Physics 217: Classical Electrodynamics I

Fall 2025

Here we explore electrostatics and magnetostatics – the consequences of the laws discovered empirically by Coulomb, Gauss, Ampère and Faraday – from the beginnings of each to the complete unified embodiment in the Maxwell equations. Along the way, we also learn and practice the higher-level applied math involved in complicated electromagnetic problems, such as the solution of linear partial-differential equations in boundary-value problems.

Professor: Dan Watson: dmw@pas.rochester.edu, www.pas.rochester.edu/~dmw. He has taught the PHYS 217-218 sequence twice through, but not for a long time.

Teaching assistants: Nathan Mangus, nmangus2@ur.rochester.edu, and Erica Sundermeyer '26, esunderm@u.rochester.edu. Nathan TA-ed PHYS 217 last year too. This is Erica's first experience at teaching PHYS 217, but she has TA-ed Dan's courses before, as some of you know well.

Textbook: David J. Griffiths, *Introduction to electrodynamics*, fifth edition (2023). On reserve in the Physics-Optics-Astronomy library. This is a great textbook which deserves a permanent place in your personal library. Dan uses a Kindle electronic version of this edition, which he likes very much, though buying e-books doesn't save as much money as it used to: the hardcover version costs only about $2 more, new. Used copies can be had from online bookstores for a little more than half the price of a new one. Few of your friends who took the course last year will be found willing to sell you their copy.

Website: www.pas.rochester.edu/~dmw/phys217/. Therein one will find complete lecture presentations, a calendar of class meetings and office hours, homework-problem solutions, exam solutions, practice exams, and even a copy of this document.

BlackBoard: Not in this course. Instead …

Box: Each student will receive a personal Box folder, for submission and return of homework, and for return of graded exams. This of course means submitting homework in digital form: preparing it digitally from the beginning, or scanning it to pdf (not simply cell-phone-camera imaged), before submission.

Lectures: 12:30-1:45 PM Tuesdays and Thursdays, in 109 B&L. All students are expected to attend all of the lectures. Each lecture presentation will appear on the website about a week before it is given. We encourage everyone to bring a laptop or tablet to lecture, and take real-time notes on electronic copies of the lectures.

Workshops: 4:50-7:30 PM Wednesdays and Thursdays, in 504 Morey and 206 Hylan, respectively, conducted by Erica and Nathan, also respectively. All students are expected to attend one workshop per week. If, in any week, you cannot make it to the workshop for which you are registered, just tell the TAs, and appear in the other one. Attendance is noted, becoming part of the class-participation score.

Homework: Twelve problem sets, usually assigned during the lecture on Tuesday and due the following Tuesday. Each problem set counts equally toward the final grade. Normally, detailed solutions to the problem sets will be posted directly following the lecture they are due, which will make it difficult to accept late homework.

About a third of every homework assignment will be designated as **solo** problems, and the rest as **team** problems. For the solo problems, students are expected to work independently, but the team problems are to be solved by groups of 3-4 students working together, beginning in workshop. Each student is meant to

submit solutions of all of the problems, but of course the solutions of the team problems would be similar to those of the other team members.

Team homework is checked for completion and correctness only, and becomes part of the participation score. Solo homework is graded in detail, and weighted differently in the final grade.

Homework will begin each week in workshop with the team problems, under the guidance of the TAs. It would be unusual for the team problems to be completed during workshop; we intend for these first problems to help the homework teams gain traction, and for the team problems to help everyone get started on the solo problems.

Examinations: One midterm exam, covering most of electrostatics, will be given on Thursday, 16 October 2025, during the regular lecture time. A final examination, covering the whole course, but with emphasis on the later parts, will be given on Sunday, 14 December 2025, 7:15-10:15 PM. Detailed solutions will be posted at the conclusion of each exam. If you miss an exam due to illness or emergency, a makeup exam may be scheduled by appointment. **All makeups will be oral examinations**, lasting as long as the exams they replace, and will be administered and graded by Dan.

To each exam you are allowed to bring only a writing instrument, a calculator, and one (midterm) or two (final) letter-size sheets on which *you* have written as many notes, formulas, and physical constants as you like. No computers or network access is allowed during the exams.

The best way to study for the examinations is to do the homework problems, to make a good cheat sheet to bring to the exam, compiled as you do your homework; and to work out the sample exams that will be available (with solutions) on our website, as final practice and a test of the penultimate version of your cheat sheet.

Class participation: Each workshop attended, and each complete team homework submitted, earns a class participation point; the fraction of those possible determines the class-participation portion of one's grade.

Grades: Based 10% on class participation, 24% on solo homework, and 66% on the examinations. The midterm is worth 28%, and the final exam 38%, of the final grade. In terms of the percentage of the maximum possible score, the grading scale will be as follows:

Percentage score	≥ 85	≥ 80	≥ 75	≥ 70	≥ 65	≥ 60	≥ 55	≥ 50	≥ 40	< 40
Final grade	A	A-	B+	B	B-	C+	C	C-	D	E

Last time Dan taught this course, in Fall 2002 (!), the 20 students who took it received an average percentage score of 74.8, for a B+. (We round up to integers before assigning the final grade.)

Academic honesty disclaimer: For our purposes, *cheating* consists of submission of homework or exam solutions that are not one's own work, or submission of such work under someone else's name. This would include any detected submission of solutions copied from online sources, including results using large language models (i.e. AI). According to University rules, any detected act of cheating that is not the result of a simple misunderstanding must be handed over to the Board on Academic Honesty for investigation.

Help: PHYS 217 is one of the harder courses you will take in college; please take advantage of all the help your instructors will provide. Our office hours are posted on the Calendar page of the class website. Please come and talk to us whenever you want. Or email us with questions. We will be happy to deal with specific questions about the course, homework or exams, but are also interested in talking to those who find a problem or topic confusing enough that they're not even sure what to ask.

