Syllabus Spring 2009 - Physics 152 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 the mathematical tools of algebra and calculus. We will be covering a lot of important concepts during this semester. For this reason, you will have to review the material frequently via homework assignments 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

Prerequisite: Math 112 and Physics 141 or 151

Textbook: Serway and Jewett, *Physics for Scientists and Engineers with Modern Physics*, Seventh Edition

Weekly take-home tests: The take-home tests will be due at the date stated in class, usually one week from the date they are given out in class. **Late submission will not be accepted unless in the case of a medical emergency.** My goal is to ensure that you keep up with the material covered in class. **A take-home test will normally be worth 90 points so that, together with the quiz, there will be a total of 100 points for the week (see below).**

Quizzes: There will be frequent quizzes on the material that was covered in the past two lectures. I will not be giving out warnings for the quizzes. Also, quizzes cannot be made up: If you miss class the day when a quiz is taken, then you will get a zero for that quiz. Just as with the take-home tests, my goal is to ensure that you review the material frequently. You cannot possibly learn a concept if you see it only once. **A quiz will be 10 points, and those points will be counted as part of that week's take-home test.** That means that the take-home test will be 90 points and the quiz 10 points, so that you will have a total of 100 points for that week. The grade for the quiz will count as part of the take-home test.

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). 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 take-home tests 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:

Homework (with the quizzes): 20%

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

Labs (notebook, report, project): 20%

Class participation: 10%

Course Content: Electricity, Magnetism, and Optics

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
Thursday, Jan. 15, 2009	Class Logistics – Go over the syllabus / study plan Chapter 23: Properties of electric charges Charging objects by induction Coulomb's law
Tuesday, Jan. 20, 2009	Chapter 23: The electric field Electric field of a continuous charge distribution Electric field lines
Thursday, Jan. 22, 2009	Chapter 23: Motion of a charged particle in a uniform electric field Chapter 24: Electric flux Gauss's law
Tuesday, Jan. 27, 2009	Chapter 24: Application of Gauss's law to various charge distributions Conductors in electrostatic equilibrium
Thursday, Jan. 29, 2009	Chapter 25: Electric potential and potential difference Potential difference in a uniform electric field Electric potential and potential energy due to point charges
Tuesday, Feb. 3, 2009	Chapter 25: Obtaining the value of the electric field from the electric potential Electric potential due to continuous charge distributions Electric potential due to a charged conductor
Thursday, Feb. 5, 2009	Chapter 26: Definition of capacitance Calculating capacitance Combinations of capacitors
Tuesday, Feb. 10, 2009	Chapter 26: Energy stored in a charged capacitor Chapter 27: Electric current Resistance
Thursday, Feb. 12, 2009	Chapter 27: Electrical power Chapter 28: Electromotive force Resistors in series and parallel
Friday, Feb. 13, 2009	**Test 1: On Chapters 23, 24, 25, 26**
Tuesday, Feb. 17, 2009	Chapter 28: Kirchhoff's rules

	RC circuits Chapter 29: Magnetic fields and forces
Thursday, Feb. 19, 2009	Chapter 29: Motion of a charged particle in a uniform magnetic field Magnetic force acting on a current-carrying conductor Torque on a current loop in a uniform magnetic field
Tuesday, Feb. 24, 2009	Chapter 30: The Biot - Savart law The magnetic force between two parallel conductors Ampere's law
Thursday, Feb. 26, 2009	Chapter 30: The magnetic field of a solenoid Gauss's law in magnetism Chapter 31:Faraday's law of induction **Note: First full lab report due today**
Tuesday, Mar. 3, 2009	Chapter 31: Motional emf Lenz's law Induced emf and electric fields
Thursday, Mar. 5, 2009	Chapter 32: Self-induction and inductance RL circuits Energy in a magnetic field
Friday, Mar. 6, 2009	**Test 2: On Chapters 27, 28, 29, 30**
Tuesday, Mar. 10, 2009	Spring recess – No class
Thursday, Mar. 12, 2009	Spring recess – No class
Tuesday, Mar. 17, 2009	Chapter 32: Mutual inductance Oscillations in an LC circuit The RLC circuit
Thursday, Mar. 19, 2009	Chapter 33: AC sources Resistors in an AC circuit Inductors in an AC circuit
Tuesday, Mar. 24, 2009	Chapter 33: Capacitors in an AC circuit The RLC series circuit Power in an AC circuit Resonance in a series RLC circuit
Thursday, Mar. 26, 2009	Chapter 34: Displacement current and the general form of Ampere's law Maxwell's equations and Hertz's discoveries Plane electromagnetic waves
Tuesday, Mar. 31, 2009	Chapter 34: Energy carried by electromagnetic waves The spectrum of electromagnetic waves
Thursday, Apr. 2, 2009	Chapter 35: The nature of light Measurements of the speed of light The ray approximation in geometric optics The wave under reflection
Tuesday, Apr. 7, 2009	Chapter 35: The wave under refraction Huygens's principle Dispersion Total internal reflection
Thursday, Apr. 9, 2009	Chapter 36: Images formed by flat mirrors Images formed by spherical mirrors
Friday, Apr. 10, 2009	**Test 3: On Chapters 31, 32, 33, 34**
Tuesday, Apr. 14, 2009	Chapter 36: Images formed by refraction Thin lenses

Thursday, Apr. 16, 2009	Chapter 37: Conditions for interference Young's double-slit experiment Light waves in interference
Tuesday, Apr. 21, 2009	Chapter 37: Intensity distribution of the double-slit interference pattern Change of phase due to reflection Chapter 38: Introduction to diffraction patterns Diffraction patterns from narrow slits **Note: Second full lab report due or oral presentation during the lab sessions**
Thursday, Apr. 23, 2009	Chapter 38: Resolution of single-slit and circular apertures The diffraction grating Polarization of light waves
Tuesday, Apr. 28, 2009	Last day of classes – Review for the final exam
Wednesday, May. 6, 2009	**Final Exam (cumulative)**

Chapters 23, 24, 25, 26	Test 1 (February 13, 2009, 2-4 pm)
Chapters 27, 28, 29, 30	Test 2 (March 6, 2009, 2-4 pm)
Chapters 31, 32, 33, 34	Test 3 (April 10, 2009, 2-4 pm)
Chapters all the above + 35, 36, 37, 38	Final Exam (May 6, 2009, 2 pm-5 pm, cumulative)

Working with the Honor Code: The Oxford College Honor Code applies to take-home tests, 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.

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 tests (take-home and in-class) 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 do rockets fly?" 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.