

Physics 320: Electricity & Magnetism

Fall 2013 [Course Schedule](#) Online Syllabus: <http://www.uwsp.edu/physisatr/Documents/kmenning/Physics320.pdf>

Instructor:	Dr. Ken Menningen	Office hours:	<u>M</u>	<u>T</u>	<u>W</u>	<u>R</u>	<u>F</u>
Office:	B101 Science Building	10:00am – 10:50am	X	X		X	X
Phone:	(715) 346-4871	1:00pm – 1:50pm	X	X		X	X
email:	Ken.Menningen@uwsp.edu						
		By appointment	X	X	X	X	X

Course Prerequisites: Physics 250 *University Physics II* and Math 222 *Analytic Geometry and Calculus III*.

Required text: *Introduction to Electrodynamics*, David Griffiths, 3rd edition (available at Text Rental)

Other materials: You will need a calculator and a table of integrals. You may purchase a table of integrals from the bookstore. You may order a larger [math handbook](#) like the one I use or you may choose a smaller, less expensive [Pocket Book of Integrals](#) by CRC press. You may also wish to purchase [Div, Grad, Curl, and All That](#) by H. M. Schey, a helpful reference on vector calculus.

Course Description: This course will concentrate on chapters 1 through 7 of the text, and has the following objectives:

- Learn and apply mathematical skill in vector calculus and other advanced methods.
- Learn various techniques for calculating electrostatic potentials.
- Understand and predict the behavior of electric and magnetic fields in vacuum and in materials.
- Understand and predict the behavior of time-varying fields.
- Understand Maxwell's equations and the behavior of electromagnetic radiation.

Electricity and magnetism involves a lot of math with little real-world application. For instance, you might work 3 hours calculating the field due to a non-uniformly charged sphere, but how many non-uniformly charged spheres exist in real life? Therefore, in order not to get either bored or overwhelmed by this course, you should change your mindset a little: instead of expecting the course to increase your understanding of the world around you, expect it to teach you to use advanced math to solve electromagnetic problems. Not only will these methods be useful to you when you work out future (graduate school) electricity and magnetism problems, but many of the methods are also used in other subject areas, such as fluid dynamics and aerodynamics. The course will definitely sharpen your calculus skills as well.

Timeliness: Homework assignments are due by the **beginning of class** on the day I indicate. Assignments submitted within the next 24 hours will be graded at half credit and zero credit thereafter. Excuses for late assignments must be communicated to me before the assignment is due, either by phone, email, or a message to the department secretary. It is your responsibility to prepare and submit your assignments on time. Late exams are not allowed, but in special cases you may take an exam early.

Grading policy: The course grade is based upon homework assignments and five exams, weighted approximately as follows:

Grading Scale		Grade Breakdown	
<u>Letter</u>	<u>Score</u>	<u>Assignment</u>	<u>Weight</u>
A	78–100	Midterm exams	50%
B	63–77	Final exam	20%
C	53–62	Homework	30%
D	43–52		
F	0–42		

Exams: Midterm exams are tentatively scheduled to occur on September 18, October 2, October 23, and November 20. These are all on Wednesday nights from 6:30 pm to 8:30 pm. The final exam, part of which will be comprehensive, is scheduled for Tuesday, December 17, at 2:45 pm.

Homework: Homework problems will be assigned regularly. You should not believe that the homework problems are sufficient practice for the exam. Instead I recommend that you work out a few additional problems for each chapter from the text, and work through some example problems in the text (actually writing it out is better than simply reading it). I have the complete solution manual to the text, and there are several other E&M texts in the library with other example problems, homework problems, and solutions. I highly recommend obtaining your own copy of an introductory physics text for reference and additional homework problems. Practice helps a lot!

Tentative Course Schedule:

<u>Week</u>	<u>Chs</u>	<u>Description</u>
Unit I: Vector Calculus		
1	1	Vector algebra, differential calculus
2	1	Integral calculus, spherical coordinates
Exam I: Wednesday, September 18; Ch. 1		
Unit II: Electrostatics		
3	2	Gauss' law, electric potential
4	2	Work and energy, conductors, capacitors
Exam II: Wednesday, October 2; Ch. 2		
Unit III: Finding potentials		
5	3	Separation of variables
6	3,4	The multipole expansion, atomic polarizability
7	4	Polarization, dielectrics
Exam III: Wednesday, October 23; Chs. 3 and 4		
Unit IV: Magnetism		
8	5	Lorentz force, uniform currents, Biot-Savart law
9	5	Ampere's law, magnetic vector potential
10	5,6	Multipole expansion, magnetic dipoles
11	6	Magnetization, linear media
Exam IV: Wednesday, November 20; Chs. 5 and 6		
Unit V: Electrodynamics		
12	7	Ohm's law, magnetic flux
13	7	Faraday's law, inductance
14	7-9	Maxwell's equations, plane electromagnetic waves
15	9	Topic TBA: EM radiation, optics, QED, or relativistic E&M
Final Exam: Tuesday, December 17; Ch. 7, 9 and comprehensive		

Community Rights & Responsibilities:

Students with special needs should contact the [Disability and Assistive Technology Center](#) during the first two weeks of the semester in order to request accommodation. An [Exam Accommodation Request Form](#) is available online. Religious beliefs will be accommodated according to UWS 22.03 as long as the student notifies the instructor about the conflict within the first three weeks of class. Students are expected to maintain the highest standards of academic integrity for their work in this course. The University of Wisconsin-Stevens Point dedicated to a safe, supportive and non-discriminatory learning environment. It is the responsibility of all students to familiarize themselves with University policies regarding special accommodations, misconduct, religious beliefs accommodation, discrimination and absence for university sponsored events. (For details please refer to the [Community Rights & Responsibilities](#) documents, including the [Student Academic Standards and Disciplinary Procedures](#) document.)