Syllabus Spring 2009 - Physics 142 Dr. Frosso Seitaridou

Goals of the Course

Using the scientific method, we will learn and understand the basic concepts and principles of physics. To achieve this goal, we will use laboratory exercises, discuss real-world applications, and employ some algebra. We will be covering a lot of important concepts during this semester. For this reason, you will have to review the material frequently via practice problems sets and quizzes.

Important Information

Instructor and Contact Information: Dr. Frosso Seitaridou. You can reach my by emailing at eseitar@LearnLink.Emory.edu or by calling my office at 4-8344

Office Hours: My office is at Pierce 209. I have an open door policy: if I am in the office and the door is open, feel free to come in. We can talk about physics and homework assignments, your student life, and anything else you would like to chat about. You can definitely find me at my office on **Mondays and Tuesdays, 2-4 pm**. You will be notified if, for some reason, there is a change to these days/times

SI and Lab assistants: SI for 142 is Daniel Real (the day/time of his session will be announced).

Prerequisite: Math 111 or 110A and Physics 141 or 151

Textbook: Serway and Vuille, *College Physics*, Eighth Edition

Practice Problem Sets: Throughout the semester I will assign problem sets that are for you to practice. Doing those problems sets will greatly help you prepare for the tests and quizzes. Therefore, working on them can only benefit you. How you work on the practice problems is up to you. You can do them in groups if you like, but I recommend working on them alone, so that you are perfectly prepared for the tests/quizzes. These assignments must be handed in on the due date stated on the assignment and doing them will count towards your class participation grade. These assignments will not be graded. The solutions will be posted on the bulletin board outside Pierce 209 (my office).

Quizzes: There will be frequent in-class and take-home quizzes.

Tests and Exams: There will be three tests and one final exam. The tests will be on the material covered up until that point (the second test will cover the material after the first test and, similarly, the third test will be on the material after the second test). Keep in mind though that the material is interconnected and, therefore, no test can be completely independent of the previous tests. All tests will be taken on Friday afternoons (see detailed schedule below). The final exam will be cumulative. There is no such thing as a make-up exam!

Attendance and Class Participation: I find attendance and class participation to be vital for this course. You will find the practice problems to be really easy to do, if you come to class and you actively participate by asking questions. **ATTENDANCE IS MANDATORY FOR LAB SESSIONS**.

Tardiness and Cell Phones: Being late for a class, or having your cell phone ring in the middle of one, is distracting not only for you but also for me and for your classmates. Students who are late for class for more than 5 min will generally not be allowed to attend that day's lecture. Students whose cell phone rings during class will be asked to leave the classroom. For the same reason, I will not allow food or drink during class, with the exception of a bottle of water.

Grading: Grades given for this course will be a subset of A (93-100), A- (90-92), B+ (87-89), B (83-86), B- (80-82), C+ (77-79), C (73-76), C- (70-72), D+ (67-69), D (60-66), F (below 60). See Catalog. The final grade will be determined based on the following weighting:

Quizzes: 20%

Exams: 10% each test, 20% for the final

Labs (notebook, report, project): 20%

Class participation (includes practice problem sets): 10%

Course Content: Electricity, Magnetism, Optics and, if time permits, some Modern Physics

Important Note: The following table is subject to change, depending on the rate at which we are covering the material. All the topics are titles of sections from the corresponding chapter. Thus, if the title of a section is not mentioned, that means that you can skip that section, unless otherwise announced in class.

