

Physics 514, Winter Quarter 2018

Prof. Leslie J Rosenberg, Department of Physics, University of Washington

General information:

Physics 514, the second course in graduate electrodynamics.

Lectures are Wednesdays and Fridays 11:00-12:20 in the Physics & Astronomy Building (A-wing), room A114.

Textbook: J.D. Jackson, "Classical Electrodynamics," third edition.

Course Instructor:

Prof. Leslie J Rosenberg

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Office: Physics & Astronomy Building, room C503

Office Hours: Physics & Astronomy Building, C503, Wednesdays: 12:30 or by appointment

Telephone: (206) 221-5856

TA's/graders:

Isaac Shelby ishelby@uw.edu, office hours Wednesdays 4:00-5:00 B422.

Francis Walsh fwalsh2@uw.edu, office hours Thursdays 3:00-4:00 in the grad student lounge.

Nikola Whallon alokin@uw.edu, office hours Tuesdays 2:30-3:30 in the grad student lounge.

Useful Information:

- [Readings, Lectures and Exams](#)
- Special Lectures
 - [Special lecture 1: Kramers-Kronig relation \(Kramers' derivation\)](#)
 - [Special lecture 2: Slater formula for frequency shift of cavity with perturbed location of surface](#)
- Homework
 - [Homework 1 \(Due January 12\)](#)
 - [Homework 1 solutions](#)
 - [Homework 2 \(Due January 19\)](#)
 - [Homework 2 solutions](#)
 - [Homework 3 \(Due January 26\)](#)
 - [Homework 3 solutions](#)
 - Homework 4 moves to the week after the mid-term exam (would have been due exam week), it will be posted Monday.
 - [Homework 5 \(Due February 12\)](#)
 - [Homework 5 solutions](#)
 - [Homework 6 \(Due February 16\)](#)

[Homework 6 solutions](#)

[Homework 7 \(Due February 23\)](#)

[Homework 7 solutions](#)

[Homework 8 \(Due March 2\)](#)

[Homework 8 solutions](#)

[Homework 9 \(Due March 9\)](#)

[Homework 9 solutions](#)

- Midterm exam info. The exam is Friday February 2 at the usual class time. The exam is closed-book. An [equation sheet](#) is provided with the exam and you can ask for most any equation in Jackson. The exam includes chapters 1 through 7.4 in Jackson. All material, including lectures, homework, tutorial, and text material may appear in the exam. Problem 1 is calculating fields from non-static sources. Problem 2 involves manipulating magnetic vector and electric scalar potentials. Problem 3 involves reflection and refraction. You will write your solutions directly on the exam. You may bring scratch paper, but nothing on scratch paper will be graded.

Exam [solutions](#).

Mean 59.4, StDev 18.1

- Final exam info. The exam is Wednesday March 14 at 2:30pm. The exam is closed-book, you will not have access to Jackson or other source materials. An [equation sheet](#) is provided with the exam. (Equation-sheet update 13mar2018 11:40 at the request of a student I added more equations under waveguides.) The exam includes chapters 1 through 9.4 in Jackson. All material, including lectures, special lectures, homework, and text material may appear in the exam. The focus of the exam is interactions of waves with materials, waveguides, cavities, and radiating systems.

Recent course news:

- [07feb18 13:25] Revised due date for homework #5: Monday Feb 12, 11:00am in the instructor's Physics mailbox.
- [02jan18 14:30] The first lecture is Wednesday, January 3, 2018. Lectures are Wednesdays and Fridays. The first homework assignment is distributed Friday January 5

