

UNIVERSITY OF MISSISSIPPI
Department of Physics and Astronomy
Electromagnetism II (Phys. 402) — Prof. Leo C. Stein — Spring 2019

Electromagnetism II Syllabus

Class schedule:	Tues/Thurs 1300–1415, Lewis Hall room 228
Office hours:	Mon 1500–1600, Tues 1700–1900
Course website:	https://duetosymmetry.com/teaching
Professor:	Leo C. Stein
Email:	lcstein@olemiss.edu
Office:	205 Lewis Hall
Phone:	+1 (662) 915-1941 (x1941 on campus)

Text

- Main text: *Introduction to Electrodynamics*, David Griffiths. We will be covering chapters 7-12.
- The definitive reference, at a higher level, is Jackson's *Classical Electrodynamics*.

Course goals and learning outcome

This is the second half of a standard course on electromagnetism in the undergraduate curriculum for physics.

Key concepts (time permitting): • going from electrostatics to electrodynamics • mutual and self inductance • Maxwell's equations • conservation laws • waves in general and electromagnetic waves • energy and momentum in the electromagnetic field • reflection, transmission, absorption, and dispersion • waveguides • potential formulation and gauge transformations • special relativity and relativistic EM.

Goals: Reinforce understanding of electrostatics and magnetostatics; understanding of Maxwell's equations and interactions with matter, and relevance to physical systems; learning tools of waves; applying multivariate and vector calculus and special mathematical tools (e.g. multipole/Legendre expansion); introduction to special relativity. These goals are to enhance students' mathematical reasoning, critical thinking, and analytical reasoning.

Evaluation

Grade type:	Letter grade A–F
Grade ranges:	(subject to change) <ul style="list-style-type: none">• A: 88% and up• B: 75–87%• C: 65–74%• D: 55–64%• F: <55%
Grade breakdown:	(subject to change) <ul style="list-style-type: none">• 50% Homework• 20% Midterm• 30% Final

Homework, tests, and final exam

Homework assignments will be announced in class, and they must be turned in at the beginning of class on the due date. Late homework will be penalized 20% per day (exceptions and extensions permitted with good cause). Homework must be easy to read: please write down clearly your name and the problem set number, do not use a red pen, write consistently on either one side or both sides of the paper and staple the pages together. The final exam will be open-book and open-notes, and a calculator will be permitted.

Attendance

There is no strict attendance requirement, but you are strongly advised to attend class. Attendance has a strong correlation with performance. I recommend that you read the book sections in advance and come ready to participate. If you miss an exam or cannot turn in homework, please inform me beforehand and get a doctor's note if applicable. Absences from tests count as zeros, unless they are justified. If you must be absent during a test for a University sponsored event, you must discuss this with me before the test date.

Academic Integrity

Violations of the University's policy of academic integrity will result in a failing grade and other disciplinary actions. A student with a documented case of plagiarism or cheating in this course will receive a failing grade for the course and may face disciplinary action by the University, including expulsion.

Disability Access and Inclusion

The University of Mississippi is committed to the creation of inclusive learning environments for all students. If there are aspects of the instruction or design of this course that result in barriers to your full inclusion and participation, or to accurate assessment of your achievement, please contact the course instructor as soon as possible. Barriers may include, but are not necessarily limited to, timed exams and in-class assignments, difficulty with the acquisition of lecture content, inaccessible web content, and the use of non-captioned or non-transcribed video and audio files. If you are approved through SDS, you must log in to your Rebel Access portal at <https://sds.olemiss.edu> to request approved accommodations. If you are NOT approved through SDS, you must contact Student Disability Services at 662-915-7128 so the office can: 1) determine your eligibility for accommodations, 2) disseminate to your instructors a Faculty Notification Letter, 3) facilitate the removal of barriers, and 4) ensure you have equal access to the same opportunities for success that are available to all students.

Other

If a change in the syllabus becomes necessary during the semester, it will be discussed in class and then posted on the course website. The course website will also contain up-to-date information on the class schedule, homework assignments and complementary material.

Schedule (subject to change)

	Monday	Wednesday	Friday
Week 01: 1/21–1/25	—	Syllabus/assessment quiz	Review of 401
Week 02: 1/28–2/01	7.1, EMF		7.2, induction
Week 03: 2/04–2/08	7.2, induction	7.3, Maxwell's Equations	
Week 04: 2/11–2/15	8.1, charge/energy conservation		8.2, momentum cons.
Week 05: 2/18–2/22	8.2, momentum cons.	9.1, waves in 1d	
Week 06: 2/25–3/01	9.2, EM waves in vacuo		9.3, EM waves in media
Week 07: 3/04–3/08	9.3, EM waves in media	9.4, absorption and dispersion	
Week 08: 3/11–3/15	Spring vacation (no class)		
Week 09: 3/18–3/22	Midterm review	9.5, waveguides	
Week 10: 3/25–3/29	10.1, potential formulation		10.2, distributions
Week 11: 4/01–4/05	10.2, distributions	10.3, field of point charges	
Week 12: 4/08–4/12	11.1, dipole radiation		11.2, rad'n from point charges
Week 13: 4/15–4/19	11.2, rad'n from point charges	12.1, special relativity	
Week 14: 4/22–4/26	12.2, SR mechanics		12.3, EM in SR language
Week 15: 4/29–5/03	12.3, EM in SR language	Final review	
Finals: 5/06–5/10	Finals week		