

PHY 320 Intermediate Laboratory Physics II
Spring 2011

A. J. Nicastro
135 Merion Lab
610.436.2540
anicastro@wcupa.edu
Office Hours: MWF: 10-11;
MR: 1:30-2:30
Other hours by appointment

TEXT: An Introduction to Error Analysis, John R. Taylor, 2nd ed.

SPRING SEMESTER SCHEDULE

18 Jan	Tue	8 a.m.	University classes begin
19 Jan	Wed	3 p.m.	First class meeting of PHY 320
4 Mar	Fri	5 p.m.	Spring Break begins
14 Mar	Mon	8 a.m.	Spring Break ends
27 Apr	Wed	3 p.m.	Last class meeting of PHY 320
29 Apr	Fri	11 a.m.	Laboratory notebooks due
29 Apr	Fri		University classes end

COURSE GOALS, DIRECTION, AND OBJECTIVES

Experiments are at the heart of modern Physics. If the results of an experiment are consistent with the predictions of a theory or model of the physical phenomenon studied in the experiment, then we say we have a measure of understanding of the phenomenon in question. If no agreement is apparent, then either the theory or the experiment is in error. In this course you will carry out five experiments dealing with fundamental physical phenomena. The experiments will involve differing techniques of measurement and analysis. You will be assembling the requisite apparatus, running the experiment, and analyzing the data in an effort to thoroughly understand how good the results of your experiment are. In a general way, this course will allow you to quantitatively assess the quality of experimental data and how well the data correspond to theory, an important function in the practice of physical science. Indeed, without an analysis of the errors and uncertainties involved in an experiment, no answer is possible to the question, Do the results of my experiment agree with the theoretical prediction?

In science, the *clarity* of the *presentation* of data, results, and conclusions are almost as important as these factors themselves. In this course you will continue to progress in refining your presentation skills. This Physics laboratory course is a writing emphasis course. During the semester you will produce technical reports describing in your own words an experiment you have personally completed. Data and error analysis will be an integral part of each report. The report's organization and presentation strive for clarity. You will also be scheduled for oral presentations.

SCHEDULE OF EXPERIMENTS AND ASSIGNMENTS

2 Feb Report #1 due, 3:00 p.m.

16 Feb Report #2 due, 3:00 p.m.

2 Mar Report #3 due, 3:00 p.m.

Spring Break

23 Mar Report #4 due, 3:00 p.m.

6 Apr Individual Presentations¹: Abele, Clark, Colagreco, DiEmedio

13 Apr Individual Presentations¹: Johnstone, Kane, Margolis, Martin

20 Apr Individual Presentations¹: Plumridge, Roberts, Stahl, Wise, Kushner

27 Apr Group Presentations²

29 Apr Laboratory notebook due, 11:00 a.m.

¹ Individual presentations are presentations to the class with some faculty attending. They are oral summaries of an experiment for which a written report was previously submitted. Oral presentations can include ancillary support such as Power Point slides, transparencies, and demonstrations, and are 15 to 20 minutes in length.

² Group presentations are assigned as follows:

1. Zeeman Effect: Abele, Clark, Colagreco, DiEmedio
2. Nuclear Spectroscopy: Johnstone, Kane, Margolis, Martin
3. Hall Effect: Plumridge, Roberts, Stahl, Wise, Kushner

The format for the group presentation is the same as the individual presentations except that the relevant data is analyzed and presented by the group. Each member of the group receives the same grade for the presentation.

AVAILABLE EXPERIMENTS

1. Electron spin resonance and the measurement of the g factor*
2. Franck-Hertz experiment (mercury)
3. Speed of light[†]
4. e/m for an electron[†]
5. Michelson interferometry and the measurement of the wavelength of light
6. Millikan experiment and the fundamental unit of electric charge
7. Planck's constant[†]
8. Measurement of the wavelengths in the spectra of hydrogen and deuterium[‡]
9. Current balance and the measurement of μ_0
10. X-ray diffraction
11. Half-life of a radionuclide[‡]
12. Thermal radiation experiments and the Stefan-Boltzmann law
13. Gravitational constant
14. Avogadro's Number
15. Nuclear magnetic resonance and NMR spectra of materials*
16. Hall effect*
17. Zeeman Effect*
18. Nuclear Spectroscopy*[‡]

Experiments can be conducted in any order, but the ones marked by a (†) are best conducted in the Fall semester and those indicated by a (*) are best conducted in the Spring. Unmarked experiments can be conducted in either semester. I recommend that you conduct Experiments 10 and 12 at some point in PHY 310-320. For experiments marked ([‡]), you will need to speak with the instructor prior to undertaking them for important safety instructions and practical tips for conducting the experiment.

Laboratory Notebook: You are expected to keep a record of your laboratory activities, both for the individual experiments and the group experiments. You must use the same notebook for PHY 310 and PHY 320. Use a bound, quadrille-ruled laboratory notebook for this purpose. This notebook will be submitted and evaluated at the end of the semester.

Laboratory Reports: All reports must be typewritten and use a technical writing style. This writing style is described in the AIP Style Manual. Analysis should follow the guidelines described in that document. You may wish (and are encouraged) to discuss the contents of your reports with other class members and the instructor. Of course, the submitted report must be the work of the individual(s) submitting it, with proper acknowledgments and references.

Attendance policy, due dates, and deadlines: You are expected to complete all of the reports by the date and time due. These deadlines will be strictly enforced – to the second. Please do not ask for an exception. Because unforeseen circumstance befalls us all, you ought to complete the work and submit it as far in advance of the deadline as is practical. Reports not meeting the deadline receive a grade of zero.

Grade: Your grade will be determined by the quality of your written work, the oral presentations, your participation, and the degree of independence you show in conducting the course requirements. Your final grade is based primarily on the following partition: 4 lab reports @ 15% each; 1 individual presentation, 15%; 1 group presentation, 15%; participation, 5%; and independence, 5%.

Disability:

We at West Chester wish to make accommodations for persons with disabilities. Please make your needs known by contacting the Office of Services for Students with Disabilities at extension 3217 as well as myself. Sufficient notice is needed in order to make the accommodations possible. The University and I desire to comply with the ADA of 1990.

Public Safety:

The Emergency Communication Committee has made the recommendation that the emergency phone number for WCU's Department of Public Safety be listed on all course syllabi. That number is **610-436-3311**. This specific recommendation is made to help the campus be prepared in case of an emergency situation.