

University of Wisconsin – Stevens Point

Department of Physics and Astronomy

Electricity and Magnetism – PHYS 320

Fall 2023

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**Instructor:** Maryam Farzaneh

**Contact:** B105 Science Building, [mfarzane@uwsp.edu](mailto:mfarzane@uwsp.edu)

**Class time:** MTRF 9:00 – 9:50 am, SCI-A210

**Pre-requisites:** PHYS 250, Math 227.

**Textbook:** *Introduction to Electrodynamics*, David Griffiths, 4th edition, Pearson.

**Office hours:** MWRF: 1:00 – 2:00 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.**

### 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 participation

I strongly encourage you to attend *all* the lectures and take detailed notes. Sometimes the lecture covers more material than you might find in your textbook. However, the only way to master an upper-level subject in physics is to read the text carefully (more than once) and consult other books and not solely rely on your class notes.

### Homework

There will be one homework set per week, which is due at the beginning of the class period on the day indicated on the assignment. **For your solutions, please follow the format summarized in the “Homework Guidelines” that I will hand out to you on the first day of class. I will not grade the homework assignments which deviate significantly from this format.**

I will post the solutions to the entire homework assignment on Canvas right after all homework assignments are submitted. **If you need an extra day or two to finish your homework, please let me know. I generally grant extensions. However, I do not accept assignments which are unreasonably late, unless you have talked to me about the situation in advance. Homework counts for 40% 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 (Exams will be posted on Canvas)**. 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 19, at 10:00 am**. *Overall, these three exams count for 60% of your grade (20% for each exam).*

### Grading and Evaluation

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

Homework	40%
Exams (2 midterms , 1 Final)	60% (20% each exam)

Your final grades will be determined as follows:

93% and above	A	87--89%	B+	77--79%	C+	67--69%	D+
90--92%	A-	83--86%	B	73--76%	C	60--66%	D
		80--82%	B-	70--72%	C-	below 60%	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

- 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 Resource Center \(DRC\)](#) located at 108 Collins Classroom Center (CCC) as soon as possible. DRC can be reached at 715-346-3365 or at [drc@uwsp.edu](mailto:drc@uwsp.edu).
- Academic misconduct**  
 As a student at UWSP, I expect you to be familiar with the Chapter 14 of the UWSP policy document on Academic Misconduct (especially Section 14.03) found here: <https://www3.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 the University policy.
- 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.

<b>Week</b>	<b>Chapter and Topic</b>	<b>Comments</b>
(1)	(1) Introduction, Vector calculus	HW1
(2)	(1,2) Vector calculus (contd.), spherical polar and cylindrical coordinates, electrostatics, Coulomb's law	HW2
(3)	(2) Flux, Gauss's Law, div $\mathbf{E}$ , curl $\mathbf{E}$ , electric potential, work and energy	HW3
(4)	(2,3) Energy of discrete and continuous charge distributions, conductors, capacitance, boundary conditions, Laplace's equation in 1D	HW4
(5)	(3) Separation of variables (Cartesian), separation of variables (Spherical), Legendre Polynomials	<b>Exam 1</b>
(6)	(3,4) Multipole expansion, dipole moment, atomic polarizability	HW5
(7)	(4) Polarization, bound and free charges, electric displacement, dielectric constant, capacitors	HW6
(8)	(4,5) Torque on dipoles, force on dipoles and dielectrics, Lorentz force, currents, continuity equation, Biot-Savart law, parallel wires	HW7
(9)	(5) Ampere's law, div $\mathbf{B}$ , infinite wire, plane, solenoid, toroid, magnetic vector potential, boundary conditions	HW8
(10)	(5) Multipole expansion, dipole potential and field	<b>Exam 2</b>
(11)	(6) Torques and forces on magnetic dipoles, atomic interaction, magnetization, bound currents, Ampere's law, auxiliary field $\mathbf{H}$	HW9
(12)	(6) Linear media, ferromagnetism, Ohm's law	<b>THANKSGIVING BREAK</b>
(13)	(7) Motional emf, Faraday's law	HW10
(14)	(7) Faraday's law (contd.), inductance, energy in inductors, Maxwell's equations	HW11
(15)	Review or topics from Chapter 9 (electromagnetic Waves)	HW12
(16)	<b>Final Exam: Tuesday, December 19, 10:00 am</b>	

