# **Physics 200:** Electricity & Magnetism

## CUYAMACA COLLEGE / SPRING 2018 / SECTION 0333


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**Lec** (H-223)**: MW** 10-11:50a
**Lab** (H-223)**: F** 8-10:50a

**Office Hours** (H-243)**: M**2-4p, **W**9-10a, **TuTh**12:30-1:30p

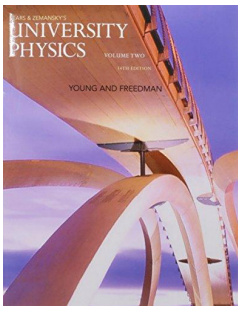
**Description:** Course focus is on the electric and magnetic behavior of matter, primarily Maxwell's Equations and their applications.

**Prerequisites:** "C" grade or higher or "Pass" in PHYC 190 (or equivalents), "C" grade or higher or "Pass" in MATH 280 (or equivalents) or concurrent enrollment. *Recommended* concurrent enrollment in MATH 281.s

WITHOUT THE FOLLOWING SKILLS YOU WILL BE HIGHLY UNLIKELY TO SUCCEED IN THIS COURSE:

1) Solve algebraic word problems by using substitution or simultaneous equations.
2) Knowledge of trigonometric functions & their identities.
3) Solve linear, quadratic & trigonometric equations.
4) Knowledge of related rates & derivatives.
5) Integrate polynomial, exponential & trigonometric functions.
6) Use the relationship between force, mass & acceleration to solve dynamics problems.
7) Use conservation of energy & conservation of momentum concepts.
8) Understand simple harmonic motion & apply its concepts to analyze oscillating systems.
9) Understand definition of vectors & how to use them.

**Required Text:** University Physics w/Modern Physics *plus MasteringPhysics* (14th Edition)
Hugh D. Young & Roger A. Freedman
3 hole punch+MasteringPhysics: ISBN: 0134151798
Hardbound+MasteringPhysics: ISBN: 0134311825
ebook+MasteringPhysics: ISBN: 0133979393




**Course Objectives (Expected Student Learning Outcomes):**

Upon successful completion of this course, students will be able to:

1) Recognize the basic concepts concerning electric fields, electric potential, capacitance, resistance, current, DC circuits, magnetic fields, inductance, AC circuits, Maxwell's Equations, and use algebraic, trigonometric and advanced calculus expressions to represent physical situations involving these subjects.
2) Investigate and delineate the relationship between the theoretical principles of physics and their practical applications, and explain how this relationship affects real world problem solving.
3) Investigate, interpret and analyze the fundamental principles of physics based on reading assignments and in-class discussions.
4) Calculate solutions to physics problems using the fundamental principles of physics and symbolic logic skills:
   a. Analyze simple static charge distributions and calculate the resulting electric field and electric potential.
   b. Analyze simple current distributions and calculate the resulting magnetic field.
   c. Predict the trajectory of charged particles in uniform and magnetic fields.
   d. Analyze DC and AC circuits in terms of current, potential different and power dissipation for each element.
5) Design experiments using the scientific method.
6) Collect and analyze data using both traditional and computer data acquisition methods; interpret and analyze numerical data, including appropriate use of error propagation, units and significant figures, and generate a visual representation of the data.
7) Using concepts covered in class, evaluate and interpret the experimental results.

## VERY IMPORTANT

**MAKEUPS:**
Because the lowest quiz, homework, attendance and lab scores will be dropped, makeups are not given except in very extreme cases.

**CHEATING:**
Cheating is representing someone else's work as your own including copying off someone else's test. If I find you cheating on your work, you will receive a **non-droppable** zero for that assignment. A second offense will result in a zero for that assignment and disciplinary action.

**STUDENTS WITH DISABILITIES:**
Students with a verified disability *may* be entitled to appropriate academic accommodations. Please consult your instructor during the first week of class.

**Grade Cut Offs:**
**A** 90 % to 100 %
**B** 80 % to 89.99 %
**C** 70 % to 79.99 %
**D** 60 % to 69.99 %
**F** 0 % to 59.99 %

***I reserve the right to make changes during the semester to schedules, topics, assignments, tests etc. in order to optimize class progress.***

**COURSE SCHEDULE:** The schedule is available to enrolled students at https://gcccd.instructure.com. It may be revised during the semester as necessary; changes to the schedule will be announced.

