

Syllabus for Physics 0212

Introduction to Laboratory Physics

Spring 2020

Course and Instructor Information

CRN	10125, 10128 & 10170			
Instructor	Russell Clark			
Phone	412-624-9204			
Email	ruc2@pitt.edu			
Office	OEH 404	Office hours	Monday:	7:00am – 8:00am
			Tuesday:	1:30pm – 2:30pm
			Wednesday:	3:00pm – 4:00pm
			Thursday:	3:00pm – 4:00pm
			Friday:	10:00am – 11:00am

Other times by appointment: <http://tinyurl.com/Russell-Clark-Appointments>

Prerequisites PHYS 0111 is a co-requisite for PHYS 0212

General Studies Requirements – This course does not fulfill any general studies requirements.

Course Description and Objectives

All sciences are a combination of theory (the hypothesis) and measurement (the experiment). A theory has no value unless it can be verified, or tested, by experiment. Once a theory passes this test, it may be expanded and tested further, which is the way that Physics and other sciences progress. So understanding experimental work is vital to understanding the process of science. A typical introductory physics course sequence, such as Physics 0110 and 0111, teaches the student the basic principles of Physics that were learned through the interplay of theory and experiment over several hundred years. Such courses focus on the theory side of Physics. In this course, you will learn how the experimental process works by learning how to obtain and analyze experimental results. You will also see the basic principles that you have learned in action, to see the physical reality behind the equations. Along the way you will learn to use the basic tools of experimental physics, from simple measuring devices such as a ruler, to sophisticated digital data acquisition systems. You will learn how physical theories are tested within the bounds of experimental uncertainties. By the end of the course you will have performed experiments and tested theories on the topics of mechanics, waves, energy conservation, electricity and magnetism, and optics.

The course is structured in two parts, a recitation and a lab with attendance required for both. The 50-minute recitation lecture will introduce the physical principles that are to be demonstrated by the experiments in the lab sessions. The lab sessions will include instruction on how to use the equipment and how to perform the experiment. The remainder of the lab will be used to collect and analyze the data.

Required Materials

The following materials are required for the course.

- 1) *RealTime Physics, Active Learning Laboratories- Custom Edition* by Sokoloff, Laws & Thornton (Wiley).

WARNING – Used manuals may have missing pages!

- 2) A scientific calculator that has trigonometric, logarithmic, exponential and statistical functions.

General Information for the Labs

- 1) **Eating and drinking are not permitted in the labs.** This is both for your safety and to prevent damage to the laboratory equipment.
- 2) **You are responsible for reading and understanding the section in the manual on the scheduled experiment before coming to the lab class.** Make sure that you understand the physical principles to be demonstrated and the general procedure for the experiment. The more prepared you are, the faster and easier the lab will go. Feel free to ask questions about the experiment at any time. A schedule of the experiments is listed below.
- 3) Before each lab session you will complete a pre-lab assignment.
- 4) The lab teaching assistant (TA) will provide some guidance on starting the experiment. **Listen to this presentation very carefully.**
- 5) Before starting the experiment, make sure that you understand the function and purpose of the equipment. The lab manual should provide sufficient instruction for using the equipment, but if there is anything that you do not understand then ask your TA.
- 6) Students will work in groups of two with the following exceptions. If a class has an odd number of students, one group will have three people. If a piece of equipment fails and cannot be replaced, the members of that group will split up and join other groups. **Under no circumstances should a group have more than three students.**
- 7) Once you finish the experiments, if time permits, then you should try to complete the lab report before you leave the lab. That way, if you have questions about the lab report, then your TA will be there to answer them, and if you find that you need to repeat one of the experiments then you will still have access to the equipment.

Lab Schedule

#	Week	Lab
	1/6/2020	ORIENTATION
1	1/13/2020	Module 1-2 (Changing Motion)
	1/20/2020	MLK HOLIDAY
2	1/27/2020	Module 1-3 (Force and Motion)
3	2/3/2020	Module 1-4 (Combining Forces)
4	2/10/2020	Module 1-9 (Conservation of Momentum)
5	2/17/2020	Module 1-10 (Projectile Motion)
6	2/24/2020	Module 1-12 (Conservation of Energy)
7	3/2/2020	Module 3-6 (Voltage in Simple DC Circuits)
	3/9/2020	SPRING BREAK
8	3/16/2020	Module 3-8 (Introduction to Capacitors)
9	3/23/2020	Module 3-9 & 10 (Magnetism)
10	3/30/2020	Module 4-2 (Reflection and Refraction)
11	4/6/2020	Module 4-3 (Geometrical Optics - Lenses)
12	4/13/2020	Module 4-6 (Waves of Light)
	4/20/2020	MAKE-UP LABS

Inquiry Based Labs

Inquiry based labs differ from traditional labs in that they focus on learning the concepts more than following a step by step procedure. The manual and the digital lab reports for the inquiry based labs will guide you through the process of exploring a concept rather than providing you with a detailed set of instructions. You are also welcome and encouraged to play around and find your own way of exploring each concept.

