PHYS 1312 Advanced Introductory Physics II:
Optics, Electricity, and Magnetism
Fall 2017
The University of Georgia
Course Information and Schedule

Times and Locations

- Classes: TuTh, 11:00am-12:15pm (Period 3), Room 145, SLC
- Laboratory: W, 4:40-6:35pm, Room 319, Physics Bldg.
- Office Hours: TBD and by appointment

Instructor

- Prof. Phillip C. Stancil
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Introduction

This course is the second semester of advanced introductory physics which will focus on optics (and waves), electrostatics, circuits, and magnetism. Multivariable calculus will be used throughout. Prerequisites include PHYS 1311/1211 and MATH 2270/2500/3500. It is also a good idea to be taking PHYS 2001. Some familiarity with general chemistry and computer programming would be useful.

Course Goals

- To expand our physics expertise to optics and electricity and magnetism
- To apply advanced mathematics to describe the physical world
- To expand our physics language ability, both written and verbal
- To enhance our problem solving abilities
- To enhance our ability to work in groups
- To keep up with current developments in physics and astronomy
- To grow as scientists

Required Course Materials

1. *Matter & Interactions* (volume 2), R. W. Chabay and B. A. Sherwood, 4th Edition, Wiley (2015).
2. *Experiments for an Introductory Physics Course*, UGA Physics and Astronomy, Hayden-McNeil publishing (2014, 2016, or 2017). Needed for the laboratory section of the course.
3. A simple scientific calculator, which must be non-programmable, non-graphing, and non-symbolic for tests/exams. The use of a calculator with graphing, algebra-solving, or programming functions will not be permitted for any test or exam, nor are PDAs, cell phones, Apple watches, or other electronic devices to be used.

Required Resources

1. Course Webpage: http://www.physast.uga.edu/classes/phys1312/stancil/
2. *Learning Online Network with CAPA (LON-CAPA)*: http://spock.physast.uga.edu/. Online homework system. See Homework section for more information.

Other Resources

1. Resources for Students: http://matterandinteractions.org/student/
2. Other University Physics textbooks

Grading Policy

Your final score will be determined from your overall performance in the class including tests, final exam, homework, project, group assignments, and laboratory grade with the following weights:

1. 30% Two (out of three) in-class tests (15% each)
2. 25% Final exam score
3. 10% Computational project
4. 10% Homework
5. 10% Inclass group assignments
6. 15% Overall laboratory score

The tests grades will be taken from the highest two out of three tests with the lowest score dropped. Final letter grades will be based on the class statistical distribution of total composite scores with the mean score corresponding to a middle-C. However, the lower range of the grade distributions will be no higher than 95.00 A, 90.00 A−, 86.67 B+, 83.33 B, 80.00 B−, 76.67 C+, 73.33 C, 70.00 C−, and 60.00 D.

Test/Exam Policy

There will be three in-class tests and one final exam. All tests and exams are closed book and closed notes. You can only bring pencil and calculator to the tests and exam. Calculators must be non-programmable, i.e. no formulae can be stored in your calculator. Equation sheets will be provided. The tests and exam will consist mostly of problems requiring a **complete written solution** and some conceptual questions. Further details about each test and the exam will be given in class.

The test make-up policy is as follows:

1. If you miss a test you have the option of taking a make-up test, typically to be given within a week of the original test date (see below) or to let your final exam score replace the missed test (i.e., your final exam would count 40% of your total course grade). Alternatively, the missed test can be your dropped test.
2. Using your final exam score to replace a missed test, can only be applied for one missed test.
3. Make-up tests will typically be given on the first Monday (if not a holiday) following the original test date. The time will be determined by the instructor to accommodate the most number of students who need the make-up test and you must attend that make-up session. Alternate times/dates will not be given. By default, make-up tests are designed to be more difficult.
4. In order to be eligible for a make-up test or for your final exam grade to replace the missed test, you must have a documented excuse for missing the test (e.g., doctor's note for a serious illness) and you must contact me (via email or telephone) BEFORE the test.
5. An unexcused missed test results in an automatic zero for that test.
6. If you miss a second test or the final exam, regardless of the excuse, the maximum grade you can receive in the course is an Incomplete. A missed final exam can only be made-up under extreme circumstances.
7. In order to be eligible for a make-up final exam, you must inform me at least two weeks before the final exam, so arrangements can be made.
8. The anticipated test schedule is attached, though it may be possible that the dates of the in-class tests can change. Announcements of the fact will be made in class. "I did not know we had a test today" is an unacceptable excuse.

Homework Policy

Homework assignments will consist of two parts. The first part will be done online with the Learning Online Network with a Computer Assisted Personalized Approach (LON-CAPA) system. More details about using LON-CAPA will be given in class and on the course website. The second part of the homework will be the End of Chapter (EOC) problems from Chabay and Sherwood, 4th ed., which will be collected for grading roughly every week. Assignments will generally be made by Thursday (or Tuesday) of each week with the LON-CAPA portion due by the following Wednesday (or Monday) night. The EOC problem assignments will be posted on the class website and due as indicated. The EOC portion is one of the most important things you can do in this course to learn physics. The EOC assignments will focus on the Problems, but also will include parts from Questions and Computational Problems. Concepts you learn from the online problems are applied to more complex, and often, practical problems in the EOC portion. I suggest you do all of the assigned problems as carefully as you can. It is highly likely that one or more online or EOC problem will appear, in some form, on a test and/or the final exam. You are encouraged to study with your fellow group members and classmates, but the graded assignments must be your own work. You are also encouraged to work additional problems - as many as possible!

