

PHYS 1308: Electricity and Magnetism
Syllabus
Professor Stephen Sekula
FALL 2016

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University Curriculum Student Learning Outcomes

Pure and Applied Sciences Level 1 [PAS1] Student Learning Outcomes:

1. Students will be able to demonstrate basic facility with the methods and approaches of scientific inquiry and problem solving.
2. Students will be able to explain how the concepts and findings of science or technology in general, or of particular sciences or technologies, shape our world.

Quantitative Reasoning [QR] Student Learning Outcomes:

1. Students will be able to develop quantitative models as related to the course subject matter.
2. Students will be able to assess the strengths and limitations of quantitative models and methods.
3. Students will be able to apply symbolic systems of representation.
4. Students will be able to test hypotheses and make recommendations or predictions based on results.
5. Students will be able to communicate and represent quantitative information or results numerically, symbolically, aurally, visually, verbally, or in writing.

Goals of this Course

The specific learning goals of this course are as follows. Upon successful completion of this course, students will be able to:

1. Explain the nature of electrical charge, force, potential, and fields and describe the behavior of electrical phenomena; explain the basic components of electrical circuitry, including conductors, batteries, resistors, and capacitors; explain the nature of magnetism and describe the behavior of magnetic phenomena; explain the nature of light and its connection to electricity and magnetism; explain the basic working of optical systems; explain how the study of electricity, magnetism, and light set the stage for a 20th-century revolution in our understanding of the universe;
2. Setup and solve quantitative problems in the areas described above, and thus be able to apply their understanding of electricity, magnetism, light, and optics to areas other than physics, such as medicine, biology, chemistry, electronics, and everyday life;
3. Demonstrate, through performance on homework, quizzes, in-class exercises and discussion, and exams, a clear understanding of the principles and application of electricity, magnetism, light, and optics.

Course Information

When/Where?	The course is held in Fondren Science 158 on Tuesday and Thursday from 9:30am-10:50am
Instructor	Professor Stephen Sekula Office: Fondren Science 39 Phone: (214)-768-7832 E-mail: sekula@physics.smu.edu Facebook: stephensekula Twitter: drsekula Diaspora*: stephensekula@social.cooleysekula.net GNU Social: steve@chirp.cooleysekula.net Pump.io: steve@hub.polari.us
Office Hours	Where: My Office, FOSC 39 When: <ul style="list-style-type: none">• Tuesday: 12:30 p.m. - 2:30 p.m. <p><i>Note: additional help sessions will be arranged with a Teaching Assistant</i> Cancellations of office hours, when unavoidable, will be announced by e-mail. If demand for office hour support is high, I may be forced to move it to another location that accomodates more people. If you cannot make office hours, which are open without appointment, you need to schedule a separate time to meet with the instructor or a teaching assistant. It is your responsibility to do this. <i>Please try to be courteous and request a meeting in writing at least a day before your proposed meeting time to allow for scheduling.</i></p>
Prerequisite(s)	MATH 1337
Textbook(s)	REQUIRED: Halliday, Resnick, Walker. "Fundamentals of Physics Volume II with WileyPlus and Orion" <i>See course website for information about obtaining the course learning system.</i>

Course Topics

In PHYS 1308 (Introduction to Electricity and Magnetism), you will learn the foundational concepts in the study and use of electricity, magnetism, and light. The course will begin with the study of electric charge, the electric force, the electric potential and field, electric energy, and the basic ingredients in electrical circuitry. We will proceed to then discuss magnetism, its nature and description, and apply our understanding to the study of magnetic phenomena. We will then use our study of electricity and magnetism to understand light, and discuss the “second unification” that occurred in physics in the 1800s (which set the stage for the modern physics subjects of relativity, quantum theory, the unification of forces, and the study of the building blocks of nature). We will explore the application of light in the world through optics, and you will learn the basic ingredients in optical systems (those designed to transport light and make use of it). Finally, we may close with some “special topics” that are direct spinoffs of the topics in the course. The nature of these “special topics” will be decided over the course of the semester in consultation with the students in the class. Throughout the course, applications of the study and use of electricity, magnetism, and light to the modern life sciences (and beyond) will be given as a means to hone your problem-solving skills in unfamiliar territory.

Attendance

Your attendance in the class will be checked through the assignment of homework, your participation in quizzes, and through participation in classroom discussions and activities. Poor attendance will be reflected in your performance in the three areas. This course respects the University policies on excused absences; please see the relevant section below.

