

Ball State University
Course Syllabus for Electricity and Magnetism 2 (PHYC 452)
Spring 2026

Lecture: MWF 4:00 PM – 4:50 PM, Cooper Science Building 315

Instructor: Dr. Michael J. Skoby
mjskoby@bsu.edu
Office: CS 430B

Office Hours (subject to change):

Tuesday 2:30 PM – 3:30 PM
Thursday 10:00 AM – 11:00 AM
Friday 1:00 PM – 2:00 PM
Or by appointment

Catalog Description:

The study of electric and magnetic fields in electrodynamics, Maxwell's equations, EM waves, radiation of moving charges, and relativistic kinematics and dynamics.
Prerequisite: PHYC 450. Credits: 3

Required Materials:

Griffiths, David J. Introduction to Electrodynamics. 4th ed. Cambridge University Press, 2017

Course Objectives:

- Apply vector algebra and calculus, including the del operator, gradient, divergence, and curl of vectors as well as volume, surface, and line integrals to solve problems in electrostatics, magnetostatics, and electrodynamics.
- Apply and modify Maxwell's Laws to solve electrodynamic problems in vacuum and material cases.
- Apply Poynting's Theorem and the Maxwell stress tensor to develop conservation laws for electromagnetic systems.
- Recognize the properties of electromagnetic waves and their reflection, transmission, and polarization in optical systems.
- Investigate the behavior of electromagnetic waves in conductors and wave guides.
- Examine the causes of electromagnetic radiation in dipoles and point charges.

- Investigate the mechanic and electromagnetic consequences of Special Relativity.

Course Grading:

Your final grade will be weighted as follows:

| | |
|---------------------|-----|
| In-class Exercises: | 10% |
| Homework: | 40% |
| Exam 1: | 15% |
| Exam 2: | 15% |
| Final Exam: | 20% |

Below is the grading scale. The letter grade thresholds may be lowered at the instructor's discretion, but the thresholds will not be raised. For example, if you get at least 90% you will be guaranteed to receive an A- or possibly better.

| | |
|----|-----------|
| A | 93-100% |
| A- | 90-92% |
| B+ | 87-89% |
| B | 83-86% |
| B- | 80-82% |
| C+ | 77-79% |
| C | 73-76% |
| C- | 70-72% |
| D+ | 67-69% |
| D | 63-66% |
| D- | 60-62% |
| F | Below 60% |

In-class Exercises:

From time-to-time you will attempt to solve problems or complete other exercises during class. Please be prepared to show your work for in-class exercises and possibly hand it in at the end of class.

Homework:

Homework problems will generally be assigned for each lecture and the due date will be given once all the problems for a homework set have been assigned. You are encouraged to discuss the homework with others, but each student must do their own work. Solutions copied from any source (online, classmates, etc.) will not be accepted. Late homework will not be accepted.

Please follow these guidelines when writing your homework solutions:

- Solutions must be legible, organized, and logical. No scratch work, nothing scribbled out or crossed out. Please don't try to cram everything into as little space as possible. Don't be afraid to use lots of paper.
- You must cite or show how you got an equation (please don't just say "the notes", include the date and context). You don't have to cite general equations (e.g. Maxwell's equations, conservation of energy, conservation of momentum, etc.), but you should label them in your solutions.
- Show all steps to the solution including the algebra. Students that show the fewest number of steps tend to be the ones that make the most mistakes.
- Don't assume that I'll assume you understand what you're doing. Include concise explanations of your solution.
- Draw a box around your final answer(s).

Exams:

The date and material covered on exams will be confirmed a week before the exam.

Final Exam: Friday, May 1 at 2:15 PM to 4:15 PM

Attendance:

Students are expected to be present for the entirety of every lecture. Only exceptional cases (e.g. illness), *for which you notify the instructor before missing class*, will be considered excused. You may be required to provide the instructor with documentation for an excused absence. Students who miss class are still responsible for homework assigned and all material covered in class.

University Statement:

We are committed to ensuring that all members of the community are welcome, through valuing the various experiences and worldviews represented at Ball State and among those we serve. We promote a culture of respect and civil discourse.

Disability Statement:

If you need course adaptations or accommodations because of a disability, please contact the instructor of record as soon as possible. Ball State's Disability Services Office coordinates services for students with disabilities; documentation of a disability needs to be on file in that office before any accommodations can be provided. Disability Services can be contacted at 765-285-5293 or dsd@bsu.edu.

Academic Dishonesty:

"To maintain its credibility and reputation, and to equitably assign evaluations of scholastic and creative performance, Ball State University is committed to maintaining

a climate that upholds and values the highest standards of academic integrity.” Refer to the following BSU web site for more information:

<https://www.bsu.edu/about/administrativeoffices/vice-provost/student-services/academic-integrity>

Disclaimer: This syllabus is subject to change.

Tentative Course Schedule

| Week | Dates | Lecture |
|------|--------------|---|
| 1 | Jan 5-9 | Ch. 7: Electrodynamics |
| 2 | Jan 12-16 | Ch. 7: Electrodynamics |
| 3 | Jan 19-23 | Ch. 8: Conservation Laws No class on Monday (MLK Day) |
| 4 | Jan 26-30 | Ch. 8: Conservation Laws |
| 5 | Feb 2-6 | Ch. 9: Electromagnetic Waves |
| 6 | Feb 9-13 | Ch. 9: Electromagnetic Waves |
| 7 | Feb 16-20 | Review Exam 1 |
| 8 | Feb 23-27 | Ch. 10: Potentials and Fields |
| 9 | Mar 2-6 | No class (Spring Break) |
| 10 | Mar 9-13 | Ch. 10: Potentials and Fields |
| 11 | Mar 16-20 | Ch. 11: Radiation |
| 12 | Mar 23-27 | Ch. 11: Radiation |
| 13 | Mar 30-Apr 3 | Review Exam 2 |
| 14 | Apr 6-10 | Ch. 12: Electrodynamics and Relativity |
| 15 | Apr 13-17 | Ch. 12: Electrodynamics and Relativity |
| 16 | Apr 20-24 | Review |
| 17 | Apr 27-May 1 | Review on Monday Final Exam: Friday, May 1 @ 2:15-4:15 PM |