Date	Material Covered
Wednesday, Jan. 14, 2009	Class Logistics – Go over the syllabus / study plan Chapter 15: Properties of electric charges
Friday, Jan. 16, 2009	Chapter 15: Insulators & Conductors Coulomb's law
Monday, Jan. 19, 2009	Martin Luther King day holiday – No class
Wednesday, Jan. 21, 2009	Chapter 15: The electric field Electric field lines Conductors in electrostatic equilibrium
Friday, Jan. 23, 2009	Chapter 15: Electric flux and Gauss's law
Monday, Jan. 26, 2009	Chapter 16:Potential difference and electric potential
Wednesday, Jan. 28, 2009	Chapter 16: Electric potential and potential energy due to point charges
Friday, Jan. 30, 2009	Chapter 16: Potentials and Charged Conductors Equipotential surfaces
Monday, Feb. 2, 2009	Chapter 16: Capacitance The parallel-plate capacitor Combinations of capacitors
Wednesday, Feb. 4, 2009	Chapter 16: Energy stored in a charged capacitor Capacitors with dielectrics
Friday, Feb. 6, 2009	Chapter 17: Electric current Current and drift speed
Monday, Feb. 9, 2009	Chapter 17: Current and voltage measurements in circuits Resistance, resistivity and Ohm's law
Wednesday, Feb. 11, 2009	Chapter 17: Temperature variation of resistance Electrical energy and power
Friday, Feb. 13, 2009	Chapter 18: Sources of EMF Resistors in series Resistors in parallel
Friday, Feb. 13, 2009	**Test 1: Chapters 15, 16, 17**
Monday, Feb. 16, 2009	Chapter 18: Kirchhoff's rules and complex DC circuits RC circuits

Wednesday, Feb. 18, 2009	Chapter 19: Magnets Magnetic fields Magnetic force on a current-currying conductor
Friday, Feb. 20, 2009	Chapter 19: Torque on a current loop and electric motors Motion of a charged particle in a magnetic field
Monday, Feb. 23, 2009	Chapter 19: Magnetic field of a long, straight wire and Ampere's law Magnetic force between two parallel conductors
Wednesday, Feb. 25, 2009	Chapter 19: Magnetic fields of current loops and solenoids Chapter 20: Induced EMF and magnetic flux
Friday, Feb. 27, 2009	Chapter 20: Faraday's law of induction Motional EMF Lenz's law revisited **Note: First full lab report due today**
Monday, Mar. 2, 2009	Chapter 20: Generators Self-inductance
Wednesday, Mar. 4, 2009	Chapter 20: RL circuits Energy stored in a magnetic field
Friday, Mar. 6, 2009	Chapter 21: Resistors in an AC circuit Capacitors in an AC circuit
Friday, Mar. 6, 2009	**Test 2: On Chapters 18, 19, 20**
Monday, Mar. 9, 2009	Spring recess – No class
Wednesday, Mar. 11, 2009	Spring recess – No class
Friday, Mar. 13, 2009	Spring recess – No class
Monday, Mar. 16, 2009	Chapter 21: Inductors in an AC circuit The RLC series circuit
Wednesday, Mar. 18, 2009	Chapter 21: Power in an AC circuit Resonance in a series RLC circuit
Friday, Mar. 20, 2009	Chapter 21: The transoformer Maxwell's predictions Hertz's confirmation of Maxwell's predictions
Monday, Mar. 23, 2009	Chapter 21: Properties of Electromagnetic waves The spectrum of electromagnetic waves The Doppler effect for electromagnetic waves
Wednesday, Mar. 25, 2009	Chapter 22: The nature of light Reflection and Refraction
Friday, Mar. 27, 2009	Chapter 22: The law of refraction Dispersion and prisms The rainbow
Monday, Mar. 30, 2009	Chapter 22: Huygens' principle Total internal reflection
Wednesday, Apr. 1, 2009	Chapter 23: Flat mirrors Images formed by concave mirrors
Friday, Apr. 3, 2009	Chapter 23: Convex mirrors and sign conventions Images formed by refraction Atmospheric refraction
Monday, Apr. 6, 2009	Chapter 23: Thin lenses
Wednesday, Apr. 8, 2009	Chapter 24: Conditions for interference Young's double-slit experiment
Friday, Apr. 10, 2009	Chapter 24: Change of phase due to reflection

	Diffraction Single-slit diffraction
Friday, Apr. 10, 2009	**Test 3: On Chapters 21, 22, 23**
Monday, Apr. 13, 2009	Chapter 24: The diffraction grating Polarization of light waves
Wednesday, Apr. 15, 2009	Chapter 25: Resolution of single-slit and circular apertures The Michelson interferometer
Friday, Apr. 17, 2009	Chapter 27: Blackbody radiation and Planck's hypothesis The photoelectric effect and the particle theory of light
Monday, Apr. 20, 2009	Chapter 27: X-rays Diffraction of x-rays by crystals
Wednesday, Apr. 22, 2009	Chapter 27: The Compton effect The dual nature of light and matter The wave function **Note: Second full lab report due or oral presentation during the lab sessions**
Friday, Apr. 24, 2009	Chapter 27: The uncertainty principle
Monday, Apr. 27, 2009	Last day of class – Review for the final exam
Monday, May 4, 2009	**Final Exam (Cumulative)**