Group Assignments

This semester the course is further evolving to incorporate *active learning* methodologies (also called SCALE-UP). While some lecture structure will remain, we will spend some of each class period working in (usually) 3-member groups on problem solutions, vpython assignments, demonstrations, and other group activities. The group compositions will be determined by the instructor and group assignments will be turned in at the end of most class periods. It is therefore important that the groups learn to function efficiently and cooperatively. The same groups will work together on their vpython computational project (see below) and mostly constitute the two-member lab groups. Group membership may be reorganized if deemed necessary by the instructor.

Project

Working with your group, you will complete a small computational project using vpython, python, or a programming language of your choice. The topic can be taken from the course material or any subject in physics and will be assigned by the instructor. The project involves three parts: i) code, ii) written report, and iii) oral presentation. You will send me your working code and provide a report (about 5 pages) describing the topic, how the code works, and example output plots. You will give a 5-10 minute presentation using powerpoint, keynote, latex, etc., describing the physics and demonstrating the code. Due dates will be set soon, but the first oral presentations will begin soon after mid-term. While everyone should participate in all aspects of the project, each group member should be assigned to lead one of the project parts. Metrics for grading will be distributed soon.

Bonus Points

Throughout the semester, pop quizzes will be given in class (roughly every other week). Each quiz will consist of one multiple-choice or true-false question. The average of all quizzes is worth a maximum of 2 points. Further, during most class periods, I'll randomly call on some students to work an example problem or other task. If the student is in attendance and assists, they will receive 1 bonus point. The maximum number of bonus points for the course is 3. You can receive 1 bonus point just for taking all quizzes, even if all your answers were incorrect. The purpose of the bonuses is to reward those who regularly attend class and keep up with the lecture material and homework assignments. For example, if the lowest total course score for a B− turned-out to be 80.00 while your average was 78.50, you will receive a B− if your bonus average is 1.50 or higher. Otherwise, if you failed to take the quizzes or your bonus average was 1.49 or lower, you will receive a C+. Therefore, unless there is a numerical error in your scores, there will be no basis to discuss a letter grade adjustment. I do not "round up".

Student Responsibilities

1. You are responsible for all material (a) given in the homework problems, (b) discussed in class, (c) in the assigned reading, (d) from the inclass problems, and (e) in the lab exercises. 2. You are responsible for all announcements made in class, whether you are present or not, and on the class website. 3. Read the assigned portions of the textbook and online notes before class. 4. Do all homework assignments. 5. Perform your group assignments to the best of your ability. 6. Attend all lecture and laboratory sessions. 7. Know the University's policies concerning withdrawals and incompletes. 8. Ask me if you do not understand anything. Visit me during my office hours.

Academic Honesty

Be aware of the University's policy on academic honesty. See http://ovpi.uga.edu/academic-honesty. Anyone caught cheating on a test or exam will receive a failing grade for the course. Anyone found to be cheating on labs, homework assignments, or quizzes will receive a zero for that assignment. A second incident will result in an F grade for the course. All suspected incidents of academic dishonesty will be reported to the Office of the Vice President for Instruction. Appearing before the Academic Honesty Panel is an unpleasant experience for everyone - as some students from my classes have discovered. Lets not meet there.

PHYS 1312 Class Schedule, Fall 2017, Tu(T)Th(R), Period 3, Prof. Stancil

Class	Date	Chapter	Reading	Topic
1	T 8/15	23	23.4, 23.7	Introduction, waves
2	R 8/17	23		Doppler effect, superposition
3	T 8/22	23	23.8-23.9	Geometric optics, mirrors
4	R 8/24	23	23.10	Lens, aberrations, the eye
5	T 8/29	23, S3	23.10, S3.1	Optical devices, interference
6	R 8/31	*Review*		
7	T 9/5	**Test 1**		**Chapter 23**
8	R 9/7	S3	S3.2	Interference, diffraction
9	T 9/12	S3	S3.3	Resolution limits, gratings
10	R 9/14	13	13.1-13.4	The electric field
11	T 9/19	13	13.5-13.9	The electric dipole
12	R 9/21	14	14.1-14.4	Electric fields in matter
13	T 9/26	*Review*		
14	R 9/28	**Test 2**		**Chapters S3, 13, and 14**
15	T 10/3	14	14.5-14.8	Insulators and conductors
16	R 10/5	15	15.1-15.4	Distributed charges
17	T 10/10	15	15.5-15.8	Spherical charge distributions
18	R 10/12	16	16.1-16.3	Potential difference
19	T 10/17	16	16.4-16.7	Electric potential
20	R 10/19	16	16.8-16.10	Insulators (*Withdrawal Deadline*)
21	T 10/24	17	17.1-17.5	Magnetic field
22	R 10/26	17	17.6-17.12	Magnets and current loops
23	T 10/31	18	18.1-18.10	Circuits, current, and resistors
24	R 11/2	*Review*		
25	T 11/7	**Test 3**		**Chapters 14 - 18**
26	R 11/9	19	19.1-19.4	Circuit elements
27	T 11/14	19	19.5-19.7	Circuit elements
28	R 11/16	20	20.1-20.8	Magnetic force and dipole
	11/21-25			*Thanksgiving Break*
29	T 11/28	21	21.1-21.6	Electric flux, Gauss's law
30	R 11/30	*Review*		
31	R 12/7	**Final Exam**	**Comprehensive**	12-3pm