

PHYSICS 152L: FUNDAMENTALS OF PHYSICS II: ELECTRICITY AND MAGNETISM SPRING 2017

1. COURSE DESCRIPTION

WELCOME TO PHYSICS 152L! This is the second course in the physics sequence intended for majors in the physical science and engineering. The subject matter is electricity and magnetism and its applications.

This course will freely make use of ideas developed in Physics 151L. The study of E&M lays a foundation for many other fields where the application may not seem obvious at first, including astronomy, chemistry, biology, and all areas of engineering. For most students this course is their first exposure to the concepts of fields. Although gravity is also a field, using E&M this course takes ideas much further than the treatment of gravity in Physics 151L. Other fields that engineers study are representations of fluid flow, stress and strain, heat flow, and more. During the course, questions about application of the concepts to other areas of science and engineering are always welcome and students are encouraged to ask them on a regular basis.

2. COURSE INSTRUCTORS

Vahé Peroomian

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Office: SHS 360

Phone: (213) 740-2386

Office hours: Mondays 2:15pm – 3:15pm, 5:00pm – 6:00pm
Tuesdays 12:15pm – 1:45pm
Wednesdays 2:15pm – 3:15pm
Thursdays 12:15pm – 1:45pm
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Office hours: Mondays 10:30 am – 11:30am,
Thursdays 12:30 pm – 1:30pm,
Fridays 1:00 pm – 3:00 pm (general)

3. COURSE MATERIALS

3.1 Required for lectures

Randall Knight, *Physics for Scientists and Engineers with Modern Physics*, 3rd ed. (Pearson/Addison Wesley, 2013), Chapters 20 – 35.

One version includes all 42 chapters of the complete textbook in a single hardback volume. Another version breaks the textbook into five volumes. The material covered this semester is in the third and fourth volumes.

WE WILL NOT BE USING MASTERING PHYSICS FOR HOMEWORK IN THIS COURSE

3.2 Required for lab

- (a) **Science Notebook** (National Notebook 43-645). Any equivalent notebook with quadrille ruled pre-numbered pages bound into the notebook, with identically numbered pages for copies (either carbon copies or carbonless forms) is acceptable.
- (b) **Laboratory Manual** (Dept. of Physics & Astronomy, current edition). The Laboratory Manual is provided on the lab's Blackboard site. You do not need to print it, though, of course, you can if you want to. While you will need to read the Manual in advance of your lab meeting, online reading is sufficient because a copy will be provided for your reference in the lab meeting room.
- (c) **Calculator** with linear and statistical functions

3.3 Suggested supplementary material (strictly optional)

There is no shortage of alternatives to the assigned textbook. My favorite happens to be Serway and Jewett's *Physics for Scientists and Engineers* (8th or 9th edition). I have a limited number of copies of this textbook for short-term loan and will also post the end-of-chapter problems from the 8th Edition to the class Blackboard site (see below).

4. ADMINISTRATIVIA

4.1 Prerequisites

Prerequisites for this course are Physics 151 (Mechanics and Thermodynamics) and Math 125- 126 (Calculus I and II). A co-requisite is Math 226 (calculus III).

A certain amount of proficiency in differential and integral calculus is essential to complete this course successfully. We will also use vectors more frequently than in PHYS 151 and becoming comfortable with vector concepts will be important. If you are rusty, you are strongly advised to review your math.

4.2 Registration and administration

Your registration for this course consists of three separate parts: the lectures, a "quiz section," and the laboratory. You must register for each of them. The only exception is that, if you have previously completed the laboratory and have received permission to carry its grade into the current semester, then you would register only for the lecture and the "quiz section." The "quiz section" is the time slot allocated to the midterms and will only be used twice during the summer session (see below).

4.3 Disabilities

The DSP office has requested that we include the following statement:

"Students who need to request accommodations based on a disability are required to register each semester with the Disability Services and Programs. In addition, a letter of verification to the instructor from the Disability Services and Programs is needed for the semester you are enrolled in this course. If you have any questions concerning this procedure, please contact the course instructor and Disability Services and Programs at (213) 740-0776, STU 301."

4.4 Grading

Your grade will be determined according to the following key:

80% Lectures:

- 15% Homework
- 20% Midterm 1
- 20% Midterm 2
- 25% Final Exams

20% Laboratory

In order to receive a passing grade in the course (D or above) you must receive a passing grade in *both* the lecture *and* the laboratory portions. Each semester a few students fail to complete the laboratory experiments and consequently fail the entire course. Please don't let this happen to you. If you miss a lab session due to some emergency, make sure to arrange a lab make-up session as soon as possible with your lab TA.

Broadly speaking, grading is done by the distribution curve of the combined scores of exams, homeworks and lab. No rigid percentage marks (such as, e.g., a rule that 90% corresponds to an A-, or similar) are used. Further details about the grading procedure are given in class.

4.5 Homework

There will be a written homework assignment every week. The problems will be either from the textbook or created especially for this course by the professors. We expect that it will take you, in total, approximately 6 hours to complete each of these homework assignments. These homework sets are the central way you will learn physics. Understanding physics does not mean knowing the words, having read the book. Instead, understanding implies having developed the ability to solve physics problems you have not seen before.