# GRADING

### 40% EXAMS

**Four exams** will be given during the semester. ***Your lowest exam score will be dropped automatically***. Exams will be closed-book and closed-notes, however you will be allowed to bring a **4" x 6" formula sheet** on which you may *hand* write anything you wish (both sides). Leaving the room or looking at/touching any personal electronic device will result in a fail. After receiving each exam grade, you have one week to contest this grade in any way.

### 20% FINAL EXAM

The final exam will be **cumulative** over the entire semester. ***You will not pass the class if you do not pass the final exam.*** It will consist of five problems and it will take two hours. At least one problem will be on material covered since the last exam. You will be allowed to bring one **8 ½" x 11" formula sheet** on which you may *hand* write anything you wish (both sides). Leaving the room or looking at/touching any personal electronic device will result in a fail.

### 20% LABS

Lab manuals are posted on Blackboard and must be printed prior to the lab. Your lab work will be done in pairs or small groups but each person will turn in their own work. One lab from each group will be graded at random each week. You will miss points for arriving late to or leaving early from lab or if you are not participating in your group. ***Your lowest lab score will be dropped.***

### 10% PARTICIPATION

**In-Class Participation:** During class, clickers will be used to assess understanding. You must answer at least ***75%*** of the questions to get credit. If you have someone else's clicker you and they will receive a zero for the day. In class, there will be opportunities to answer questions and interact with other students. Although lively discussion is permitted, behavior that inhibits the learning of other students will result in forfeiture of points and possible dismissal from class.

**Online Quizzes and Tasks:** pre and post lecture surveys and quizzes and other tasks on Canvas will also count towards participation.

***Two lowest participation scores are dropped.***

### 10% HOMEWORK

Each week a problem set will be assigned on that will be due the following week. These problems will be difficult and you are encouraged to collaborate with other students (although you must turn in your own work). YOU MUST HAVE MasteringPhysics to do the homework. ***Lowest score is dropped.***

***** Alternative grading: 80% Final, 20% Lab**

**EXAM SCORING RUBRIC**→**10**: perfect; **9**: math/calculation mistakes, all numbers are plugged into correct places; **8:** small physics error, like putting + instead of - in an equation; **7**: simple conceptual mistake; **6**: leaving out part of the solving process, or missing something substantial; **5**: getting the overall concept, but not doing much correct; **4**: maybe using the right equation, but no idea what's going on; **3**: garbage, but at least equations and numbers; **2**: having a equation and maybe a figure or some values written down; **1**: having anything written down; **0**: blank.
**ADDITIONAL -1**: incorrect units (if nothing is written, default units are potatoes), ridiculous number of sig figs

# How To Study For This Class

& general good advice for being awesome at Physics

## PREPARING FOR EXAMS

### REVIEW PROBLEMS

Look over all the problems from the relevant sections. You don't need to do them all, just look at them and figure out how you would set them up and solve them. If you can't do that, then redo them until you can. Try to think of other ways the problems could be asked on a test and practice that too.

### WORK TOGETHER

Once you've looked over the problems/practice test, go over the tricky ones with other people to get help/a new perspective/practice explaining concepts. All these things will help you understand.

### MAKE AN EPIC CHEAT SHEET

Spend some time grouping topics, picking and making sure you understand the formulas, then pairing them with notes/strategies.

### PRACTICE TEST

Try to take the practice test like you would take an actual test: with a time limit and just your cheat sheet.

## BONUS POINTS

Finding mistakes in the solutions

1 extra homework point for any mistakes you catch in any solution from the book, homework or exams if you are the first person to notice it.

Posting questions

1 extra participation point for every 5 (non-terrible) questions you post on canvas.

Answering posts

1 extra homework point if you post the first useful answer to a question asked on canvas.

## BEFORE LECTURE

### READ THE BOOK, DO SOME EASY PROBLEMS/EXAMPLES

I mean, seriously, there's useful stuff in there and it was not cheap. But don't try to read it cover to cover like it's some sparkly vampire novel. Before you come to lecture, ***skim the text***, so you know what we will cover in class. ***Start at the back summary*** to get a feel for the important topics. ***Look at the pictures***/figures: can you tell what they mean? Do the equations make sense? ***Try a couple examples, conceptual problems and maybe a few low number problems.***

## DURING LECTURE

### STAY AWAKE, ATTEMPT TO THINK

In lecture I go over topics from the book including some examples that I think are useful. This is a summary with some extras thrown in.
You should actually try these problems in class and not just watch me do them because I am not a magical knowledge-imparting wizard and you need the practice more than I do.

