

# PHYSICS 152L: FUNDAMENTALS OF PHYSICS II: ELECTRICITY AND MAGNETISM FALL 2021

**\*\*\* Please make sure to see me ASAP if you were not present on the first day of class or enrolled late for the course\*\*\***

## 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.

## COURSE INSTRUCTOR

**Vahé Peroomian**

*Email address:* peroomia@usc.edu

*Office:* SHS 360

*Phone:* (213) 740-2386

*Office hours:* Tuesdays 11:00am – 12:30pm, Thursdays 11:00am – 12:30pm, and  
Fridays 12:30pm – 2:00pm, *and by appointment*

## COURSE MATERIALS

- Cengage WebAssign subscription (must last at least 1 semester—included in Cengage Unlimited, see below).
- Serway and Jewett, *Physics for Scientists and Engineers*, 10th ed. (Cengage); e-book (included in Cengage Unlimited and WebAssign subscription)
- To access WebAssign and sign up for this course, please go to <http://www.webassign.net>, then click on “Enter Class Key,” and type in **USC 1892 1714** for the class code.

## ADMINISTRATVIA

### 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.

### 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).**

*The Undergraduate Physics Office in ACB 439 deals with all administrative aspects of this class. Additional help regarding administrative issues is available in that office in person, by phone at (213) 740-1140 or (310) 740-0848, and by email at physics@dornsife.usc.edu.*

### 3. Disabilities

Students who need to request accommodation based on disability are required to register each semester with the Office of Student Accessibility Services (OSAS). This office can be found at STU 301 with phone number 213-740-0776. A letter of verification to the instructor from OSAS is needed for the semester you are enrolled in. If you have any further questions please contact the OSAS office or the instructor. **Please note that you need to send the instructor a copy of your accommodation letter as the instructor doesn't automatically receive this information.**

### 4. Grading

Your final course grade will be based upon four major components:

Grade Component	Weight
Homework and and in-class activities	10%
Midterm 1	20%
Midterm 2	20%
Final Exam	30%
Laboratory	20%

### 5. Minimum Requirements for Passing the Course

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. Specifically, you must earn a minimum score of 70% on the laboratory portion of the course. **Failure to do so will result in an automatic F in the course.**

Additionally, **you must turn in at least 75% of all homework assignments** (typically 9 out of the 12 assignments that are due). It does not matter if you do only part of an assignment that is turned in, but **failure to turn in at least 75% of the assignments will result in an automatic F in the course.**

Finally, independent of the homework that is to be turned in, you must have completed at least 70% of in-class group activities during the semester. **Failure to complete at least 70% of in-class activities will result in a 0 for your final homework score in the class.**

Each semester a few students fail to complete the laboratory experiments or turn in homework 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.

### 6. Homework Assignments

Homework will be assigned every week and will have two components: a WebAssign online assignment, and a written assignment uploaded to Blackboard. 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.

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. 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 by 11:59pm on Fridays.** Solutions to the homework assignments will be posted on Blackboard immediately after the deadline. As such, late work will NOT be accepted.

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, we have set the final homework total equal to the point total of 10 out of 12 homework assignments. This is better than dropping the two lowest homework grades, as it allows you to use all 12 assignments to build up to the maximum homework score. 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 equivalent of 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.

## 7. Exams

There will be two Midterm Examinations (September 30<sup>th</sup> and November 4<sup>th</sup> at 5pm) and a Final Examination (**December 10<sup>th</sup> at 8:00 am**). The midterm exams will be given during the weekly quiz period to all sections simultaneously. The Final Exam will be comprehensive of the entire semester.

All exams are closed-book and closed-notes. However, we will include equation sheets in each exam similar to those provided in previous semesters. Numerical constants will also be provided.

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.

## 8. Laboratory

This course has a mandatory lab component. 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, Gökhan Esirgen, KAP B19, (213) 740-1138, [esirgen@usc.edu](mailto:esirgen@usc.edu).

## 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.

### 1. Lectures

Don't underestimate the value of questions during the lecture period. In large lectures, many students are reluctant to pose questions that they fear may seem silly to either their cohorts or the instructor, and this is especially the case in an online environment. This probably includes you. Almost always, if one student asks a question, there are several others who have been bothered by the same thing. Often such questions tell the instructor what is not clear to the students. Stopping the lecture and getting everyone together on the issue is much more useful than simply letting a lecture continue without clarification.

