PHYS 4420
Electricity & Magnetism II, 3 credits
University of Wyoming, Spring 2026

Class Times and Locations

TR 9:36–10:50 AM, from 20 Jan 2026 to 8 May 2026
Classroom Building Room 103

Instructor

Richard Barrans, Ph.D., M.Ed., Assistant Lecturer, Physics and Astronomy
PS 116, no phone in office, rbarrans@uwyo.edu.
Office Hours: M 3:10–4:10 PM, T 1–2 PM; W 7–8 PM; F 10–11 AM. The Wednesday evening office hours are held in PS 234. All other hours are in my office, PS 116.

Teaching Assistant (Grading)

Aidan Fergusen

Enrollment Restrictions

Prerequisite: PHYS 4410.

Course Description

Follows PHYS 4410 and continues intermediate discussion of electricity and magnetism. Covers magnetstatics, magnetoquasistatics, alternating currents, electromagnetic waves, transmission lines and antennae.

Required Materials

Textbook: Griffiths, David J. *Introduction to Electrodynamics, 5 Ed*. Cambridge: Cambridge University Press, 2024.

Required Examinations, Assignments, and Activities

Homework exercises will be assigned in class to be completed outside of class. Examinations will be during the scheduled class time.

Grading

The final grade will be determined from cumulative points attained. Grading will be on a standard scale (90's = A, 80's = B, 70's = C, 60's = D, < 60% = F). The different components of the course comprise the following fractions of the semester grade:

Item	Percent
Homework	15%
4 Exams	64%
3 Exam analyses	21%

Attendance and Absence Policy

Attendance is expected in class; however, there is no grade for attendance.

Course Components

Homework

Homework exercises, graded on completion, will constitute 15% of the semester grade. It will be "graded" in the sense of getting constructive feedback, but won't receive a numerical score.

Exams

There will be three midterm exams during the semester and one final examination during Finals week, each worth 16% of the semester grade. The three midterm exams will be returned with constructive feedback but no numerical grade; students will propose and justify numerical grades for their own exams in an analysis worth 7% of the semester grade. The student and instructor will confer to determine the recorded grades.

The final exam will be numerically graded by the instructor and TA; students won't have any input into its scoring beyond striving to answer the questions correctly.

Internet

Course information and scores will be accessible through WyoCourses.

Student Conduct

Students are expected to respect others' opinions and abilities, and to help each other during group work activities. Those who repeatedly disrupt the class or interfere with other students' opportunity to learn will be asked to leave the class. If you have a cell phone or any other personal audio equipment, ensure that it does not make noise during class. No unauthorized video or audio recording during class is allowed to protect the privacy of your fellow students. If you require recording for accommodation of disabilities, work with Disability Support Services and me to accommodate your needs.

Diversity

The University of Wyoming values an educational environment that is diverse, equitable, and inclusive. The diversity that students and faculty bring to class, including age, country of origin, culture, disability, economic class, ethnicity, gender identity, immigration status, linguistic, political affiliation, race, religion, sexual orientation, veteran status, worldview, and other social and cultural diversity is valued, respected, and considered a resource for learning.

Disability Support

The University of Wyoming is committed to providing equitable access to learning opportunities for all students. If you have a disability, including but not limited to physical, learning, sensory or psychological disabilities, and would like to request accommodations in

this course due to your disability, please register with and provide documentation of your disability as soon as possible to Disability Support Services (DSS), Room 128 Knight Hall. You may also contact DSS at (307) 766-3073 or udss@uwyo.edu. It is in the student's best interest to request accommodations within the first week of classes, understanding that accommodations are not retroactive. Visit the DSS website for more information at: www.uwyo.edu/udss. Once UDSS informs me of the accommodations appropriate for you, I will implement them.

Academic Dishonesty Policy

Academic honesty develops respect between faculty and students, ensures fair and effective grading, and creates an environment that fosters learning. Although I encourage you to study with other students, any assignments, exams, and lab submissions must represent your OWN work.

Academic dishonesty will not be tolerated in this class. Cases of academic dishonesty will be treated in accordance with UW Regulation 2-114. The penalties for academic dishonesty can include, at my discretion, an "F" on an exam, an "F" on the class component exercise, and/or an "F" in the entire course. Academic dishonesty means anything that represents someone else's ideas as your own without attribution. It is intellectual theft – stealing - and includes (but is not limited to) unapproved assistance on examinations, plagiarism (use of any amount of another person's writings, blog posts, publications, and other materials without attributing that material to that person with citations), or fabrication of referenced information. Facilitation of another person's academic dishonesty is also considered academic dishonesty and will be treated identically.

