
 Class Meeting: **MWF** 10:10-11:30am

Email: haggard@bard.edu

Class Location: Heg 102

Office: Rose 112

Office Hours: **T** 5-6pm & **F** 2-3pmOffice Phone: (845) 758-7302

Course Description — We will explore the Physics of Electricity and Magnetism. Electromagnetic theory is one of the crown jewels of physics. With its stunning applications in electronics and technology and the remarkable insight it provides into forces exerted at a distance this is both a practical and a beautiful area of study. It provides an excellent arena for practicing the art of physics, that is, choosing what to ignore. In particular, we will develop a full quantitative description of the electric and magnetic *fields*, explore their role in electronics, and uncover their relationship to light and optics. You will become fluent at alternating between conceptual and quantitative forms of explanation, and polish your incisive, scientific thinking.

Text: *Fundamentals of Physics*, by D. Halliday, R. Resnick, and J. Walker (10th Ed, Aug 2013)

Week	Topics	Lab	Chap.
1/26	Fields & Electrostatics	No Lab	21
2/2	The Electric Field	Electrostatics	22
2/9	Gauss's law	Voltage & Meters	23
2/16	Electrostatic Potential Energy	Lab Challenge 1	24
2/23	Capacitors, Dielectrics, & Current	Resistance	25 & 26
3/2	RC Circuits	Exam 1	27
3/9	DC Circuits & Kirchoffs Laws	RC circuits	27
3/16	Spring Recess	No Lab	
3/23	Magnetic Forces & Fields	Lab Challenge 2	28
3/30	Charges and Currents in Magnetism	Magnetic Fields	29
4/6	Electromagnetic Induction, AC Circuits	Oral	30 & 31
4/13	Electromagnetic Waves	LRC Circuits	32
4/20	Optics, Reflection, & Refraction	Reflection & Refraction	34
4/27	(MT Advising days) Lenses & Optical Devices	Advising	34
5/4	Interference & Diffraction	Lenses	35
5/11	Completion days begin 5/13	Lab Challenge 3	36
5/18	Completion days end 5/19	Exam 2	

Note: I reserve the right to adjust this syllabus during the semester

Exam 1 (3/2 & 3/3) : Electrostatics, Gauss's law, & the motion of charges.

Oral (4/6 & 4/7) : Circuit physics & Magnetism.

Exam 2 (5/11 & 5/12) : Comprehensive. Emphasis on post exam 1 material.

Homework — There will be homework due every Friday. The assignment should be given to me or put into the box outside my office (Rose 112) by 5pm. I will hand homework back in class on Monday. I will grade a randomly selected portion of the problems on a 0-5 scale. These scores mean roughly the following: 5=clear and complete solution, 4=good solution missing one conceptual point or calculation, 3=clear attempt but with substantive flaw, 2=effort made but incomplete plan, 1=little effort, 0=nothing appearing. I care most about the effort you invest and you can receive credit on this basis. The goal of the homework is for us to engage each other in a discussion of physics regularly, please come and visit as often as you like to discuss. Along these lines, I recommend that you work together; this is invaluable in learning physics. Please write things up yourself to show me and you that you understand it (this helps battle the illusion of explanatory depth, which is worth looking up). Someone will be doing help sessions for the course, and will give you clues on solving the problems. I will always answer any questions in class, as well. Please do not use the internet as a resource for anything but definitions of terms.

Grading Structure:

Weekly Homework (due on Fridays)	20%
Lab	20%
Student lectures	5%
Oral	15%
Exam 1	20%
Exam 2	20%

Labs — We will have lab most Mondays & Tuesdays. The structure is different from last semester. You will openly explore a theme in electricity and magnetism most weeks. Every fourth week or so (see schedule above) you will have a synthesis lab that asks you to put all the ideas together and challenges you to achieve certain experimental outcomes.

Oral — To many people's surprise two of the most important skills of a physicist are writing and talking about physics. For the oral you will be asked to give a brief presentation about a physics topic. More details about this when the time approaches.

Exams — During the exam times (the lab periods that week) you will pick up the exam from me, sit in the lab or nearby, and return it to me two hours later. You can bring your calculator and one sheet of paper with whatever notes or formulas you want on it, but otherwise these are closed book, closed note exams. You must not collaborate or consult with anyone else while taking the exam. I will give more specific topic lists and practice problems as we review the material before each exam.

Lateness and Other Anomalies — I will usually grade your homework over the weekend and return it to you Monday. Late work will be accepted before I have graded that week's assignment with a 20% deduction on the graded score. After a set has been graded I will no longer accept late work. If you tell me about something ahead of time, almost any situation can be accommodated.

Course website: <http://bohr.physics.berkeley.edu/hal/teaching/phys142Sp15/>