Physics 152L: Fundamentals of Physics II
Electricity and Magnetism
Spring 2024

Lecture: SLH 200; Mon/Wed 3:30 – 4:50 PM; Tue/Thu 2:00 – 3:20 PM

*****See me ASAP if you were not present on the first day of class or enrolled late for the course*****

Instructor: Aaron Wirthwein

Office: SHS 370 (my office), SHS 363 (conference room where office hours will take place)
Office Hours: Mon/Wed, 10 – 11 AM; Tues/Thu, 4 – 5 PM
Contact Info: wirthwei@usc.edu. Please include "Phys 152" in the subject line.

Course Description

WELCOME TO PHYSICS 152L! This is the second course in the physics sequence intended for majors in the physical sciences 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 *concept of fields*. Although gravity is also a field, E&M takes this concept 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. It is our goal that you will gain a mastery of electromagnetism culminating in the integration of electricity and magnetism in electromagnetic waves.

Learning Objectives

Specific course objectives are as follows:

1. Conduct qualitative analysis and perform quantitative calculations in situations involving electric and magnetic fields. Students will be able to assess answers to questions for plausibility.
2. Use simple laboratory demonstrations and computer simulations to explain the basic properties of electric and magnetic fields, and electrical circuits.
3. Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.

Recommended Preparation

- 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.

Registration

Your registration for this course consists of three separate parts: a lecture, a quiz, and a laboratory. The quiz section is shared by both lecture sections so that a common time for all sections can be set aside for the midterms. **Quiz sections will only be used for the two midterms** in this course (see course schedule).

Students who are repeating 152 must obtain written permission from the Undergraduate Physics Office (ACB 439, physics@dornsife.usc.edu) in order to be excused from repeating the laboratory.

Required Materials

- Serway and Jewett, ***Physics for Scientists and Engineers***, 10th ed. (Cengage); e-book is included in your Cengage Unlimited and WebAssign subscription. You will be given instructions on purchasing the eBook and WebAssign access on the first day of class.
- 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 9620 8582** for the class code.

Last updated: January 7, 2024

Course Websites

- **Blackboard** will be used to distribute course materials and submit written homework assignments.
- **WebAssign** will be used for online homework.
- **Gradescope** will be used to submit in-class activities and exams.
- **Piazza** will be used as a learning management system which allows students to ask questions in a forum-type format.

All links will be provided on Blackboard.

Grading Breakdown

Your final course grade will depend on five major components:

Assessment Tool	% of Grade
Homework and Group Activities (in-class)	10%
Midterm 1	20%
Midterm 2	20%
Final Exam	30%
Laboratory	20%
TOTAL	100%

Grading Scale

Use the following scale as a **rough guide** for determining your final course letter grade.

A	93-100
A-	90-92
B+	86-89
B	80-85
B-	76-79
C+	70-75
C	66-79
C-	60-65
D+	56-59
D	50-55
F	49 and below

Minimum Requirements for Passing

To receive a passing grade (D or above) you must pass **both** the lecture and lab components. To pass this course, you must meet the following minimum requirements:

- Complete 100% of the labs and earn a score of 70% or higher in the laboratory grade.
- Submit 75% of all homework assignments. **Even incomplete assignments will count as submitted**.
- Complete 70% of the in-class group activities. Failure to complete 70% or more will result in a 0 for the homework score.
- You must pass the comprehensive final exam to pass the course.

Homework Assignments

- Homework will be assigned every week and will have two components: a WebAssign online assignment, and a written assignment uploaded to Blackboard. We expect that it will take you approximately 4-6 hours to complete each of these homework assignments.
- **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 and with enough details so that anybody can understand them. 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**.

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.

Examinations

There will be three examinations that evaluate your comprehension of the lecture material:

- Midterm Exam 1 will be Thursday February 15th from 5:00 – 6:10 PM.
- Midterm Exam 2 will be Thursday March 28th from 5:00 – 6:10 PM.
- Final Exam will be Monday May 6th from 4:30 PM to 6:00 PM.

