative that cites data in tables, graphs, and figures. Be sure to label graphs, label axes, give all units, etc.
5. Analysis. Calculate whatever quantities are most appropriate for making comparison to theory of for extracting useful information. Be sure to include an error analysis starting with estimates and uncertainties of the measured quantities, and ending with estimates for the precision of your final results.
6. Conclusion and Discussion. State the main results of your experiment. List and discuss possible discrepancies between your experiment and theory, previous measurements, or initial expectations.
7. References. Acknowledge sources throughout the report. Consult the AIP style menu for format. Include an extra bibliography page if you consult other sources that you don't explicitly cite in your report. A word about the usefulness of a reference would also be appreciated, but is not required.

Because there is a strong emphasis on the quality of writing, I reserve the right to return the reports for rewriting. If this happens, I expect to meet the group during office hours to discuss improvements. I encourage you to let other people read the report before you turn it in. They don't necessarily have to be in the class or even technically literate (sometimes those people are the best reviewers).

Presentation: A 20-minute oral presentation will be given by each student during the final exam period with a few minutes for questions and answers. The presentation style will be similar to a presentation that is given at a scientific conference.

Missed labs:
If you miss class for an excused reason (to be determined in consultation with instructor), arrangements for making up the lab will be made.

Schedule (Tentative):

08/26	Class begins 12:30 PM in MSB333A, introductory meeting.	
08/28	MSB333A: Bohr Model, Quantization, Hydrogen atom.	
09/02	MSB333A: Laboratory Safety Course: 1:00PM to 3PM. Kasey Creel	
09/04	MSB333A: Errors, probabilities and distribution, mean value.	
09/09 - 09/11	First Experiment	**First lab due 09/18**
09/16 - 09/23	Second Experiment	**Second lab due 09/30**
09/25 - 09/30	Third Experiment	**Third lab due 10/07**
10/02 - 10/09	Fourth Experiment	**Fourth lab due 10/16**
10/14 - 10/16	Fifth Experiment	**Fifth lab due 10/23**
10/21 - 10/28	sixth Experiment	**Sixth lab due 11/04**
10/30 - 11/04	seventh Experiment	**Seventh lab due 11/13**
11/06 - 11/13	eighth Experiment	**Eighth lab due 11/20**
11/18 - 11/25	ninth Experiment	**Ninth Lab due 12/04**
11/26 – 11/27	Thanksgiving	
12/02 – 12/4	Finish all labs and interviews, work on reports and presentations.	
12/08	**10:00-12:00AM: Final Student presentations (first series) MSB 333**	
12/08	**1:00-3:50PM: Final student presentations (second series) MSB 333**	

Experiments: (a lab journal is required for each group, no data on pieces of paper)

1. AC electronics (RC filters, RLC resonant circuits)
2. Optical experiment: diffraction
3. Optical experiment: spectroscopy
4. Frank-Hertz experiment
5. Charge-to-Mass ratio of electrons
6. Nuclear Spectroscopy (Gamma ray spectroscopy, nuclear activation of Al, lifetime)
7. Superconducting Quantum Interference Device and Electron Spin Resonance
8. Photoelectric Effect
9. Temperature Dependence of Resistivity

All reports are due one week after the last lab day for the corresponding experiment.

Schedule:

Group	**9/09**	**9/16**	**9/25**	**10/02**	**10/14**	**10/21**	**10/30**	**11/06**	**11/18**
A	1	4	3	8	5	2	7	6	9
B	2	5	4	9	6	3	8	7	1
C	3	6	5	1	7	4	9	8	2
D	4	7	6	2	8	5	1	9	3
F	5	8	7	3	9	6	2	1	4
G	6	9	8	4	1	7	3	2	5
H	7	1	9	5	2	8	4	3	6
I	8	2	1	6	3	9	5	4	7
J	9	3	2	7	4	1	6	5	8