Chapters 15, 16, 17	Test 1 (February 13, 2009, 2-4 pm)
Chapters 18, 19, 20	Test 2 (March 6, 2009, 2-4 pm)
Chapters 21, 22, 23	Test 3 (April 10, 2009, 2-4 pm)
Chapters: all the above + 24, 25, 27	Final Exam (May 4, 2009, 2 pm-5 pm, cumulative)

Working with the Honor Code: The Oxford College Honor Code applies to quizzes, tests, and exams. You are asked to follow the instructions given by me and abide by the Honor Code. For example, you are only allowed to use books when I specifically tell you that you can. Also, sharing calculators, pencils, etc., is not allowed. All work should be your own.

Religious Holidays: You need to tell me immediately if any religious holidays, other than those designated in the schedule above, will interfere with the course, especially the final exam and tests

How to Solve a Physics Problem

Your practice problems sets and tests will consist of discussion questions and problems. In your solutions I expect to see that you solve the problems following several important steps.

1. Read the problem carefully so that you know what is given and what is asked.
2. Draw a picture. I cannot think of any physics problems that can be solved without drawing a good picture.
3. Label all the quantities in the diagram, those that are given and those that you need to find. Also, **show your coordinate system and show which direction you have defined as positive!**
4. State the Physics Laws that apply to that problem and explain why. Here, I am not asking for an essay, a sentence is enough. For example: ``The system is isolated ➔ Conservation of Momentum applies."
5. Write the law in equation(s) form. To continue the example, at this point you will say: $\overrightarrow{P_{final}} = \overrightarrow{P_{initial}}$

6. Solve the equations and substitute the values. **Always include the units!** Also, show your work! You cannot just write the initial equation and then the result. You have to show me the intermediate steps. This way, I can identify the wrong step and help you understand why what you did is not right.
7. Check your answer. Do the units match? Does the sign in front of your result make sense? Is the answer too big or too small compared to what you expected?

Requirements for the Lab portion of this course

For the lab portion of the course, you are required the following:

1. Have a lab notebook. Your lab notebook is where you will record details of your experiment. Each time you do an experiment you will have to record
    a. The title of the experiment. Include your name, your partners' names and the date
    b. The goal of the experiment: in a couple of sentences you will have to describe what you are trying to measure and why
    c. A list of the materials/equipment you are using for this lab assignment
    d. What you are measuring and why (State what formulas you need and why in order to go from the quantities you are measuring to the quantities you are interested in).
    e. Show your results (measured quantities and the quantities you wanted to find). In this section you would show the graphs (label axis and show the units) and any other results (such as tables) that you gathered during the experiment.
    f. Discuss the results. I am not really asking for an essay here, just say if the results you got were as expected (and why) describe and show the errors in your measurements and, in a couple of sentences, say what you would do differently if you had to do the experiment again.
    g. Conclusion. In a small paragraph summarize the experiment and explain what you got out of it
2. A full lab report (for due date, see the table above). For one lab experiment (I will announce which one) you will have to do one lab report. Almost all the elements your lab report will contain are the same as above (a-g) but they are going to be more detailed. For example, you will have to explain in full every step of your lab experiments, your conclusions, etc. I will give a more detailed handout on this when the time comes. The lab report will be corrected and graded and detailed comments will be given. If you desire, you can resubmit the lab report (after addressing all the comments) and the lab report will be re-graded, erasing in this way the first grade. You can only resubmit the lab report once. A handout on the elements of a full lab report will be given during the semester.
3. Towards the end of the semester you will have a choice of a) either doing another full lab report (on an experiment of your choice, this time) or doing a small final project. For the final project you will have to pick a topic and, using the physics you have learned throughout the semester, you will have to explain how it works during a 15min oral presentation. As an example, a topic can be "How does the TV work?" Depending on your preference (how many people decide to do the project) we will have the last lab section of the semester devoted to the presentations. The final projects will be group projects.