Homework

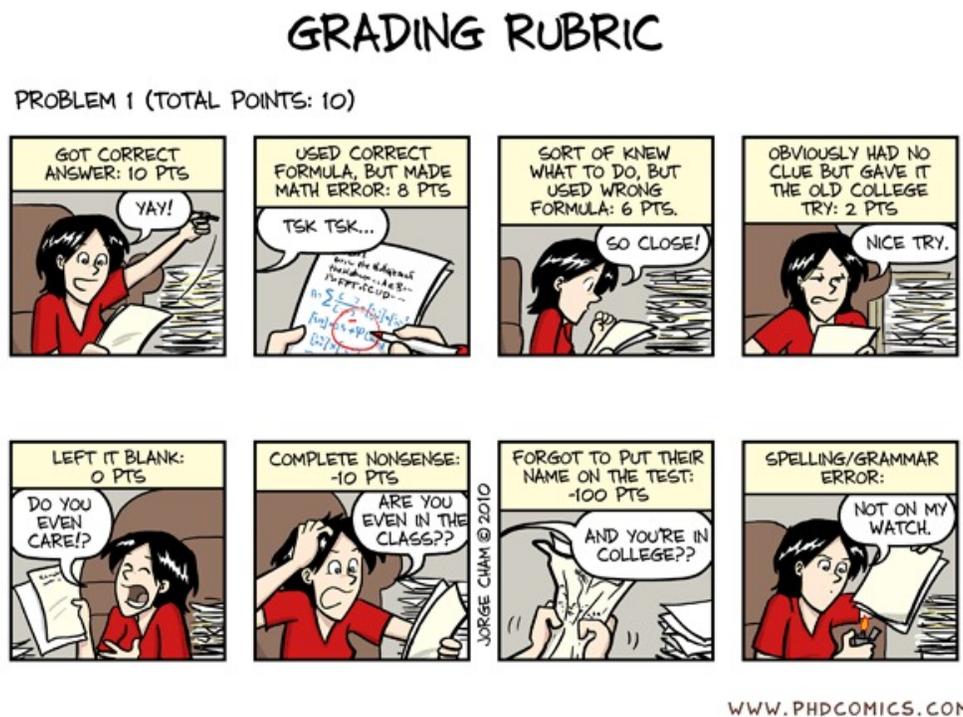


Figure 1: You'll be tempted to wait to the last minute to start your homework. You'll even be tempted to wait to the last minute to write up what you've done. Then it comes to us, unstapled and half-crumpled with no name and the spelling and grammar of a TwitterBot. You have been warned. Images are copyright Jorge Cham, and available at <http://www.phdcomics.com/comics/archive.php?comicid=1319>

Homework problems will be assigned in class. Homework will typically be assigned on a Thursday and due the following Thursday, with the exception of the first day of class (a Tuesday), when homework will be assigned and due two days later. Reduced credit will be given for late assignments, and no credit for missed assignments. A formal homework policy will be separately provided by the instructor.

Exams

There will be a series of in-class exams throughout the semester: **Thursday, September 22, 2016; Thursday, October 20, 2016; and Thursday, November 17, 2016**) which will cover topics in the course incrementally. The core of the final exam will be *incremental* and only cover material that was introduced since the material covered on Exam 3. **The final exam will be held on Friday, December 9, 2016, from 8:00 a.m. - 11:00 a.m. in FOSC 158.** In addition to incremental new material, the final exam period will be used to assess individual understanding of solutions to the Grand Challenge Physics Problem (see below).



Figure 2: Before you ask your instructor, “Will this be on the test?”, think very, very, very carefully. Images are copyright Jorge Cham, and is available at <http://www.phdcomics.com/comics/archive.php?comicid=1875>.

Quizzes

There will be reading quizzes at the beginning of every class, unless otherwise specified (there is no reading quiz on the first day of class). The reading quiz will cover reading and lecture video material assigned during the previous class. Your two lowest quiz grades will automatically be dropped. Your assigned reading and lecture videos will be your primary means of studying for the quiz. You are allowed to bring 1 sheet of notes taken while reading and viewing the pre-assigned material; it is in your best interest to treat reading and video assignments as you would class-time: take notes, review them, ask questions of the instructor before class, and come prepared to answer questions about the material.

If you have an excused absence, either due to an event covered by University policies or by enrollment (e.g. you were not enrolled in the first week of class), the quiz grade for that day will be additionally dropped automatically and will not count toward the “two lowest quiz grades dropped” policy; those are separate from excused absences. Excused absences NEVER count against you.

The Grand Challenge

A culminating event of this semester will be the completion of a “Grand Challenge” problem. This is a physics problem with no textbook solution. Rather, you will draw upon your own creativity, informed by the principles of physics you learned in PHYS 1307 and are learning in PHYS 1308, to address the question in as detailed a manner as possible. You will be graded on:

- your incremental progress on developing answers to the question;
- the creativity, originality, or novelty of the ideas that lead to your final answers;
- your ability to investigate the ideas through physics calculations and supporting material;
- and the reliability and accuracy of your calculations.

