

# Electricity, Magnetism, & Thermodynamics

## Physics 111, Spring 2018

### Instructors

Lectures Monday, Wednesday, Friday 9:00-9:50 am in Wright 201

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Office Hours: Monday 11 am – 12 pm Friday 10 – 11 am, and by appointment

If my office door is open you are welcome to drop in.

Laboratory Tuesday, Wednesday, or Thursday 1:30-4:30 pm in Wright 214

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### Learning Goals

In this course we will take a first look at the fields of electricity, magnetism and thermodynamics. The course is a continuation of Physics 110 and we will use many of the ideas that were developed in your study of mechanics. At the end of the course you should

1. Have a theoretical understanding of the basic laws governing electricity and magnetism
2. Be familiar with several applications and consequences of the theory of electricity and magnetism, including simple dc and ac circuits
3. Understand the first two laws of thermodynamics as applied to heat transfer, engines, and gases
4. Be able to apply physical principles to solve simple problems involving electricity, magnetism, and thermodynamics
5. Be comfortable using calculus to solve physics problems

The format of the course is three hours of lecture and three hours of lab each week. In addition, there are optional problem sessions as described below.

### Textbook

The required text for this course is *Fundamentals of Physics* by Halliday, Resnick, and Walker. The current edition is the 10<sup>th</sup>.

### Assignments

Problem sets will typically be passed out on Wednesdays and due at the beginning of class on the following Wednesday. **No late problem sets will be accepted unless you have made arrangements with me prior to the assignment's due date.** However, I will drop the score of your lowest problem set when calculating your grade. The assignments and solutions will be posted on Blackboard.

## Problem Sessions

There will be two weekly problem sessions, tentatively scheduled for Sunday 7 – 8 pm and Tuesday 12:30 – 1:30 pm. These optional problem sessions are designed to provide you an opportunity to ask questions about the course material and homework.

## Participation

During the lectures we will make use of “i-Clickers” to facilitate class participation. These clickers will allow you to remotely answer questions posed during the lecture. Your participation grade will be largely based on whether or not you respond (you will not be graded based on whether or not your answer is correct). The clickers can be checked out at the Science Library using a “clicker ticket” distributed in class. The clicker rental is free. However, if you fail to return it at the end of the semester you will be charged. Please check out a clicker before class on Friday Feb. 9<sup>th</sup>.

## Exams

We will have **two in-class mid-term exams on Wednesday March 14<sup>th</sup> and Wednesday April 18<sup>th</sup>**. The final exam is scheduled for **Thursday May 17<sup>th</sup>** at 9 am. Please see me immediately if you have a conflict with any of these dates. The exams will be closed book, but you will be allowed an 8½ x 11 inch sheet of notes (both sides) and a calculator.

## Labs

The laboratory experiments are designed to supplement the lectures and provide some exposure to practical experimental systems. The lab sessions will begin the first week of classes. **You must pass the laboratory section of the course in order to pass the course.**

## Grading Policy

Your grade will be determined by your performance in following areas:  
Problem Sets 35%, Two Midterm Exams: 12.5% each, Final Exam: 20%, Lab: 15%, Participation 5%.

## Guest Lectures

Throughout the semester the physics and astronomy department invites speakers to give lectures on their research. While you may not understand these talks in their entirety, they are a great chance to learn about some of the things going on in the world of physics. If you attend a guest lecture and submit a one paragraph description of the talk on Blackboard within a week of the talk I will give you three extra credit points on your homework (equivalent to one problem).

## Honor Code

Please remember that Oberlin students are bound by the honor code. Details of the honor code are located at <http://new.oberlin.edu/students/policies/honor>  
You are welcome to work together on the problem sets as long as each student works on and understands all aspects of the assignment and is responsible for his or her own answers. **Use of solutions found online, from past offerings of the course, or through other means is not permitted.** In addition, you are requested to acknowledge any outside help. For example, “I looked at a similar example problem

in *Physics Made Simple* and discussed the problem with fellow student Al Einstein.” Such acknowledge will not hurt your grade.

The midterm and final exams are to be completed individually. Please write and sign the honor code on all assignments. The Honor Code reads: “I affirm that I have adhered to the Honor Code on this assignment.”

### Services for Students with Special Needs

If you are a student with a documented disability who will require accommodations in this course, please register with the Office of Disability Services in Peters Hall Room G-27/2116/118 for assistance in developing a plan to address your academic needs.

### Other Resources

If you feel that you need additional one-on-one help, you may stop by Student Academic Services and pick up a tutoring card. I will sign the form and help you find a student tutor.

### Reserve Books

You are encouraged to look at other physics books. I have placed several potentially useful books on reserve in the science library.

## Tentative schedule

Dates	Topics	Assignments	Laboratory
Feb. 5-9	Charge and the Electric Field		Organizational Meeting (30-45 min.)
Feb. 12-16	Electrostatics & Gauss' Law	PS #1 due Feb. 14	Electrostatics
Feb. 19-23	Electric Potential	PS #2 due Feb. 21	Capacitance
Feb. 26-Mar. 2	Capacitors and Resistors	PS #3 due Feb. 28	Mapping Electric Field
Mar. 5-9	dc Circuits	PS #4 due Mar. 7	DC Circuits I
Mar. 12-16	Magnetism	<b>Midterm 1 Mar. 14</b>	DC Circuits II
Mar. 19-23	Spring Recess		
Mar. 26-30	Ampere's Law and Faraday's Law	PS #5 due Mar. 28	Oscilloscope
Apr. 2-6	Inductance	PS #6 due Apr. 4	Solar Cells
Apr. 9-13	ac Circuits	PS #7 due Apr. 11	Measuring Magnetic Fields
Apr. 16-20	Maxwell's Equations and E&M Waves	<b>Midterm 2 April 18</b>	AC Circuits I
Apr. 23-27	Temperature, Heat, and Work	PS #8 due Apr. 25	AC Circuits II
Apr. 30-May 4	1 <sup>st</sup> Law of Thermodynamics & Ideal Gases	PS #9 due May 2	Polarization of Light
May 7-11	Entropy and 2 <sup>nd</sup> Law of Thermodynamics	PS #10 due May 9	Calorimetry
May 17 <sup>th</sup>	<b>Final Exam at 9 am</b>		