Students with special examination requirements as documented by the Office of Student Accessibility Services must present their documentation to the instructor no later than seven days before the exam, or as soon as the accommodation is granted.

Please email your Letter of Accommodations to the instructor at wirthwei@usc.edu with the subject line "Phys 152 OSAS LOA." Even if you sent me one for Phys 151, please send it again!

Lectures

The purpose of the lecture is to introduce and carefully examine the core concepts of physics. I will do my best to split our time evenly between derivations, examples, group activities, and lecture demonstrations. While we will spend time doing examples, your homework will generally be more difficult than the examples we cover in class.

Come to class prepared and ask questions. I find that students are more likely to ask questions during the lecture period if they have spent time trying to understand the material on their own. Read the relevant section in the textbook and make a list of questions before coming to class. **If you are confused, you are not alone!** Your questions help me gauge what topics need more attention for the class as a whole.

Attendance and Participation

Participation in classroom exercises is an important element of the education this class offers. **You cannot receive credit for this in-class work if you are not present, no exceptions.** While I do not grade you on attendance, it is the precondition for receiving credit for the work that we will do in class. As stated above, you must complete at least 70% of in-class activities to receive a homework grade in the course.

Supplemental Instruction

Supplemental Instruction (SI, http://www.usc.edu/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 Liam Hall 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, Toni Richardson (tonirich@usc.edu).

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 (as well as on Blackboard).

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.

Feedback

Students are encouraged to approach the instructor with feedback regarding **any aspect of the course**. Typically, the Department of Physics and Astronomy will carry out a mid-semester evaluation of all instructors, and students also have an opportunity of evaluating the instructor and the course during the formal end of semester evaluation process.

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).

Important Dates

January 8th	Spring semester classes begin
January 15th	Martin Luther King Day
January 26th	Last day to drop without mark of "W," and last day to change enrollment option.
February 15th	Midterm 1
February 19th	President's Day
March 28th	Midterm 2
April 5th	Last day to drop with mark of "W"
April 26th	Spring semester classes end
May 6th	Final Exam

PLEASE DO NOT SCHEDULE FLIGHTS HOME BEFORE THE FINAL EXAM!

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. During lecture we will balance instruction with assessment through quizzes and activities, and this style works best with some moderate level of preparation.

Please see the "Schedule" tab on Blackboard for a more detailed (tentative) schedule of topics, homework deadlines, and exams.

Week	Topic	Chapter(s)
1	Electric Fields	22
2	Electric Fields / Gauss's Law	23
3	Gauss's Law	23
4	Electric Potential	24
5	Capacitance and Dielectrics	25
6	Current and Resistance	26
7	Direct-Current Circuits	27
8	Direct-Current Circuits	27
9	Magnetic Fields	28
10	Sources of Magnetic Field	29
11	Sources of Magnetic Field	29
12	Faraday's Law	30
13	Inductance	31
14	Alternating-Current Circuits	32
15	Electromagnetic Waves	33

Technological Proficiency and Hardware/Software Required

Students are expected to be proficient in using Blackboard. Students will require a hand calculator (e.g., on smartphone or personal computer) to do some of the laboratory exercises. You may use any calculator on the exams, but smartphones or other smart devices will not be allowed.

USC technology rental program

If you need resources to successfully participate in your classes, such as a laptop or internet hotspot, you may be eligible for the university's equipment rental program. To apply, please submit an application.

USC Technology Support Links

Zoom information for students
Blackboard help for students
Software available to USC Campus

Statement on Academic Conduct and Support Systems

For information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Please email your LOA to the instructor at wirthwei@usc.edu with the subject line "Phys 152 OSAS LOA."

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

988 Suicide and Crisis Lifeline - 988 for both calls and text messages – 24/7 on call
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL) – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - *(213) 740-0411*
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - *(213) 740-2101*
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - *UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call*
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - *UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call*
Non-emergency assistance or information.

Office of the Ombuds - *(213) 821-9556 (UPC) / (323-442-0382 (HSC)*
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - *(323) 442-2850 or* otfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.