Homework problems will range from the trivial to the difficult. Midterm and final examination questions will more closely resemble (and in some instances may be identical to) homework problems on the more difficult end of the spectrum. Experience shows a strong positive correlation between total homework scores and total exam scores. So **DO THE HOMEWORK!**

The counsel to do your own homework does not mean that you cannot work with other students in the class. On the contrary, we recommend students work together, where feasible, in deciding how to solve problems. Of course, working together does not mean simply copying solutions from each other. That action is a violation of academic integrity standards. There is, however, a large difference between simply copying and learning by cooperating. Take advantage of this opportunity.

We also understand that many solutions can be found online (this is why we are going to create some new problems). However, the more important point is that, apart from being an academic integrity violation, copying pre-existing solutions denies you an essential learning experience and this will typically result in a poor performance on midterms and the final exam.

Homework will be due in class on Wednesdays. All homework must be turned in at the beginning of the class session in which it is due. Solutions to the homework assignments will be posted on Blackboard immediately after the class in which they are due. As such, late work will NOT be accepted. Written assignments will be returned in class after being graded.

It is very important that your solutions are written legibly with enough details so that anybody, not just the author, can understand what is going on. Specifically, be sure to show intermediate steps and use words, not just equations, to explain the solution. A solution consisting of a string of equations with no comments, a figure if required, or some minimal explanation will be considered unsatisfactory and graded accordingly.

The minimum threshold 75% submission rate cited in the grading criteria above applies to the homework assignment, not to the individual problem count. A partially completed written homework assignment will satisfy the requirement of submission but, for it to count, there must be some evidence of attempts at the assigned problems.

We recognize that from time to time students find it impossible to complete a specific homework assignment owing to illness or other outside commitments. In order to address this issue, before computing your homework grade we will automatically discard your two lowest homework scores. This will happen without any special permission and so no documentation will be required.

This is intended to cover things like, but not limited to, illness, intercollegiate competitions (both academic and non-academic), intramural competitions, conflicts with other courses scheduling required activities outside of their declared times, and family emergencies. The only exceptions are (i) Religious observances when documented on the web site of the Office of Religious Life,

<http://orl.usc.edu>, in which case any affected student must inform his/her instructor of the situation no later than the day before the religious observance. (ii) Extended and well-documented medical issues. Warning: You should view the fact that the lowest two homeworks will be dropped as a safety-net, and not as an excuse to goof-off on early homework. A student who misses an early homework for inadequate reasons, and then misses later homework for completely legitimate reasons will receive little sympathy.

4.6 Exams

There will be two Midterm Examinations (February 16th and March 30th at 5pm) and a Final Examination (May 8th at 4:30 pm). The midterm exams will last 60 minutes and will be given during the weekly quiz period to all sections simultaneously. The Final Exam will last 120 minutes and will be comprehensive of the entire semester.

All exams are closed-book, closed-notes exams. However, we will include in each exam a page (or two, or three) of Possibly Useful Formulae which will contain all of the important formulae from the book which might be useful in generally solving the exam questions.

We recommend that you write all exam answers in pen, not pencil, because if, after reviewing your graded answers, you wish to request a reconsideration of their grading, only solutions written entirely in pen will be considered. Prior to turning in the exam, no student may leave the exam room unless personally accompanied by a proctor. There are no scheduled make-up examinations for either midterm or the Final Exam.

Students with special examination requirements as documented by the Office of Disability Services must present their documentation to their instructor as soon after the start of classes as is possible, and certainly no later than seven calendar days prior to the first midterm, or as soon as the accommodation is granted.

4.7 Laboratory

At every laboratory meeting (except the first) you must bring your Laboratory Notebook. The Laboratory Manual is available on the laboratory's Blackboard site. A printed copy of the Manual will be available in the laboratory for each set of lab partners to share, so you do not need to print it out yourself. The Manual will explain how your Notebook should be prepared in advance of each week's meeting.

Laboratory grades are determined by^[1]_{SEP}

1. A pre-lab quiz due before your lab section meets,^[1]_{SEP}
2. Your performance during the lab, and^[1]_{SEP}
3. Your lab write-up (the Green Sheet bundle) turned in at the lab's conclusion.

You must attend only the lab section in which you are registered. Lab TAs are forbidden to make exceptions. If you miss your lab, follow the procedure found in the make-up policy on the lab section's Blackboard site in order to attend the make-up session scheduled on the following week.

Complete details about lab grading and make-up policies are provided on the laboratory section's Blackboard site. Other questions concerning the laboratory should be referred to the Lab Director, Dr. Gokhan Esirgen, KAP B19, (213) 740-1138, Email: esirgen@usc.edu.

5. SUPPORT AND ASSISTANCE

You have a variety of opportunities for assistance available to you. Here we list a non-exclusive set of these opportunities. Your home department or housing unit may provide others.

