Syllabus Fall 2010 - Physics 151 Dr. Frosso Seitaridou

Physics is a fundamental science. A good understanding of introductory physics will help you a) understand most technology (e.g., hydraulic brakes, the mechanics of bridges, MRI machines, photocopiers, etc.), b) better appreciate how physics concepts are constantly being used in other sciences (i.e., chemistry, biology, geology, etc.), c) hone your thinking and engineering skills, d) recognize the close connection between physics and history, politics, culture and the arts! By taking Physics 151 and 152 you will learn the concepts needed for understanding how a big part of the Universe works! I hope you are getting excited!

Goals of the Course

At the end of this course, we will be able to:

1. Explain the basic concepts, theorems, and principles of physics and when and where they apply
2. Recognize the limitations of the concepts/theories/principles
3. Apply these concepts in order to solve both simple and advanced (i.e., multiple-step or multiple-concept) physics problems by learning how to
    a. Break down a problem to its component "mini" problems
    b. Identify which concept should be used for each "mini" problem
    c. Correctly apply the concept and check the validity of the answer
    d. Develop an organized and methodical solution to a problem
4. Use calculus in order to solve advanced problems and gain insight into the concept/principle
5. Combine multiple concepts when analyzing a complex phenomenon
6. Recognize the physics concepts behind our day-to-day experiences
7. Begin to develop the quantitative and modeling skills used by engineers and physicists

Remember that **knowing how to use calculus and using calculus is NOT the same as understanding the underlying concept. In this class you will be asked to do both!**

To achieve these goals, we will solve many problems, use laboratory exercises, and discuss real-world applications while employing the mathematical tools of algebra and calculus in the process. We will be covering a lot of important concepts during this semester. For this reason, you will have daily assignments and frequent quizzes.

Important Information

Instructor and Contact Information: Dr. Frosso Seitaridou. You can reach me 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 also email me to make individual appointments.

Tutor: Joseph Kim is the Physics tutor. The day/time/location of his sessions will be announced.

Prerequisite: Math 111 and Math 112 (Math 112 can be taken concurrently)

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

Homework: All homework assignments and other announcements and handouts will be posted on Blackboard. Therefore, you are expected to check Blackboard frequently. Omission on your part to do so

will not be regarded as a valid excuse for not completing an assignment. Homework assignments will be of three different kinds:

a) **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).** When writing up the solutions to the problems, **use a separate sheet of paper for each problem**.
b) **Daily reading:** After each class, I will assign the reading that you are REQUIRED to do BEFORE coming to class the next time. You will be asked to reflect on that reading by answering some questions. **I will be asking for your oral responses during class.** By doing the reading before coming to class, you will be better prepared to follow the material covered in class.
c) **Daily practice problems and review questions:** At every lecture, you will be assigned a couple of problems and questions from the handout "Review Questions and Practice Problems". These problems will be much simpler than the ones on the take-home test (remember that 141 students have the same handout). Thus, you should be able to do these problems before attempting the problems on the take-home test. Use sheets of paper for the problems and keep them in a binder. I will be randomly collecting problems from students at the end of each class. I will be looking to see if you did the problems since the **beginning** of the semester. Failure to present the solutions to the assigned problems or failure to submit the binder will count against your Practice Problems grade (see section on Grading below).

Quizzes: There will be frequent quizzes on the material that was covered in the lectures and homework assignments. 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 homework assignments, 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.

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!

Re-grading Assignments: I am very careful when I grade assignments and you will receive a handout with information about my grading system. However, I might make mistakes when I grade. If you would like me to re-grade a test/quiz/assignment, your request should be submitted to me **in writing within 24 hours** from the time I give back the graded assignment. Note that such a request will result in me re-grading the whole assignment/test/quiz (not just the specific problem you requested).

Attendance: I find attendance and class participation to be vital for this course. You will find the homework to be easier to do, if you come to class and you actively participate by asking questions. You are allowed **3 absences regardless of whether you have a valid reason for them or not.** Therefore, I recommend that you save those for when you really need them (e.g. you get sick) instead of skipping class. If you exceed the 3 absences, the cost will be 5% off of your final grade for every additional absence. **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 and will be considered absent. Students whose cell phone rings during class will be asked to leave the classroom and will be considered absent. For the same reason, I will not allow food or drink during class, with the exception of a bottle of water.