A portion of each week's lecture time will be devoted to illustrative examples that will be similar to those from the assigned homework sets. This is natural considering that midterm questions frequently are derived from homework problems.

### 2. Instructor Office Hours

For more personal attention you can come to the office hours of your instructor listed on page 1 of this document. If at all possible, come to the regularly scheduled office hours listed there. However, if your schedule conflicts with this, it is possible to schedule an appointment at a different time by e-mailing your instructor with the request, or approach your instructor after lecture.

### 3. 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.

### 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. Our SI leader for this course will be xxxxxx (xxxxxxx). She will make an announcement in class during the first week. For further information, see the [SI web site](#), or contact its director, Judy Haw ([judyhaw@usc.edu](mailto:judyhaw@usc.edu)).

### 5. 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*.

## OBTAINING YOUR GRADES

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

## STATEMENT ON ACADEMIC CONDUCT AND SUPPORT SYSTEMS

### 1. Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](http://policy.usc.edu/scampus-part-b). Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

### 2. Support Systems

*Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call*

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. [engemannshc.usc.edu/counseling](http://engemannshc.usc.edu/counseling)

*National Suicide Prevention Lifeline – 1 (800) 273-8255*

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. [www.suicidepreventionlifeline.org](http://www.suicidepreventionlifeline.org)

*Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call*

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. [engemannshc.usc.edu/rsvp](http://engemannshc.usc.edu/rsvp)

*Sexual Assault Resource Center*

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: [sarc.usc.edu](http://sarc.usc.edu)

*Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086*

Works with faculty, staff, visitors, applicants, and students around issues of protected class. [equity.usc.edu](http://equity.usc.edu)

*Bias Assessment Response and Support*

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. [studentaffairs.usc.edu/bias-assessment-response-support](http://studentaffairs.usc.edu/bias-assessment-response-support)

*The Office of Disability Services and Programs*

Provides certification for students with disabilities and helps arrange relevant accommodations. [dsp.usc.edu](http://dsp.usc.edu)

*Student Support and Advocacy – (213) 821-4710*

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. [studentaffairs.usc.edu/ssa](http://studentaffairs.usc.edu/ssa)

*Diversity at USC*

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. [diversity.usc.edu](http://diversity.usc.edu)

*USC Emergency Information*

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. [emergency.usc.edu](http://emergency.usc.edu)

*USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.* Provides overall safety to USC community. [dps.usc.edu](http://dps.usc.edu)

## FACULTY LIAISON

All courses in the Department of Physics & Astronomy have an assigned Faculty Liaison to serve students as a confidential, neutral, informal, and independent resource when they wish to discuss issues concerning their course without directly confronting their instructor. The Faculty Liaison for this course is Prof. Jack Feinberg (feinberg@usc.edu, 213-740-1134, SSC 327).

## SOME USEFUL DATES

August 23	Fall semester classes begin
September 6	Labor Day (University Holiday)
September 10	Last day to drop class without a mark of "W," and last day to change enrolment option
September 30	Midterm 1
October 14 – 15	Fall Recess
November 4	Midterm 2
November 12	Last day to drop class with mark of "W"
November 24 – 28	Thanksgiving Break
December 3	Fall semester classes end
<b>Friday December 10, 8:00am – 10:00am</b>	<b>Final exam</b>

## 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	Electric Fields	22
3	Gauss's Law	23
4 – 5	Electric Potential, Capacitance and Dielectrics	24, 25
<b>Midterm #1: Thursday, September 30<sup>th</sup> from 5:00 – 6:30pm</b>		
6	Current and Resistance	26
7	Direct-Current Circuits	27
8 – 9	Magnetic Fields, Sources of Magnetic Field	28, 29
10 – 11	Faraday's Law, Inductance	30, 31
12	Alternating-Current Circuits	32
<b>Midterm #2: Thursday, November 4<sup>th</sup> from 5:00 – 6:30pm</b>		
13	Oscillatory Motion, Wave Motion	15, 16
14	Electromagnetic Waves	33
15	Review	
<b>***FINAL EXAM: Friday, December 10<sup>th</sup> from 8:00 am – 10:00 am. Cumulative</b>		

\*\*\* 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**.