

**UNIVERSITY OF MISSISSIPPI**  
Department of Physics and Astronomy  
Electromagnetism I (Phys. 401) — Prof. Leo C. Stein — Fall 2019

**Electromagnetism I Syllabus**

Class schedule:	MWF 1400–1450, Lewis Hall room 109
Office hours:	Monday 1300–, Lewis Hall room 205
Course website:	<a href="https://duetosymmetry.com/teaching">https://duetosymmetry.com/teaching</a>
Professor:	Leo C. Stein (you can call me “Leo” or “Dr. Stein”)
Email:	<a href="mailto:lcstein@olemiss.edu">lcstein@olemiss.edu</a>
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 1–6.
- The definitive reference, at a higher level, is Jackson’s *Classical Electrodynamics*.

## Course goals and learning outcome

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

Key concepts (time permitting): • vector calculus • curvilinear coordinates • electric field and potential • work and energy in electrostatics • Laplace’s equation, separation of variables, multipole expansions • electric fields in media • Lorentz force, magnetostatics • magnetic vector potential • magnetic fields in media.

Goals: Understanding of electrostatics, magnetostatics, and matter in static fields; relevance to physical systems; strengthen tools of vector calculus; applying multivariate and vector calculus and special mathematical tools (e.g. multipole/Legendre expansion). 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"><li>• A: 88% and up</li><li>• B: 75–87%</li><li>• C: 65–74%</li><li>• D: 55–64%</li><li>• F: &lt;55%</li></ul>
Grade breakdown:	(subject to change) <ul style="list-style-type: none"><li>• 50% Homework</li><li>• 20% Midterm</li><li>• 30% Final</li></ul>

## 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 clearly write down 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.

In particular, do not turn in problem set solutions copied from online or a solutions manual. Copying solutions does nothing to enhance your learning. If I see this then you will get an automatic 0 for the problem set. If it happens more than once I will report it to the chair of the department.

## **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: 08/26–08/30	Syllabus/assessment	1.1, vector algeb.	1.2, differential calc.
Week 02: 09/02–09/06	Labor day (no class)	1.3, integral calculus	
Week 03: 09/09–09/13	1.4, curv. coords	1.5, Dirac $\delta$ function	1.6, vect. field theory
Week 04: 09/16–09/20	* 2.1, $\boldsymbol{E}$ field	2.2, div and curl of $\boldsymbol{E}$	
Week 05: 09/23–09/27	2.3–2.4, electric potential, work, energy		
Week 06: 09/30–10/04	2.5, conductors		* 3.1, Laplace's Eq.
Week 07: 10/07–10/11	3.1, Laplace's Eq.	3.2, image charges	3.3, sep. of vars.
Week 08: 10/14–10/18	3.3, sep. of vars.	3.4, multipole expansion	
Week 09: 10/21–10/25	4.1, polarization	* 4.2, field of pol. obj.	4.2, field of pol. obj.
Week 10: 10/28–11/01	4.3, $\boldsymbol{D}$ field	4.4, linear dielectrics	
Week 11: 11/04–11/08	5.1, Lorentz force		* 5.2, Biot-Savart law
Week 12: 11/11–11/15	5.2, Biot-Savart law	5.3, div and curl of $\boldsymbol{B}$	
Week 13: 11/18–11/22	5.4, magnetic potential $\boldsymbol{A}$		6.1, magnetization
Week 14: 11/25–11/29	Thanksgiving holidays (no class)		
Week 15: 12/02–12/06	6.2, field of mag. obj.	6.3, aux. field $\boldsymbol{H}$	6.4, (non-)linear media
Finals: 12/09–12/13	Finals week		

\* = Leo has travel planned, another Prof. will give lecture

Oct. 14: Jake Bennet