Each inquiry based lab will have three parts. The first is a pre-lab assignment that you will complete prior to coming to the lab. The second is a digital lab report that is based on the manual that you will complete during the lab session. The third part is a homework assignment that you should complete after you have finished the lab. The homework and pre-lab assignments will be completed by individuals, but group work is welcomed and encouraged for the digital lab reports.

Lecture Questions and Attendance

The recitation lecture will utilize the Student Interactive Response System (SRS). This system consists of hand-held remote controls, called pads or clickers, assigned to individual students, which will be used to answer multiple-choice questions. Students will receive full credit for questions that are answered correctly, and 90% for questions that are answered incorrectly.

The pads will be stored in bins on a cart at the front of the room so that you may pick up your pad before lecture and then place it back there at the end of lecture. **Do not take the pads out of the classroom!** Many other classes use the same system and pads. If your pad is missing then notify your instructor.

Grades

The lowest pre-lab assignment, lab report, homework, and lab check-in grades will be dropped. **Makeup labs will be given at the discretion of the lecture instructor.** The grades are weighted according to the table below.

Lecture Questions	5%
Lab Check-ins	5%
Pre-Lab Assignments	15%
Post-Lab Homework	15%
Digital Lab Reports	60%

Grade Change Policy

Grade cutoffs are chosen to be as fair as possible but ultimately the line has to be drawn somewhere and it has to be drawn straight. Once your final grade for the semester has been submitted to the Registrar it will not be changed unless there is a verifiable error in the grade book, such as a missing grade or a grade that was entered incorrectly. You can check all of your course grades at any time on Courseweb (<http://Courseweb.pitt.edu/>).

Makeup Labs

Makeup labs are only given at the discretion of the instructor. The lowest pre-lab assignment, digital lab report, and homework grades are dropped automatically (independently), so if you miss a lab for any reason then that will be the lab that is dropped and no makeup will be allowed. If you miss two labs during the semester and you have a valid reason for missing both, then you will be allowed to make-up one of the missed labs; the other lab will be dropped. Valid reasons include illness (a doctor's note may be required), family emergency, or other events of similar importance. Note that it will not be possible to make-up more than one lab at the end of the term. If you have to miss more than two labs, then please contact the instructor.

The make-up lab policy is the same for incomplete labs. If you need to leave the lab before the work is completed, then please notify your TA before you go. You will be required to turn in a separate lab report from your partner, and you will only receive credit for the sections of the report that were completed before you left. **You may not use the work completed by your lab partner or partners after you leave the lab to complete the lab report.**

Academic Integrity

All students are expected to adhere to the standards of academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity (<http://www.provost.pitt.edu/info/acguidelinespdf.pdf>). This may include, but is not limited to the confiscation of the examination of any individual suspected of violating the University Policy.

Gradescope

All of the course assignments will be submitted through Gradescope:

<https://www.gradescope.com/>

You will turn in paper copies (pages from the lab manual) of the pre-lab and homework assignments which your TA will then scan and upload into Gradescope. You will submit the digital lab reports directly to Gradescope. More specific instructions will be provided by the instructor.

To access the Gradescope website, follow the link above (also available in Courseweb, below) and follow these directions:

- 1) Click on the "Log In" button.
- 2) A login window will pop up, click on "School Credentials".
- 3) Select "University of Pittsburgh" and then use the same procedure for accessing your Pitt email, etc.

Courseweb

The University of Pittsburgh provides an online portal for participating classes called Courseweb. Here you will find your grades and relevant course material such as a copy of the syllabus, sample exams, etc.

<http://courseweb.pitt.edu>

The username and password is the same as your Pitt email account. If you need to setup your email account or have forgotten your username and password then call the computer center help desk (4-HELP or 412-624-4357).

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 216 William Pitt Union, (412) 648-7890/(412) 383-7355 (ITY), as early as possible in the term, DRS will verify your disability and determine reasonable accommodations for this course.

Statement on Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Code of Conduct:

Communication is key to a productive learning environment, and we can maintain productive communication by exhibiting respect for one another. The success of the course for yourself and others depends on all of our commitment to behavior that demonstrates respect for differences, understanding towards others and a willingness to listen and learn. For these reasons, it is unacceptable to harass, discriminate against, or abuse anyone because of race, ethnicity, gender, disability, religious affiliation, sexual orientation, or age. If you witness or are subject to such harassment, please report it to the instructor or to the Office of Diversity and Inclusion.

Title IX:

Legal text: "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance." As a professor, I am a mandatory reporter and I am required to report violations of Title IX that I observe, or am made aware of, to the Title IX office. Title IX violations include, but are not limited to, sexual harassment, sexual violence and verbal or sexual abuse. Within the classroom, behavior in violation might appear as suggestive jokes or innuendos, inappropriate touching, and unwanted sexual behavior or advances, but my capacity and obligation to report does not end at the classroom.