

PS 315: Modern Physics Lab

Spring 2017 Syllabus

Professor: Dr. Darrel Smith

Office Phone 777-6663

Course PS 315.50

Credit Hours 2

Class Time M W 9:00 – 11:30 AM

Office Location AC1, Room 253

Classroom Bldg. 61

Corequisite PS 303

Required Materials Scientific calculator, lab notebook.

Books: *Practical Physics* 4th edition, G.L. Squires
Experiments in Modern Physics 2nd edition,
Melissinos and Napolitano

Office Hours: see my web site: <http://physicsx.pr.erau.edu/>

Course Description

Two laboratory session per week with experiments complementing the material presented in PS 303.

This is a required laboratory course in the space physics degree program. The course will provide a hands-on experience with several sophisticated devices that are used in science and engineering.

Learning Objectives:

After completing this course, students should be able to

1. carry out an open-ended investigation using moderately sophisticated hardware.
2. analyze properties of electromagnetic radiation.
3. analyze selected nuclear and atomic processes.
4. describe how to measure the charge and the charge-to-mass ratio of the electron.
5. explain how to observe energy transitions produced by collisions between electrons and atoms.
6. produce a concise and informative written record of laboratory test work.
7. perform a significance test for the correlation of experimental results.
8. Produce two formal reports using the LaTeX type-setting program to produce journal-quality papers.

Lab Material: Available on my website -- <http://physicsx.pr.erau.edu/>

Grading Policy:

Your final grade will be based on the cumulative score you earn for all lab exercises. In general, letter grades will likely be based on the traditional scale, but your instructor has the freedom to alter this scale as he or she sees fit.

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| ✓ 90% to 100% is an A | ✓ 60% to 69% is a D |
| ✓ 80% to 89% is a B | ✓ 0% to 59 % is an F |
| ✓ 70% to 79% is a C | |

You must complete every lab exercise. If you miss one lab, there will be an opportunity to make it up during the scheduled make-up week. If you anticipate missing a second lab, you must discuss the problem with your instructor. Do not wait until the end of the term and then attempt to remedy the problem. You will fail the course.

Plagiarism. Formal lab reports will be scrutinized for plagiarism. If any part of your report is identical or very similar to the report of another student or any other source, that is considered plagiarism and will be disciplined in the same manner as cheating. (Note: your raw data should be the same as that recorded by your lab partner.)

Incomplete grades. The Incomplete (I) grade is only possible for students who have suffered medical emergencies or some other unusual hardship. An instructor will consider giving an “I” grade only if a student provides written evidence (e.g., a letter from a physician) concerning the hardship. A written agreement, detailing remaining work

to be completed and the deadline, must be signed and dated by the student and the instructor before the end of the semester.

Lab Books. Each student will have a logbook to write and record observations. In preparation for each lab, every student is required to write a **laboratory plan** describing both the physics principles being investigated and the apparatus to be used to measure the physical phenomenon. This will be due by Tuesday 7:00 pm in John Dallyn's or Sophia Schwalbe's email, so, he/she will have time to read them before the lab the following morning. The due date for **laboratory plans** may switch to Sunday's at 7:00 pm later on in the semester. The first **laboratory plan** will be due Tuesday, January 17, 2017. The lab TA or instructor must sign off on the laboratory plan before a student starts to take measurements. As part of the "sign off" students should be prepared to answer questions regarding the experiment they are undertaking. The calendar for January can be found on my PS315 website.

emails: John Dallyn dallynj@my.erau.edu
 Sophia Schwalbe schwalbs@my.erau.edu

Formal Reports. Students will submit two formal reports as part of the course. The reports will be written using LaTeX, a type setting language used in scientific journals. One report will be based on the measurements taken from one of the first 6 labs, while the second report will be based on measurements taken from one of the last 3 labs.

Supplemental Material. I will include additional material on my website as they relate to these experiments. So, periodically check my website for leaflets, manuals, and other material that will assist you with the understanding the physics, or the operation of the experimental equipment.

Attendance: Regular attendance and punctuality, in accordance with the published class schedule, are required.

Experiment list

Cavendish	Charge-to-mass ratio	Spectroscopy
Radioactive Decay	Franck-Hertz	Planck's constant
Electron Diffraction	Geiger-Muller Tube	Millikan Oil Drop

The first 6 experiments (weeks 1 - 3, and 4 - 6) are worth a maximum of 20 points each, for a total of 120 points. The last 3 experiments (weeks 7 – 12) are worth a maximum of 40 points each, for a total of 120 points.

The first formal lab report is worth a maximum of 40 points, and the second formal lab report is worth 60 points. Each Pre-Lab is worth a maximum of 1 point. With 9 prelabs and three 10-point quizzes, the **total number of points you can earn in the semester is 379 points.**

The 2nd Formal Lab Report

The final formal lab report will be due on the last day of classes, Thursday, April 27, 2017.

Final Exam: Tuesday May 2, 2017 12:30 – 2:30 pm (Oral Presentations)

As it turns out, our PS303 final will be earlier in the morning on May 2nd, at 8:00 – 10:00 am.