

# Syllabus for Physics 0212

## Introduction to Laboratory Physics

### Spring 2022

### Course and Instructor Information

CRNs	10116, 10119, 10161			
Instructor	Russell Clark, Ph.D.			
Phone	412-624-9204			
Email	ruc2@pitt.edu			
Office	OEH 404	Office hours	Monday:	10:30am – 11:30am
			Tuesday:	2:30pm – 3:30pm
			Wednesday:	2:30pm – 3:30pm
			Thursday:	1:30pm – 2:30pm
			Friday:	7:00am – 8:00am

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 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 you 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, energy conservation, electricity, 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 explore the interplay of theory and experiment.

### Lab Manual

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

**WARNING – Used manuals may have missing pages!**

## 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 lab.** 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 from the manual.
- 4) Your lab teaching assistant (TA) will provide some guidance on starting the experiment. **Listen to this presentation very carefully.**
- 5) The lab manual and the lab report template should provide sufficient instruction for using the equipment, but if there is anything that you do not understand then ask your TA.
- 6) You will work in a group of three or four students. **Under no circumstances should a group have more than four students.**
- 7) Once you finish the experiments, if time permits, then you should try to complete the lab report before you leave. 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	1/10/2022	Virtual Lab 1 - Changing Motion <sup>1</sup>
	1/17/2022	NO LABS - MLK, Jr. Day
2	1/24/2022	Virtual Lab 2 - Force and Motion
3	1/31/2022	Lab 3 - Combining Forces
4	2/7/2022	Lab 4 - Newton's Third Law and Conservation of Momentum
5	2/14/2022	Lab 5 - Two-Dimensional Motion (Projectile Motion)
6	2/21/2022	Lab 6 - Conservation of Energy
7	2/28/2022	Lab 7 - Voltage in Simple DC Circuits and Ohm's Law
	3/7/2022	SPRING BREAK
8	3/14/2022	Lab 8 - Introduction to Capacitors and RC Circuits
9	3/21/2022	Lab 9 - Magnetism and Electromagnetism
10	3/28/2022	Lab 10 - Reflection and Refraction of Light
11	4/4/2022	Lab 11 - Geometrical Optics - Lenses
12	4/11/2022	Lab 12 - Waves of Light
	4/18/2022	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 for the inquiry-based labs will guide you through the process of exploring

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<sup>1</sup> The first two labs will be virtual, so you will not attend those labs in-person. You will complete the reports on your own using online simulations. Templates with complete instructions are available in Canvas. Both the lab lecture and lab sessions for the virtual labs will be through Zoom, with the links provided in Canvas. There are no pre-lab or homework assignments for the first two labs.

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 handout based on the manual that you will complete during the lab session. The third is a homework assignment that you should complete after you have finished the lab. The handout and homework parts will be turned in the following week.

## Grades

The lowest lab report grade will be dropped. **Makeup labs will be given at the discretion of the lecture instructor.** The grades will be weighted according to the table below.

Pre-Lab Assignments	20%
Post-Lab Homework	20%
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.

## Makeup Labs

Makeup labs are only given at the discretion of the instructor. The lowest lab report is automatically dropped, 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 makeup 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.

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 may not use the work completed by your lab partner or partners after you leave to finish the lab report.**

## Gradescope

The pre-lab and homework assignments from the lab manual will be handed to your lab TA. The lab reports will be submitted directly to Gradescope:

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

To access the Gradescope website, follow the link above (also available in Canvas) 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.

Please ask your TA or course instructor if you need additional help with using Gradescope.

## Canvas

The University of Pittsburgh provides an online portal for participating classes called Canvas. Here you will find your grades and relevant course material such as a copy of the syllabus, lecture notes, lab report templates, etc.

<http://canvas.pitt.edu>

## Academic Integrity

Students in this course will be expected to comply with the [University of Pittsburgh’s Policy on Academic Integrity](#). 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. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the [Academic Integrity Guide](#) for an overview of the topic. For hands- on practice, complete the [Understanding and Avoiding Plagiarism tutorial](#).

## 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 \(DRS\)](#), 140 William Pitt Union, (412) 648-7890, [drsrecep@pitt.edu](mailto:drsrecep@pitt.edu), (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

## Health and Safety Statement

In the midst of this pandemic, it is extremely important that you abide by public health regulations and University of Pittsburgh health standards and guidelines. While in class, at a minimum this means that you must wear a face covering and comply with physical distancing requirements; other requirements may be added by the University during the semester. These rules have been developed to protect the health and safety of all community members.

Failure to comply with these requirements will result in you not being permitted to attend class in person and could result in a Student Conduct violation. For the most up-to-date information and guidance, please visit [coronavirus.pitt.edu](http://coronavirus.pitt.edu) and check your Pitt email for updates before each class.

## 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.

## **Email Communication**

Each student is issued a University e-mail address (username@pitt.edu) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address.

## **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.