Physics 3327 Fall 2023

Advanced Electricity and Magnetism

Instructor: Debanjan Chowdhury — Office Hours: Friday 10-11 AM (and by appt.)

514A Clark Hall

dc977@cornell.edu (please include "3327" in subject)

TA: Zhou Yang — Office Hours: TBD (and by appt.)

zy429@cornell.edu

Course structure:

Lectures	MWF,	122 Rockefeller,	11:15 - 12:05 PM
Recitation			
201:	Th,	Clark 294A,	10:10 - 11:00 AM
202:	F,	Clark 294B,	12:20 - 1:10 PM
203:	F,	231 Rockefeller,	02:30 - 3:20 PM

Course goals:

- Explore advanced techniques in electrostatics
- Explore the dynamical aspect of Maxwell's equations and the role of the electromagnetic fields in conservation of energy and momentum
- Understand the origin of gauge transformations and their utility in E&M
- Understand plane waves as the building blocks for EM radiation and the frequency-dependent behavior of EM waves in a variety of materials and waveguides
- Gain exposure to mechanisms for the generation of EM waves
- Explore the relationship between Special Relativity and Maxwell's Equations

Homework: One set each week, released each **Monday**, due via Canvas by midnight on the **Tuesday of the following week**. Please note the exceptions around Fall Break and Thanksgiving. Working together on the homework is encouraged, but the submitted work must be your own. Please list your collaborators on the HW, if any. The homework assignments teach you the material – we are your guides. You should expect to find the HW challenging.

Late homework: To submit late, you will need to email me to extend your due date. You have 2 "free passes" to submit homework late, no questions asked, over the course of the semester. Typical extensions will be 2 days. Late homework will otherwise be subject to 2-point penalty for each calendar day late. If you know of a conflict or are ill, please contact me *in advance* and we will make a plan separate from the free passes. Otherwise late homework will be subject to the rules above.

Texts (it is not compulsory to purchase a physical copy, but I will recommend readings) *:*

M.A.Heald and J.B.Marion, *Classical Electromagnetic Radiation*, 3rd edition.

Griffiths, David, "Introduction to Electrodynamics, 3rd Ed.", Prentice-Hall, Inc., NJ, 1999

Exams: Notes and Canvas information may be used, but no other resources, internet-based or otherwise. Unlike the HW, you may not collaborate with your classmates on the exams.

- Tentative Prelim dates:
  - September 20 and October 25 (**In class**)
- Final exam: TBA

Grades: Prelims = 20% each, Final = 40%, HW = 20%.

The lowest homework will be dropped. I recommend doing ALL the homework to maximize your chance for your highest possible grade, rather than using the dropped HW as an invitation to skip one of the assignments.

Ed Discussion: Course material and HW discussions will occur over *Ed Discussion,* linked from our canvas site. The primary use is for all of you to discuss the material. Our TA, Zhou, will primarily monitor the site for questions. If you have a direct question about the course material that you would like me to answer, please *email me*.

Conflicts: I recognize that you can have conflicts or unexpected situations (illnesses, etc.) that can make attendance, or HW deadlines, or exam dates occasionally problematic. *When you contact me in advance of the relevant deadline, you will find me very accommodating.* After the fact notifications will be considered in the context of whether advanced notification was possible.

Conduct: Please abide by:

- Cornell Code of Academic Integrity: As a scientist, you will find that scientific integrity is valued highly. Abuse can destroy one's career. The principles overlap strongly with those laid out in the Cornell Code.