PHYS 361 # Electromagnetic Theory **Spring 2026**

Course #29614 (3 credits)

Instructor: Dr. Alan R. Denton `alan.denton@ndsu.edu`
Professor, Dept. of Physics office: SE 214B, NDSU

Classes: TTh, 3:30-4:45pm, SE 221 **Help:** on demand (in-person or on Zoom)

Bulletin Description:

Electrostatics, magnetostatics, dielectrics, electric circuits, time varying electric and magnetic fields, electromagnetic induction, and application of Maxwell's equations.

Prerequisites: PHYS 252, MATH 266, basic knowledge of math methods and mechanics

Objectives: Students will master the foundations of electrodynamics and learn to apply theoretical and computational methods to model a variety of physical systems, including ionic solutions, plasmas, metals, and dielectric and magnetic materials.

Format: Students are expected to review assigned resources in advance and attend class prepared to discuss and work through guided exercises. You are not expected to fully understand the material before class, but be familiar with terminology and definitions. In this way, class time can be used more effectively to deepen conceptual understanding, strengthen problem-solving skills, and discuss practical relevance and applications.

Textbook: D. J. Griffiths, *Introduction to Electrodynamics*, 4th ed. (Cambridge, 2017)

Bison Ready: To avoid charges, you must opt out before the Bookstore's deadline.

Evaluation:			
	Homework	100 pts	(written solutions and presentations)
	In-class participation	100 pts	(exercises and discussions)
	Exams	150 pts	(3 midterms and a final exam)
	Quizzes	50 pts	(reading and in-class)
	Total	400 pts	

Attendance is expected and important: NDSU Policy 333. *Three unexcused absences may result in failure.* Participation is strongly correlated with success in this course!

Homework: Assignments are posted on Blackboard (`https://blackboard.ndus.edu`). I encourage collaborative discussion of methods and strategies for solving problems, but submitted work must be your own. Similarity to other students' work or internet solutions will yield no points. Unsupervised work may be checked with online tools, but beware of risking your own understanding! *Any use of AI must be acknowledged and explained.* Class time will be allotted for group work on assigned problems. A representative from each group will present solutions at the board and guide discussions in class (see Rubric).

Quizzes: Short quizzes to guide reading assignments will be posted on Blackboard.

Grading: A: $\geq 85\%$, B: 70 to $< 85\%$, C: 55 to $< 70\%$, D: 40 to $< 55\%$, F: $< 40\%$
Grades will not be curved and any shift in grade boundaries will be only in your favor.

Health and Safety Expectations

If you are sick, let me know as soon as possible and do not come to class.

If circumstances necessitate, instruction will continue online via Blackboard and Zoom.

PHYS 361 Preliminary Schedule (Spring 2026)

Week	Topic	Chapter(s)
1	Vector Analysis	1
2	Vector Analysis, Electrostatics	1, 2
3	Electrostatics	2
4	Electrostatics, Potentials	2, 3
5	Potentials	3
February 19	**Midterm Exam 1**	1–3
6	Potentials	3
7	Electric Fields in Matter	4
8	Electric Fields in Matter	4
9	Magnetostatics	5
10	Magnetostatics	5
March 31	**Midterm Exam 2**	3–5
11	Magnetic Fields in Matter	6
12	Magnetic Fields in Matter	6
13	Electrodynamics	7
14	Electrodynamics	7
April 30	**Midterm Exam 3**	5–7
15	Conservation Laws	8
16	Electromagnetic Waves	9
May 11	**Final Exam** (10:30am-12:30pm)	1–9

Computational Examples and Exercises

To deepen our conceptual understanding, and build computational skills, we will use *PhET Interactive Simulations* (University of Colorado Boulder), Wolfram Mathematica, and *Simulations in Physics* in the Open Source Physics Library, free Java software you can download, compile, and run on any computer.

All access to NDSU computers must respect
NDSU Policy 158: Acceptable use of Electronic Communication Devices.

Any students with disabilities or other special needs, who need special accommodations in this course are invited to share concerns or requests with the instructor and to contact the Center for Accessibility and Disability Resources as soon as possible.

Your personally identifiable information and educational records as they relate to this course are subject to FERPA.

The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of the Provost. Informational resources about academic honesty for students and instructional staff members can be found at
Standards for Academic Honesty & Integrity at NDSU: Student Resources.

Homework Guidelines and Expectations

Together with your group, in and out of class, discuss and solve all assigned problems.

Each group member contributes to discussions and submits solutions in their own words.

A complete written solution includes (1) statements of physical concepts and principles, (2) definitions of all symbols, (3) explanations in words of all steps, and (4) a conclusion. A sequence of equations lacking context and linking words is not an acceptable solution.

Each group member prepares to present and defend solutions in class (all are accountable).

Rubric for Evaluating Presentations of Solutions

Element	**Expectations**	**Score**
clarity	identify concepts, define symbols, write legibly	3
completeness	show all steps and explain reasoning	3
accuracy	reason logically to obtain correct results	3
interpretation	explain meaning and significance of results	3
accountability	answer questions and defend solution	3
Total		15