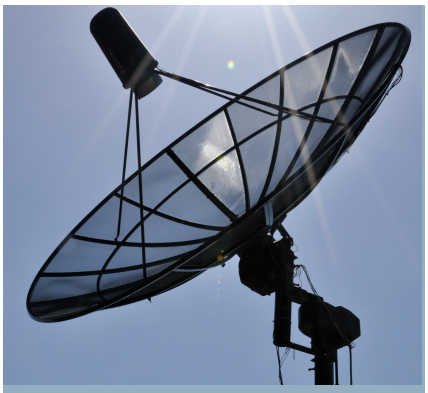
PHY 301 Electricity & Magnetism



Staff Info

DR. MARIN PICHLER
Instructor

Office Hours: M 3:30-4:30; Tu,Th 11-12 and by appointment.

You can find me in

Office: HS-G10 D, x6328 or
Lab: HS-G16; if you can't then email me marin.pichler@goucher.edu

Class: MWF 9:30-10:20 HS B-26

Text:

David Griffiths: *Introduction to Electrodynamics*, 3rd edition, Prentice Hall

other texts: W. Panofsky and M. Phillips: *Classical Electricity and Magnetism*, 2nd ed. Dover;
E. Purcell: *Electricity and Magnetism*, Berkley Physics Course-Volume 2

Webpage: PHY301 on Blackboard

Grading Scale

Class Schedule

Welcome to PHY301 !

The course is designed for physics majors and minors. Prerequisites are Mathematical Methods in the Physical Sciences. Electricity and Magnetism (E&M), together with Statistical and Quantum physics is one of the fundamental disciplines on which modern physics research (in condensed matter, atomic, molecular, nuclear, astro, bio, and chemical physics) relies on.

Objectives: (i) To familiarize you with main main concepts and methods appropriate for a description of systems involving different charge and current distributions. (ii) To apply mathematical skills to complex problems involving statics and dynamics of E & B fields, EM waves and radiation. (iii) To help you develop analytical skills so you can apply this knowledge to solve practical problems in this and similar fields.

Learning Outcomes. Completing this course the student will (i) acquire a solid foundation of E&M theory; (ii) solve complex problems involving electric and/or magnetic fields; (iii) be able to apply this knowledge to new situations using analytical and computational skills. Furthermore, the student will be prepared for graduate school in physics, applied science or engineering field.

The Nature of E & M

E&M and their applications are present everywhere in todays life. Understanding the underlining phenomena and theory is necessary to further advance science and technology.

The course is quite math intensive. At first we will spend time getting the tools most of which you have already seen in Calc. 3 or Math. Methods. After that we will dive into the E&M. So start working and studying early. If you find yourself confused and struggling seek help, the sooner the better. I am here to teach and help you. Use my office hours and open door policy and provide some feedback on your learning.

Grading policy is based on the following

Homework	30 %
Quizzes	25 %
Midterm Exam	20 %
Final Exam	20 %
Class participation	5 %
Total	**100 %**

Lectures

You are expected to attend all lectures and actively participate in discussions and problem solving sessions. You will be asked to present problems on different topics during a course of the semester. Some problems will involve computer simulations and will be used to aid in understanding of concepts. Homework assignments, answers to problems and other relevant material will be posted on Blackboard[tm].

Homeworks

there will be ~10 homework assignments throughout the semester. The problems are assigned from the text. Working assiduously on the homework is crucial for learning the material and performing well on the exams. The problems will be discussed in class. For some of the problems we will use symbolic manipulation software (Maple, Mathematica, Matlab, Mathcad). You will have a week to complete each homework, but plan to start working on problems early. I will not discuss homework problems on the dates the homework is due. Late assignments will not be accepted. I encourage you to discuss problems but not blindly copy someone else's work.

Exams

There will be two exams: a mid term and a final. Exam times are listed in the schedule. The mid term is a take home exam while the final will be in class. Exams are open textbook and **your** notes only.

Quizzes

There will be three in-class quizzes. Quiz times are listed in the schedule. Quizzes are open book and notes only. For your convenience you may bring a formula sheet.

Policies

Special Needs/Disability -please contact the ACE: Assistance to Students with Disabilities office to arrange accommodation.

Attendance- I strongly urge you to attend all classes and **come prepared**: read the assigned sections of the text with the examples and problems. Participate in class discussions and pay close attention to what is presented. Ask questions and clarifications to the presented material.

Lateness - try not to be late for class. However if you are late, please come in with as little disruption to the the class as possible.

Absence - Let me know if you are going to miss a class. You are responsible for the material that was covered. Excused absences may be due to serious illness, family reasons, court appearance, religious observance and varsity athletic events.

Reminder - I encourage you to work together on problem sets, but blatantly copying someone else's ensures that you haven't taken the opportunity to learn. All students are bound by the standards of the Goucher's Academic Honor Code (see http://www.goucher.edu/documents/General/AcademicHonorCode.pdf).

Safety: We may use equipment for the demonstrations. You have to follow safety instructions and precautions. Failure to do so may endanger yourself and others and can result in dismissal from class.

Grading Scale

A	91 – 100 %
A-	87 – 90 %
B+	85 – 87 %
B	80 – 84 %
B-	77 – 79 %
C+	74 – 76 %
C	70 – 73 %
C-	67 – 69 %
D+	64 – 66 %
D	60 – 63 %
C-	57 – 59 %
F	56 and below

Exact numerical cutoffs will be determined at the end of the semester.

Schedule

Note: Class schedule is tentative and subject to a change.

Week	Topics	Readings
1	Intro; Vector algebra; differential calculus; coordinate systems	1.1, 1.2,
2	Integral calculus; Electrostatics: coulomb's law; $\nabla\cdot\mathbf{E}$;$\nabla\times\mathbf{E}$	1.3-6, 2.1-2
3	Electric potential; Work and energy in electrostatics	2.3-4
4	Conductors; Laplace's equation; electrostatic methods	2.5; 3.1-3.4; Quiz
5	**E** fields in mater; polarization, displacement; dielectrics	4.1-4.4
6	Magnetostatics: Lorentz force, Biot-Savart law; $\nabla\cdot\mathbf{B}$, $\nabla\times\mathbf{B}$;	5.1-3; Exam
7	Magnetic vector potential; **B** fields in mater	5.4; 6.1-2
8	**H**- field; Magnetized media; Electrodynamics	6.3-4; 7.1; Quiz
9	Faraday's Law; Maxwell's equations	7.2-3;
10	Scalar & vector potentials; energy and momentum	7.4-5
11	EM-waves; wave equation; waves in media & conductors	8.1-3
12	Dispersion; EM radiation	8.4; 9.1-2; Quiz
13	Electrodynamics and relativity	10.1-2
Finals	Exam	