Students are permitted to use advanced automated artificial intelligence or machine learning tools on assignments in this course only if instructor permission is declared in advance. Unless given permission to use those tools, students are expected to complete each assignment without substantive assistance from others, including automated tools.

Physics is fun. Involvement in a case of academic dishonesty is not fun.

Duty to Report

UW faculty are committed to supporting students and upholding the University's non-discrimination policy. Under Title IX, discrimination based upon sex and gender is prohibited. If you experience an incident of sex- or gender-based discrimination, we encourage you to report it. While you may talk to a faculty member, understand that as a "Responsible Employee" of the University, the faculty member MUST report information you share about the incident to the university's Title IX Coordinator (you may choose whether you or anyone involved is identified by name). If you would like to speak with someone who may be able to afford you privacy or confidentiality, there are people who can meet with you. Faculty can help direct you or you may find info about UW policy and resources at http://www.uwyo.edu/reportit.

You do not have to go through the experience alone. Assistance and resources are available, and you are not required to make a formal complaint or participate in an investigation to access them.

Disclaimer

Information in the syllabus was, to the best knowledge of the instructor, correct when distributed at the beginning of the term. The instructor, however, reserves the right, acting within the policies and procedures of the University of Wyoming, to make changes in the course content, schedule, or instructional techniques during the term. If any changes to the syllabus become necessary, students will be notified in class and on WyoCourses.

Student Resources:

- DISABILITY SUPPORT SERVICES: udss@uwyo.edu, 766-3073, 128 Knight Hall, www.uwyo.edu/udss
- COUNSELING CENTER: uccstaff@uwyo.edu, 766-2187, 766-8989 (After hours), 341 Knight Hall, www.uwyo.edu/ucc
- ACADEMIC AFFAIRS: 766-4286, 312 Old Main, www.uwyo.edu/acadaffairs
- DEAN OF STUDENTS OFFICE: dos@uwyo.edu, 766-3296, 128 Knight Hall, www.uwyo.edu/dos
- UW POLICE DEPARTMENT: uwpd@uwyo.edu, 766-5179, 1426 E Flint St, www.uwyo.edu/uwpd
- STUDENT CODE OF CONDUCT WEBSITE: www.uwyo.edu/dos/conduct

Tentative Schedule

Date	Topic	Reading*
01/20	Syllabus, grading, where are we?; Ohm's law	7.1
01/22	Faraday's law	7.2.1
01/27	Emf	7.2.2–7.2.2
01/29	Inductance	7.2.3–7.2.4
02/03	Maxwell's equations	7.3.1–7.3.3
02/05	Interpreting and applying Maxwell's equations	7.3.4–7.3.6
02/10	**Exam 1**	
02/12	Charge and energy	7.4–8.1
02/17	Momentum in fields	8.2
02/19	The Wave equation	8.3–9.1.2
02/24	Maxwell's wave equation	9.1.3–9.2.1
02/26	Electromagnetic waves	9.2.2–9.2.3
03/03	Transmission, reflection, and refraction	9.3
03/05	Absorption and dispersion	9.4
03/10	Guided waves	9.5
03/12	**Exam 2**	
	03/17–03/19 Spring Break	
03/24	Potential and gauge	10.1.1–10.1.2
03/26	Coulomb and Lorenz gauges	10.1.3–10.1.4
03/31	Extended moving distributions	10.2
04/02	Moving point charges	10.3
04/07	Electric dipole radiation	11.1.1–11.1.2
04/09	Magnetic dipole radiation; arbitrary source radiation	11.1.3–11.1.4
04/14	Radiation power	11.2
04/16	**Exam 3**	
04/21	Radiation reaction	11.3
04/23	Special relativity	12.1.1–12.1.3
04/28	Space-time	12.1.4–12.2.2
04/30	Relativistic mechanics	12.2.3–12.2.4
05/05	Magnetism in relativity	12.3.1
05/07		
05/15	**(Thursday) Final Exam 10:15 AM–12:15 PM**	