

Physics 310, Advanced Laboratory/ Experimental Analysis Spring 2018

Meeting: Trexler 272
11.30AM Instructor: Matthew C. Fleenor
266D
email: fleenor@roanoke.edu
2.30PM

Time: TR 8.30–
Office: Trexler

Office Hours: T 1.00–

W R 1–2.30PM, by
appt

webpage: <http://http://www.roanoke.edu/mcsp/fleenor/>

Required Textbook: An Introduction to Error Analysis, 2nd ed., J. Taylor (1997), University Science Books
Required (Co-)Prerequisites: Physics 203

I. Components of Learning

There are several factors that make a course “good” (by good, I mean a healthy combination of the intellectual and the affective). Good courses are also clear about their essential components. Below is an attempt to be clear about how will I operate within PHYS 310, as well as my expectations of a student who is enrolled in PHYS 310.

Descriptions

Aspiration: I am really excited about the opportunity that we both have this semester. It is an opportunity to explore new fields of research and to deepen in areas where you may already feel comfortable. It is an opportunity to teach your colleagues, and me, about some areas of physics. It is an opportunity to learn physics from experts in their own environment.

I have (sub-)titled the 310 course, Advanced Lab, because this course is a threshold to performing your own independent research project (here at Roanoke, or off-campus). As a result of the course, you should have a greater comfortability with discipline-specific instrumentation and software, creating research-quality figures, and publishing articles of journal-quality. It is my job to help guide you in these activities

Intended Learning Outcomes

The successful student will–

1. explore open-ended questions that highlight course-related phenomena.
2. challenge (and be challenged by) colleagues regarding their current understanding of physical concepts as they are implemented within the lab.

3. write reports that pertain to physical phenomena, graphical results, and error uncertainties in a meaningful way.
4. present graphical, quantitative, and qualitative results, both through written and oral communication.
5. deepen understanding and application of errors, both systematic and statistical, as they apply to physical results.

Attendance Policy

Students are expected to attend every class, unless otherwise announced. Attendance is checked at each meeting. If a student is going to be absent from class, the instructor must be notified. You are working in a collaboration for most of these labs, so you are letting down the member(s) of your group if you miss class. All of the work does not need to be completed within the hours of the class. After the second unexcused absence, you will be dropped (forcibly, with a "DF" or "DP," or willingly with a "W" before the ninth week) from the class. Students are accountable for all work missed because of an absence.

Academic Integrity

All freedoms imply responsibility, and your responsibility to the RC AI policy ensures your academic freedom. I want to foster a mutual respect for the classroom hours that we have together, and AI is primarily about mutual respect (because responsibility and accountability accord). In light of this, please silence cell phones to vibrate before class and come prepared (e.g., book, paper, and pencil). Classroom computers are designed for academic learning and should be used in this manner during class; i.e., no email exchanges and/or surfing during class.

Reading, reflection, and research all involve the activity of recognizing the good thinking of others. Plagiarism exists when someone takes personal credit for another's creative (usually written) work. Hacker's *A Writing Reference* gives very clear examples for citing the work of others from a broad spectrum of sources (including the internet). Please use this guide when citing work during the writing that you will complete in the course.

Lastly, please be advised that the RC AI policy will be upheld within this course as detailed online at http://roanoke.edu/A-Z_Index/Registrar/Policies_and_Information/Academic_Integrity.htm

Included here is an explanation of how violations of the College's academic integrity policy are handled.

Grading

Written lab reports for each exercise are due when noted on the Course Outline. Typed reports are required that generally follow in the order presented below. In the name of conserving paper, the course will (attempt to) conduct all-electronic submission in PDF only and grading via the NQR site.

Please note the following grading policy: 25% deduction for the first week past the due date, and a 50% deduction for the second week. After the second week, i.e., two weeks after the specified due date, NO work will be accepted.

We will discuss lab writing at length within the course itself, and you have a working knowledge of what is a "good" paper.

II. Modes of Learning

Rubric: Your grade is determined according to the following distribution:

Mid-Term Exam 10% Classwork/homework 10% Notebook 10% Final Oral
Presentation 10% Critique & Review 10% Reports 50%

Descriptions

Written Reports

All physical science papers have a similar structure that includes the following: title & author information, abstract, introduction (background or overview), quantitative methodology (experimental approach & methods, data collection, modeling), results, discussion & conclusions. We will discuss the differences between different disciplines and the way each section can be altered or adjusted depending on the focus of the research.

Critique & Review

You will be required to observe and reflect on your colleague's work, both written and oral. You will be evaluated on your completion and your thoughtfulness in carrying out your review.

Class/Homework

Part of the course objectives relates to the proper understanding of uncertainty and its propagation when multiple variables are involved. The Taylor text will aid us in our development of understanding, and we will complete some work from that book (in class or at home).

Mid-Term Exam

The work from Taylor will include a mid-term exam related to error propagation and determination. It will only cover the topics that are discussed in class.

Notebook

All scientists keep a journal of their data, thoughts, reflections, and imaginative ideas. Creativity is part of the science process, and one cannot be certain when creativity will reveal itself. Therefore, it makes sense to carry with you a notebook of some sort. I want to facilitate the creative science process by requiring you to (at least) take data, notes, and some thoughts about the research you conduct.

Final Oral Presentation

One of the primary means of communicating scientific activity is through oral presentation, even more so than writing. We will focus some of our time on presenting science to others this semester. I look forward to learning from each of you about the research you conduct. **Final presentations are scheduled for April 26th and 27th from 8:30-11:30 in Trexler Hall room 272.**

III. Lab Outline

There is an attached outline of the semester calendar. We will attempt to follow this schedule closely, since the professors are primarily available on THU mornings for consultation, troubleshooting, and orientation. For a detailed description of the specific assignments during each rotation, please consult a document entitled "Rotation Assignments".