Crafton Hills College

Physics 251

Spring 2016 Syllabus

Instructor Information

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Course Description

Physics 251: Designed to give a thorough understanding of the fundamental principles of physics in the area of thermodynamics, electricity, electrical circuits, magnetism, and electromagnetic fields.

Prerequisite

PHYSICS 250; MATH 251

Textbook & Course Materials

Required Text

- Fundamentals of Physics, Halliday – Resnick – Walker, 10th edition. **OR** Physics for Scientists and Engineers: A Strategic Approach, Randall D. Knight. Pearson/Addison-Wesley. 3rd edition.
- An account at *MasteringPhysics.com* (Course ID provided in class). **Click the latter text** when they ask you "which book are you using". Pearson only allows Pearson textbooks online. It doesn't' make us any difference – the physics is all the same.

Recommended Entertaining and Educational Media

- Carl Sagen. Type his name into YouTube and enjoy!
- Neil Degrasse Tyson. Same story. YouTube the man.

Course Structure

• **Homework:** You will be given one or two assignments per week. This is to be submitted online at *MasterigPhysics.com*. I recommend you find a few people to explore and solve the problems with. It's a large load to bear for just one person! This assignment will typically be assigned on Monday and due the following Tuesday. Late homework will not be accepted. However, feel free to ask me for an extension.

• **Chapter Exams**: There will be three chapter exams. The final chapter exam will be part of the cumulative final. Each chapter exam will be worth 100 points. The points will be split evenly per chapter (25 points each). Please refer to the schedule for exam dates and chapters covered. You may use a calculator during the exam. The exams will be closed book and closed notes. The exam questions will be based on the lectures and homework assignments. *Depending on how the class does, I may elect to have one midterm exam in place of the chapter exams.*

• **Comprehensive Exam:** This exam will be comprised of questions pulled from the chapter exams (they may be reworded and the numerical values may be modified), homework, and lectures. A study guide is typically provided.

Your final grade will be marked "F" if you do not take this last exam.

• **Lecture Attendance and Participation:** Lecture participation and attendance is mandatory. If you miss more than three days of lecture/lab, you may be dropped from the course. Your lowest lab score will be dropped. Please see me if you have an emergency that will require you to miss more than three classes. *Communication is key.* Class participation will come in the form of demonstrations, games, and student responses to questions posed during the lectures.

• **Extra Credit:** Extra credit will be available through periodic homework assignments (typically a short fun project), as well as through participation during lecture. Homework extra credit will count for ~6% of your grade. Lecture extra credit will count for ~2% of your overall grade.

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Grading Policy:

Percent of Grade	Description
40%	Chapter Exams
20%	Comprehensive Exam
15%	Homework
25%	Class Participation

Letter Grade Assignment

Grades will be determined as follows:

Letter Grade	Percentage	Performance
A	90-100%	Excellent Work
B	80-89.9%	Very Good Work
C	70-79.9%	Mostly Good Work
D	60-69.9%	Below Average Work
F	0-59.9%	Needs Serious Improvement

Course Objectives

1. Determine the electric force and potential energy between electric charges.
2. Calculate and sketch the electric field for various charge distributions using both the definition of the electric field and Gauss' Law.
3. Calculate the electric potential for various distributions of point and continuous charges.
4. Solve for the charge and voltage on one or more capacitors.
5. Use the geometry of a material and its resistivity to determine resistance.
6. Use Ohm's Law to solve simple resistive circuits.
7. Solve complex resistive circuits using Ohm's Law and Kirchhoff's Laws.
8. Solve the equations for RC circuits.
9. Determine the force on a moving charged particle due to a magnetic field.

10. Use Ampere's law to determine the strength of a magnetic field.
11. Use Faraday's Law of Induction to determine induced voltage.
12. Determine the self-inductance of a coil.
13. Solve the equations for RL circuits.
14. Solve the equations for LC circuits.
15. Solve the equations for RLC circuits.
16. Determine the impedance, voltage, and current in an alternating current circuit.
17. Use Maxwell's Equations to determine the existence and properties of electromagnetic waves.
18. Determine the direction of reflected and refracted light waves entering various materials.
19. Use ray tracing and equations to solve problems involving single and multiple lenses and mirrors.
20. Determine the location or angle of constructive and destructive interference resulting from diffraction.
21. Use the concept of light interference to determine the behavior of light with thin films.
22. Write a well-structured lab report, discussing physics principles as outlined in the lab handout.

Student Learning Objectives

1. Calculate the electric force between two or more charges.
2. Add capacitors in series and/or in parallel.
3. Describe Kirchhoff’s Laws and how to use them.
4. Calculate the magnetic force on a moving charge.
5. Calculate the current and voltage for a transformer.
6. Describe Maxwell’s Equations, and how they relate to EM waves.
7. Calculate the refracted angle for a ray of light between two transparent media.
8. Perform calculations regarding Young’s Double Slit Experiment.

Commit to Integrity

As a student in this course (and at this College) you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class. Please place your cellular phones on silent mode during class. Refer to the student handbook for the college policies regarding academic dishonesty.

I wish to recognize this syllabus was partially developed from previous syllabi of Crafton Hills colleague Dr. Matthew C. Adams.