Lecture Instructor's Comments

Welcome to Physics 514, the second of a three-quarter sequence of graduate classical electrodynamics. I hope you find this course challenging and stimulating. The topic of electrodynamics is crucial for understanding the underpinnings of the physical and biological sciences. It's also crucial for modern technology. You will need a working knowledge of Jackson chapters 1-16 in order to converse sensibly with your colleagues. Regarding the course: We will use Jackson's text "Classical Electrodynamics". You might want more details than found in Jackson, or perhaps you'd like an alternative approach. In which case you might want to look at Panofsky and Phillips "Classical Electricity and Magnetism". A very good, very readable, book for some slightly more formal aspects of the classical field theory is Landau and Lifshitz "The Classical Theory of Fields". Another nice thing about Landau and Lifshitz is halfway through the book you're on to General Relativity rather seamlessly. A slightly more elementary alternate text is Slater and Frank "Electromagnetism". Most homework problems are adapted from Smythe "Static and Dynamic Electricity." There's no perfect text, and every text has gems scattered throughout. Mathematical methods are interspersed throughout the course as needed. For a math refresher, you could refer to Dennery and Krzywicki "Mathematics for Physicists". That said,

this quarter we will follow Jackson's text somewhat closely.

Syllabus The syllabus for 514 starts with chapter 6 in Jackson. We'll then follow the text in more or less the text ordering. We will supplement Jackson's presentation with added material. You should read the relevant text and added material before class; this will take time but there's a big payoff in your understanding.

Grading 40% of your grade is assigned to the midterm exam, 40% to the comprehensive final exam / MRE, 20% to the homework.

- **Midterm and final exams:** There will be one closed-book midterm exam and a closed-book final exam / MRE. An equation sheet containing selected numerical values and major equations will be provided for each exam. Calculators are permitted, but text storage and graphics functionality must not be used. Cell phones, radios, etc. are not permitted. Laptop computers are not permitted. Exams are to be your own work; you are not permitted to collaborate with any other person. The Physics Department reserves the right to ask for valid identification from any student during examinations. If you start working on the homework the day before it's due, you will not finish on time. The graders will look for neatness and logic of presentation, points will be deducted for lack of either.
- **Note that there are no make-up exams or make-up homeworks.** Students with outside professional, service, or career commitments (i.e. military service, professional conference presentation, etc.) conflicting exactly with the exam dates must contact the instructor *early in the quarter* to establish alternate procedures. Students who miss an exam or homework due to illness should contact the instructor as soon as you are able to discuss alternate procedures. Except for debilitating illness, students who miss an exam or homework without making prior arrangements with the lecture instructor will get a zero for that score. Except for illness and circumstances noted above, a final grade of 0.0 may be assigned to any student who misses a midterm exam and a final grade of 0.0 will be assigned to any student who misses the final exam.
- **Re-grades:** If you believe that points on an exam or homework were incorrectly totaled or if there's a gross error in the grading, you may submit an exam or homework for regrading. To do so, you must resubmit the exam or homework to the instructor no later than at the beginning of the lecture following the one in which it was returned. You must write a brief note on a separate piece of paper explaining the possible error in the grading, and staple this note to the front of the exam or homework pages when you submit them for re-grading. Do not make any changes or marks on any pages of the exam or homework. A request for a regrade may result in re-grading of the entire exam or homework. Therefore your total score may increase or decrease.
- **Homework:**
Lecture homework will be assigned and collected weekly. You'll usually turn in homework on the due-day at the beginning of class. You may also leave the homework in the instructor's mailbox in the Physics Department Main office by 10:45am on the due-day. Late homework receives zero points. Note that not all the homework problems will be graded. If you start working on the homework the day before it's due, you will not finish on time. The graders will look for neatness and logic of presentation, points will be deducted for lack of either. I strongly encourage you to work collaboratively, but your submitted work must be your own.
- **Late requests:**
The lecture instructor and graders will ignore re-grading requests that are not reported promptly.
- **Communication:**
For administrative issues, it's best to contact me via email. But, for physics questions, please don't use email (unless they are of the "yes/no" variety). Physics is best discussed at my office hours. You are welcome to come by outside my office hours, but please don't be offended if I'm

too busy to talk.