5.1 Lecture

Do not underestimate the value of questions during the lecture period. In large lectures, many students are reluctant to pose questions that they fear might seem silly to their instructor or to their peers. Almost always, if one student asks a question, there are several other students who were wondering about the same issue. Often such questions tell the instructor what material might benefit from a more detailed discussion. Usually, a portion of each lecture will be devoted to illustrative examples, sometimes taken from previous homework sets, and questions help the instructor select those problems that you've had the greatest difficulties with. Some exam problems may closely resemble homework problems or problems discussed during lectures.

5.2 Laboratory TAs

All lab TAs are graduate students, usually pursuing a PhD in physics. They are all capable of answering any questions you might have regarding the course material covered in the lectures or in the lab. Usually your lab TA can answer questions immediately, either at the beginning or at the end of the lab period. However, some problems you pose may require some additional thought. In either event, you should regard your TA as a resource not only for the laboratory but also for lecture-related questions.

5.3 TA office hours

All physics TA's have office hours in ACB 431 for the assistance of students in 100-level physics courses. The TA office hours will be arranged during the first week of class and posted on the door of ACB 431. TA office hours take place most days (usually Monday through Thursday) and last for several hours each day. Usually there is a different TA available each hour. Sometimes it helps to hear different people answer the same physics question, so if you feel that you did not understand the TA's explanation you might want to see a different TA a little bit later on the same day or on another day. *This is an excellent resource should you need immediate help.*

5.4 Supplemental Instruction (<http://www.usc.edu/si>)

Supplemental Instruction (SI) is an academic program organized by the Dornsife College of Letters, Arts, and Sciences, designed to improve student performance in this course and in several other traditionally difficult courses. It is free and does not require academic credit. Each week there will be several sessions led by the SI leader who will be working together with the instructors and attending the same lectures as you do. For further information, see the [SI web site](#), or contact its director, Judy Haw (judyhaw@usc.edu).

5.5 Viterbi Academic Resource Center (<http://viterbi.usc.edu/varc>)

The Viterbi Academic Resource Center office is located in the Ronald Tutor Hall of Engineering, Room 222. It provides free individual and group tutoring with tutors screened by the School of Engineering. Regular review sessions are planned. For more information visit VARC in RTH 222, phone (213) 740-3881, or email viterbi.varc@usc.edu.

5.6 Electronic assistance

Everyone registered in this course should find a link to the course in their *Blackboard* account. All information about the course will be posted on *Blackboard* at

<http://blackboard.usc.edu>.

At this address, you will find this *Syllabus*, *important announcements*, *homework assignments*, as well as *examinations from previous semesters*. Sample exams should only be considered as samples

illustrating the types of problems given in previous Physics 152L exams. Solutions to your homework sets (after the due date) will be placed on *Blackboard*.

6. OBTAINING YOUR GRADES

You will be able to access your grades in Physics 152L via *Blackboard* at <http://blackboard.usc.edu>.

7. ACADEMIC INTEGRITY

Students who violate university standards of academic integrity are subject to disciplinary sanctions, including failure in the course and suspension from the university. Since dishonesty in any form harms the individual, other students and the university, policies on academic integrity will be strictly enforced. The academic integrity guidelines can be found in

- (i) The Trojan Integrity Guide,
<http://www.usc.edu/student-affairs/SJACS/forms/tio.pdf>.
- (ii) The Undergraduate Guide for Avoiding Plagiarism,
<http://www.usc.edu/student-affairs/SJACS/forms/tig.pdf>.

8. FEEDBACK

Feedback regarding all aspects of these lectures is very much appreciated and welcome at any time. Please get in touch with your instructor via email, after lectures, or during office hours.

9. SOME USEFUL DATES

January 9	Spring semester classes begin
January 16	Martin Luther King Day (University Holiday)
February 16	Midterm 1
February 20	Presidents' Day (University Holiday)
February 24	Last day to drop class without a mark of "W," and last day to change enrolment option
March 30	Midterm 2
April 7	Last day to drop class with mark of "W"
April 28	Spring semester classes end
May 8, 4:30pm – 6:30pm	Final exam

10. COURSE SCHEDULE

You should read through the relevant chapters prior to coming to the lectures each week, and review them again after each lecture before attempting the homework problems.

Week	Topic	Chapter(s)
1 – 2	Coulomb's Law and Electric Fields	25 + 26
3	Gauss's Law	27
4 – 5	Electric Potential, Electric Fields, and Capacitors	28 + 29
6	Current and Resistance	30
Midterm #1: Thursday, February 18th from 5:00 – 6:30pm on chapters 25 – 29		
7	Fundamentals of Circuits	31
8 – 9	Magnetic Fields	32
10 – 11	Electromagnetic Induction	33
12	AC Circuits	35
Midterm #2: Thursday, March 30th from 5:00 – 6:30pm on chapters 30 – 33		
13	Oscillations	14
14	Traveling Waves + Superposition	20 + 21
15	Maxwell's Equations and Electromagnetic Waves	
***FINAL EXAM: Monday, May 8th from 4:30 – 6:30pm. Cumulative		

*** Important: This is one of the Exceptions in the Schedule of Classes. Don't make travel plans based upon a different exam date! If you have any issues or conflicts, see us **immediately**.