

University of Wisconsin – Stevens Point

Department of Physics and Astronomy

Electricity and Magnetism – PHYS 320

Fall 2021

Course Information

- **Course title:** Electricity and Magnetism
- **Course number:** PHYS 320
- **Pre-requisites:** PHYS 250, Math 222.
- **Textbook:** *Introduction to Electrodynamics*, David Griffiths, 4th edition, Pearson, ISBN 0-13-805326-X.
- **Instructor:** Maryam Farzaneh
- **Contact:** B105 Science Building, mfarzane@uwsp.edu
- **Office hours:** TWRP: 11:00 am – 12:00 pm

If you cannot make any of the above office hours, please know that I have an open-door policy. Please stop by as often as you wish or make an appointment by emailing me. If you wish, we can also hold office hours on Zoom by appointment. The link to my Zoom Personal Room is <https://wisconsin-edu.zoom.us/j/5309966920>, and is also posted on Canvas.

- **Class time:** MTRF 9:00 – 9:50 am, SCI-A208

Required Material

- **Calculator:** Please have a scientific calculator handy. A cell phone is *not* a scientific calculator.
- **Table of Integrals:** I will hand out a table of integrals in class. Please keep it for use in class, for your homework assignments and exams.

Course description and objectives: In this course, we will mainly focus on chapters 1 to 7 of the textbook. The course objectives are:

1. Learn and apply methods of vector calculus and other advanced mathematical methods.
2. Learn various techniques for calculating electric potential.
3. Understand and predict the behavior of electric and magnetic fields in vacuum and in materials.
4. Understand and predict the behavior of time-varying fields.
5. Understand Maxwell's equations.

Lecture

I strongly encourage you to attend *all* the lectures and take good notes. Sometimes the lecture covers more material than you might find in your textbook.

Homework

There will be one homework assignment per week, which is due at the beginning of the class period on the day indicated on the assignment. The solution to most of the homework problems should follow a logical step-by-step approach. You should use brief sentences to describe which concepts you are using, write down any equations you are using and justify any approximation. The numerical answers should have a unit and a brief description of why it makes sense physically. **You should submit your solutions on Canvas as a single pdf or docx file. I will not accept submission of multiple jpg files.**

Your homework grade is based on the completion of the assignment and the score from a few (typically four) randomly graded problems. I will post the solutions to the entire homework assignment on Canvas right after the date the assignment is due. Therefore, no late homework is accepted. *Homework counts for 25% of your final grade.*

Exams

There will be *two* midterm exams during the semester, not counting your final exam. These exams will be held **on weeks 5 and 10 (please see the course schedule) and are take-home exams**. I will give you 24 hours to finish each exam and submit it on Canvas. The final exam is non-cumulative and is also take home with 24-hour time limit. The Final exam will be posted on Canvas on **Tuesday, December 14, at 10:15 am**. *Overall, these three exams count for 75% of your grade (25% for each exam).*

Grading and Evaluation

I will calculate your grade based on a weighted percentage of your scores as follows:

Homework	25%
Exams (2 midterms , 1 Final)	75% (25% each exam)

Your final grades will be determined as follows:

90% and above	A	82--85%	B+	70--73%	C+	56--60%	D+
86--89%	A-	78--81%	B	66--69%	C	50--55%	D
		74--77%	B-	61--65%	C-	below 50%	F

Please note that I do *not* grade on a curve. Grades will be rounded up. For example, 85.6% will become an 86% (A-), but 85.3% will remain a B+.

General Course Policies

- **Face Coverings:**

At all UW-Stevens Point campus locations, the wearing of face coverings is mandatory in all buildings, including classrooms, laboratories, studios, and other instructional spaces. Any student with a condition that impacts their use of a face covering should contact the Disability and Assistive Technology Center (see below) to discuss accommodations in classes. Please note that unless everyone is wearing a face covering, in-person classes cannot take place. This is university

policy and not up to the discretion of individual instructors. Failure to adhere to this requirement could result in formal withdrawal from the course.

- **Other COVID-19 Related Guidance:**

- Please monitor your own health each day using this [screening tool](#). If you are not feeling well or believe you have been exposed to COVID-19, do not come to class; email your instructor and contact Student Health Service (715-346-4646).
- As with any type of absence, students are expected to communicate their need to be absent due to isolation or quarantine and complete the course requirements after discussing the available options with the instructor.
- Maintain a minimum of 6 feet of physical distance from others whenever possible.
- Do not congregate in groups before or after class; stagger your arrival and departure from the classroom, lab, or meeting room.
- Wash your hands or use appropriate hand sanitizer regularly and avoid touching your face.
- Please maintain these same healthy practices outside the classroom.

- **Disability services**

UWSP is committed to providing reasonable and appropriate accommodations to students with disabilities and temporary impairments. If you have a disability or acquire a condition during the semester where you need assistance, please contact the Disability and Assistive Technology Center on the 6th floor of Albertson Hall (library) as soon as possible. DATC can be reached at 715-346-3365 or DATC@uwsp.edu.

- **Academic misconduct**

I expect you to be familiar with the UWSP policies regarding student conduct. You can find the relevant documents here: <https://www.uwsp.edu/dos/Pages/Student-Conduct.aspx>. Simply put, *do not* copy each other's homework, lab reports and exams and pass them off as your own. Any confirmed incidence of academic misconduct, including plagiarism and other forms of cheating will be treated seriously and in accordance with University policy.

- The schedule for the final exam is set by the University. I will not schedule an early final exam for whatever reason.
- **I do not assign work for extra credit. There are *no* bonus points that you can earn.**
- Once you hand in your final exam, there is nothing more you can do to change your grade.

Tentative Course Schedule

The tentative course schedule is as follows. This might change and I will try my best to announce any changes beforehand.

Week	Chapter and Topic	Comments
(1)	(1) Introduction, Vector calculus	NO HW
(2)	(1,2) Vector calculus (contd.), spherical polar and cylindrical coordinates, electrostatics, Coulomb's law	HW1
(3)	(2) Flux, Gauss's Law, div \mathbf{E} , curl \mathbf{E} , electric potential, work and energy	HW2
(4)	(2,3) Energy of discrete and continuous charge distributions, conductors, capacitance, boundary conditions, Laplace's equation in 1D	HW3
(5)	(3) Separation of variables (Cartesian), separation of variables (Spherical), Legendre Polynomials	Exam 1
(6)	(3,4) Multipole expansion, dipole moment, atomic polarizability	HW4
(7)	(4) Polarization, bound and free charges, electric displacement, dielectric constant, capacitors	HW5
(8)	(4,5) Torque on dipoles, force on dipoles and dielectrics, Lorentz force, currents, continuity equation, Biot-Savart law, parallel wires	HW6
(9)	(5) Ampere's law, div \mathbf{B} , infinite wire, plane, solenoid, toroid, magnetic vector potential, boundary conditions	HW7
(10)	(5) Multipole expansion, dipole potential and field	Exam 2
(11)	(6) Torques and forces on magnetic dipoles, atomic interaction, magnetization, bound currents, Ampere's law, auxiliary field \mathbf{H}	HW8
(12)	(6) Linear media, ferromagnetism, Ohm's law	HW9

(13)	(7) Motional emf, Faraday's law	THANKSGIVING BREAK
(14)	(7) Faraday's law (contd.), inductance, energy in inductors, Maxwell's equations	HW10
(15)	Topics from either Chapter 9: Electromagnetic Waves OR Chapter 12: Electrodynamics and Relativity	HW11
(16)	Final Exam: Tuesday, December 14, 10:15 am	