### ASK QUESTIONS

If you are confused about something, chances are that you're not alone and others have the same question, or at least want a break.

## AFTER LECTURE (AND AT HOME)

### READ THE BOOK, DO A FEW PROBLEMS A DAY

After lecture, read to fill in the details or clarify things you didn't quite get in class. Review any problems we did in class that you didn't quite get. And then start the homework. Still reading this? One exam extra credit point for writing the word ohm on the back of the third exam.

### HOW TO APPROACH THE HOMEWORK

Look at it immediately when you get it and start thinking about which problems you can and can't do. Start early so the concepts have time to stick. Start with the easy ones. Do a couple a day. If you get stuck take the following steps:

(1) look back to the book and lecture for similar example problems,
(2) ask someone else in the class or post on blackboard,
(3) send me an email or come to office hours.

### DO MORE

If you find topics you are having trouble with, do more problems from the book on those topics. Don't think of it as extra homework, think of it as extra test points.

| Wk | | **Lecture** (MW 10-11:50a) | **Homework** | **Labs** (F 8-10:50a) |
|---|---|---|---|---|
| **1** | 1/29 | Introduction | PS1: Review | Lab 0: Graphing |
| | 1/31 | Ch 21: Electric Fields | | |
| **2** | 2/5 | | PS2: Electric Charges, Force, Field | Lab 1: Sticky Electrostatics |
| | 2/7 | | | |
| **3** | 2/12 | Ch 22: Gauss's Law | PS3: Gauss's Law | NO SCHOOL |
| | 2/14 | | | |
| **4** | 2/19 | Holiday (Washington's Birthday) NO CLASS | PS4: Electric Potential | Lab 2: Electric Fields |
| | 2/21 | Ch 23: Electric Potential | | |
| **5** | 2/26 | | PS5: Capacitance and Dielectrics | **Exam 1 (Ch 21-22)** |
| | 2/28 | Ch 24: Capacitance & Dielectrics | | |
| **6** | 3/5* | | PS6: Current and Resistance | Lab 3: Equipotentials |
| | 3/7* | Ch 25: Current, Resistance & Electromotive Force | | |
| **7** | 3/12 | | PS7: Fundamentals of Circuits | Lab 4 - Basic Circuits (Batteries, Bulbs & Current) |
| | 3/14 | Ch 26: Direct Current Circuits | | |
| **8** | 3/19 | | | **Exam 2 (Ch 23-25)** |
| | 3/21 | | | |
| | | Spring Break | | |
| **9** | 4/2 | Ch 27: Magnetic Fields & Magnetic Forces | PS8: The Magnetic Field | Lab 5 - Ohm's Law |
| | 4/4 | | | |
| **10** | 4/9 | Ch 28: Sources of Magnetic Fields | PS9: Sources of the Magnetic Fields | Lab 6 - Kirchoff's Laws (series/ parallel) |
| | 4/11 | | | |
| **11** | 4/16 | Ch 29: Electromagnetic Induction | PS10: Electromagnetic Induction | **Exam 3 (Ch 26-27)** |
| | 4/18 | | | |
| **12** | 4/23 | Ch 30: Inductance | PS11: Inductance | Lab 7 - Magnetism |
| | 4/25 | | | |
| **13** | 4/30 | Ch 31: Alternating Current Circuits | PS12: AC Circuits | Lab 8 - Induction |
| | 5/2 | | | |
| **14** | 5/7 | Ch 32: Electromagnetic Waves | PS13: EM Waves | **Exam 4 (Ch 28-30)** |
| | 5/9 | | | |
| **15** | 5/14 | | | Lab 9 - Current Balance |
| | 5/16 | | | |
| **16** | 5/21 | REVIEW | PS 14: Review | Lab 10 - AC Resonance |
| | 5/23 | | | |
| **17** | **6/4** | **Final (Ch 21-32 ) Monday, June 4 11:45am-1:45pm** | | |