This is *not* purely a storytelling exercise; rather, you will engage in a mathematical and physical exercise where the math speaks, and you will describe what it says. The Grand Challenge process and solution will be a significant component of your final grade.

The Grand Challenge will be a *team exercise*. You will be randomly assembled into teams at the beginning of the semester. Your team will be expected to meet at least once a week outside of class to discuss the Grand Challenge and, in particular, how what you have learned that week might be used to explore a consequence of the theme of the Grand Challenge. Your team will meet with the instructor four times during the semester to formally present the state of your thinking about the Grand Challenge and to discuss progress on your calculations.

Reading and lecture video is how you are introduced to the physics concepts in this semester. Homework is how you learn to begin exercising those concepts. Exams are there to make sure that you as an individual have mastered the basic concepts of the course. The Grand Challenge is how you demonstrate that, as a team, you can explore new ideas and generate predictions using physics and mathematics.

During the final exam period, in addition to questions about the material since exam 3, you will receive questions about your team’s grand challenge solution write-up. The answers to these questions will be used to assess your individual understanding of the work you and your team have done.

A separate and detailed explanation of the entire Grand Challenge exercise will be made available by the instructor.

Grading

Your course grade is composed of the following pieces: quizzes to assess out-of-class learning (5%), homework (10%), grand challenge physics problem (25%) to assess group learning and synthesis, and exams (15% each, for a total of 60%) to assess individual mastery of material.

University Honor Code

The student honor code¹ can be found in the 2016-2017 student handbook². All students will be expected to adhere to it. Any student found conducting a violation of the honor code - academic sabotage, cheating, fabrication, facilitating academic dishonesty, or plagiarizing - will *at the very least* earn a zero for that work.

¹<http://www.smu.edu/StudentAffairs/StudentLife/StudentHandbook/HonorCode>

²<http://www.smu.edu/StudentAffairs/StudentLife/StudentHandbook>

In addition, a complaint will be filed through the Vice President for Student Affairs Office. If you are uncertain of the definition of academic misconduct (especially plagiarism) as it regards independent works of mathematical and physical computation, documentation, and demonstration, it is your responsibility to speak with the instructor. Ignorance of the definition of plagiarism, or any other academic violations, is not considered a viable excuse to avoid penalties for these acts.

Disability Accommodations

Students needing academic accommodations for a disability must first be registered with Disability Accommodations & Success Strategies (DASS) to verify the disability and to establish eligibility for accommodations. Students may call 214-768-1470 or visit <https://www.smu.edu/Provost/ALEC/DASS> to begin the process. Once registered, students should then schedule an appointment with the professor to make appropriate arrangements.

Please find detailed information about DASS at the end of this syllabus.

University Policy on Religious Holidays

Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

Excused Absences for University Extracurricular Activities

Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue)

Important Dates

University Calendar³:

- **August 22, Monday: First day of classes.**
- August 26, Friday: Last day to enroll, add courses or drop courses without grade record. Last day to file for graduation in December.
- September 5, Monday: Labor Day. University offices closed.
- September 7, Wednesday: Last day to declare pass/fail, no credit or first-year repeated course grading options. Last day to request an excused absence for the observance of a religious holiday.
- September 23-25, Friday-Saturday: Family Weekend.

³<http://www.smu.edu/EnrollmentServices/Registrar/AcademicCalendarsCourseCatalogs/AcademicCalendars/Calendar16-17>

- September 27, Tuesday: Early intervention grades due for first-year undergraduate students.
- October 5, Wednesday: Last day for continuing undergraduate students to change their majors for Spring 2017 enrollment.
- *October 10-11, Monday-Tuesday: Fall break.*
- October 23, Sunday: Midterm grades due for first-year and sophomore students.
- October 31, Monday: 60 percent point of the term that federal financial aid has been earned if a student officially withdraws from SMU; prior to this date a partial calculated return to federal programs will be required.
- October 31 - November 18, Monday-Friday: Enrollment for spring 2017 continuing students for all undergraduates and for graduates in Dedman College, Lyle and Meadows.
- November 4, Friday: Last day to drop a course.
- November 4-5, Friday-Saturday: Homecoming Weekend.
- November 10, Thursday: Last day for December graduation candidates to change grades of Incomplete.
- November 18, Friday: Students should file for May graduation. The last day to file is January 20, 2017.
- November 22, Tuesday: Last day to withdraw from the University.
- November 23, Wednesday: No classes.
- *November 24-25, Thursday-Friday: Thanksgiving holiday. University offices closed.*
- November 30 - December 5, Wednesday-Monday: No final examinations or unscheduled tests and papers.
- December 1, Thursday: Last day for oral/written examinations for December graduate degree candidates. December 5, Monday: Last day of instruction.
- December 6-7, Tuesday-Wednesday: Reading days.
- December 8-14, Thursday-Wednesday: Examinations. (No examinations scheduled for Sunday).