Grading: Grades are assigned on the plus-minus scale. The final grade will be determined based on the following weighting:

Weekly take-home tests (with the quizzes): 15%
Exams: 10% each test (30% total), 20% for the final
Labs (pre-lab and post-lab quizzes, lab questions, report, project): 20%
Practice problems and review questions: 15%

Course Content: Mechanics, Wave Motion, and Thermodynamics

Important dates: Make sure you include these important dates in your planner/calendar.

Date	Description
Friday, Sept. 24, 2010, 2pm-4pm	Test 1
Monday, Oct. 18, 2010	Draft for first full lab report due in my office by 5pm
Friday, Oct. 22, 2010, 2pm-4pm	Test 2
Monday, Nov. 1, 2010	First full lab reports due in my office by 5pm
Friday, Nov. 19, 2010, 2pm-4pm	Test 3
Wednesday, Dec. 1, 2010	Second full lab report or final project presentation during lab session
Monday, Dec. 13, 2010, 9am-12pm	Final exam: Cumulative

Working with the Honor Code: The Oxford College Honor Code applies to this course as follows:

Quizzes, take-home and Friday tests, exam: The work presented in these assignments should be your own. No collaboration permitted. You are expected to follow the instructions given by me and abide by the Honor Code. Sharing calculators, pencils, etc., is not allowed

Lab report, lab project: On these assignments you can only collaborate with your lab partner

Practice problems and review questions: You are encouraged to work on the assignments **by yourselves first, before consulting others (classmates, SI, tutor, me) for help.**

Study groups: Even though you cannot work together on quizzes, take-home and Friday tests, and exams, you are definitely encouraged to form study groups and study concepts together and explain to each other things that you were not clear about from class or from your reading assignments.

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

How to Solve a Physics Problem

Your homework assignments will consist of pre-lecture reading assignments, review questions and practice problems. In your solutions to all problems (tests, practice problems, etc.), I expect to see that you solve the problems following several important steps. Following these steps will ensure that you are

learning how to develop an organized and methodical solution to a problem (see section **Goals of the Course**).

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 throughout the calculations!** 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

As noted above, the lab portion of the course constitutes 20% of your grade. For the lab portion of the course the requirements are as follows:

1. Bring your lab handout: You will be given the lab handout approximately a week in advance. You are expected to have read the lab handout BEFORE coming to the lab. To ensure that, you will take a **pre-lab quiz** before each lab section.
2. Answer all the questions in the lab handout: Some of these questions will require that you spend time at home analyzing the data and drawing graphs. ALWAYS bring the answers to those questions in next week's lab for me to check. Failure to present these answers will result in a failing grade on that week's lab
3. Understand the lab: Experiments require repetition in order to ensure that your data is reproducible. Sometimes students regard this repetition as "busy work". However, remember that at all times you need to be thinking about what your data means, if this is what you expected and why (or why not) and, also, what the reproducibility (or lack of) means. Essentially you are expected to be thinking about what conclusions you can draw from your data. There will be **post-lab quizzes** to ensure that you have understood the data and the purpose of the experiment.
4. 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. I will give more detailed handouts on what a proper scientific lab report should look like when the time comes. The lab report will be corrected and graded and detailed comments will be given. If you desire, you could 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.
5. Towards the end of the semester you will have a choice of 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.

Lab Schedule

The experiments we will be conducting this semester are on the following topics. Additional experiments might be added if time permits.

Lab 1 : Logistics, Math Review, Introduction to Physics

Lab 2: Average vs. Instantaneous velocity

Lab 3: Free fall

Lab 4: Projectile motion

Lab 5: Resolution of forces

Lab 6: Newton’s second law

Lab 7: Conservation of Mechanical Energy

Lab 8: Ballistic pendulum

Lab 9: Moment of Inertia

Lab 10: Torque

Lab 11: Archimedes’ Principle