



**COURSE TITLE/SECTION:** Phys 3313, Advanced Laboratory I, Fall 2018 / 20112

**TIME:** Th 1 - 4 pm

**LOCATION:** F 226

**FACULTY:** Dr. Rebecca Forrest

**OFFICE:** SR1 515 C

**OFFICE HOURS:** M 2-3pm, T 2:30-3:30pm, W&F 9-10am, or by appointment

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## I. Course

Cr. 3. (0-6). Prerequisites: PHYS 1122, 1322, and credit for or concurrent enrollment in PHYS 3110 and 3315. Measurement of  $e/m$ ,  $h/e$ ,  $g$ ; contemporary experiments in microwave diffraction and interference, quantized energy levels, energy distribution of beta-radiation, and chaotic systems. Core – Writing in the Discipline.

## II. Course Objectives

Upon completion of this course, students will be able to:

1. Understand the key experiments that led to the formulation of Modern Physics
2. Perform those experiments for themselves
3. Use contemporary laboratory equipment
4. Understand the basics of error analysis
5. Keep a laboratory notebook
6. Communicate the purpose, procedures, and results of an experiment in the form of a scientific journal article in the style of the American Institute of Physics

## III. Course Content

The course will include the following topical (content) areas:

1. Fundamentals
  - Measurement, Error, and Oscilloscopes
  - LabView
2. Mechanics & Waves
  - Microwave Optics
3. Modern Physics
  - Bainbridge Method ( $e/m$ )
  - Young's Double Slit Experiment
  - Thermal Emission
  - Plank's Constant

## V. Textbooks and Resources

Text Book: Experiments in Modern Physics, A.C. Melissinos, Academic Press 2003

Additional  
Reading:

UH Library Course Web Resources, <http://guides.lib.uh.edu/phys3313>

Writing About Physics Using LATEX, S. D. Sewell, Advanced Lab Handout

LabWrite, <http://www.ncsu.edu/labwrite/>

The Art of Experimental Physics, D.W. Preston, E.R. Dietz, John Wiley & Sons 1991

Practical Physics, G.L. Squires, Cambridge University Press 2001

Introduction to Error Analysis, J.R. Taylor, University Science Books 1996

## VI Course Requirements

### A. Reading Assignments

Read handouts for each experiment and answer the Preparatory Questions before coming to the lab. Answers to the Preparatory Questions are to be in your lab notebook at the beginning of lab, along with the Objective, Procedure summary, and Analysis summary for the day's experiment.

### B. Written Assignments

During lab, keep records of all experimental work in your lab notebook as described herein and in the Advanced Lab handout. While all analyses do not have to be done in your notebook, a summary of the analyses and the results should be in your notebook.

Prepare an experimental report for each experiment as described below and in the Advanced Lab handout. Additional help with report writing is available at the University of Houston Writing Center. Each student is expected to meet with a Writing Center consultant twice during the semester. The meeting date windows will be discussed in class.

## VII. Evaluation and Grading

60% Experimental Reports: Students are expected to work in groups of 2-3. There will be six experiments covering two lab periods each. Each student is expected to turn in Experimental Reports on all of the six experiments, worth 10 points each. The reports should be three to four pages (4 pages max) in the style of the American Institute of Physics publications (e.g. Journal of Applied Physics or American Journal of Physics). Students are encouraged to use TeX or MS Word to prepare their reports; an MS WORD template file is available at <https://publishing.aip.org/authors/sample-manuscripts>. Sample TeX and MSWord reports are available at Dr. Forrest's web page. A lab report rubric is included in the Advanced Lab Handout. No late reports will be accepted. (In the case of illness or similar documented situations, instructor approval must be obtained before late work will be accepted.) Reports are turned in on Blackboard, through TurnItIn. If you do not receive a confirmation email, your report was not submitted!

For the first experiment, a first draft including at least the Title, Abstract, Introduction, and Methods sections, will be due after the first lab session. All students will grade lab reports of 3 other students by the next week. This grading will count as one lab report grade. If you don't turn in a first draft, you

will not be able to grade other student's drafts. The final draft of the first experiment will be due the following week.

Students will receive 1.5 extra credit points towards their Report grade for each of their two meetings with a UH Writing Center consultant.

25%      Notebook:      Students are required to use laboratory notebooks during every lab. All writing should be in ink. Only bound, ruled and numbered notebooks are allowed. Lab Notebooks may be purchased at UH Research Stores, Fleming room 70. During the experiments, students are not to use loose sheets of paper or anything else except their notebook to record experimental data and notes. Data may be plotted on Graph Paper and then glued into the notebook. One notebook per student. These will be periodically evaluated, and turned in and graded at the end of the semester. Grading criteria will be presented during a 3110 seminar.

15%      Final Exam:      Students will have one practical or written exam at the end of the semester. Questions will pertain to the experiments completed by the student.

### VIII. Additional Notes

**Policy on grades of I (Incomplete):** The grade of "I" (Incomplete) is a conditional and temporary grade given when a student, for reasons beyond his or her control, has not completed a relatively small portion of all requirements. Sufficiently serious, documented situations include illness, death in the family, etc.

**Addendum:** Whenever possible, and in accordance with 504/ADA guidelines, the University of Houston will attempt to provide reasonable academic accommodations to students who request and require them. Please call 713-743-5400 for more assistance.

**Academic Dishonesty:** It is each student's responsibility to read and understand the Academic Honesty Policy found at <http://catalog.uh.edu/content.php?catoid=6&navoid=1025>.

**Religious Holy Days:** Students whose religious beliefs prohibit class attendance or the completion of specific assignments on designated dates may obtain an excused absence. To do so, please make a written request for an excused absence and submit it to your instructor as soon as possible, to allow the instructor to make arrangements. For more information, see the Student Handbook. <http://catalog.uh.edu/content.php?catoid=4&navoid=791>.

**Counseling and Psychological Services (CAPS)** can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS ([www.uh.edu/caps](http://www.uh.edu/caps)) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. Also, there is no appointment necessary for the "Let's Talk" program, which is a drop-in consultation service at convenient locations and hours around campus. [http://www.uh.edu/caps/outreach/lets\\_talk.html](http://www.uh.edu/caps/outreach/lets_talk.html).

**Standard Disclaimer:** This syllabus is subject to change at the discretion of the instructor.