Syllabus Fall 2012 - 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 and weekly assignments and frequent quizzes.

Student work submitted as part of this course may be reviewed by Oxford and Emory faculty/staff for the purposes of improving instruction and enhancing Emory education.

Important Information

Instructor and Contact Information: Dr. Frosso Seitaridou. You can reach me by emailing at eseitar@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/SI: James Boyle is the SI for Physics 151. 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*, Eighth Edition

Homework: All homework assignments and other announcements and handouts will be posted on Blackboard. Therefore, **you are expected to check Blackboard at least once a day**. 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) **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.
b) **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 Advanced Problems described in part (c) below (remember that these practice problems were written for the Physics 141 students). Thus, you should be able to do these problems before attempting the Advanced Problems described in (c) below. Use sheets of paper for the problems and keep them in a binder. You will be handing in the solutions to the assigned practice problems (not the answer to the review questions) at the same time as the solutions to the advanced problems. Failure to hand in the solutions to the assigned problems will count against your Practice problems grade (see section on Grading below).
c) **Advanced problems:** Each week I will also be assigning a set of five (5) advanced problems. The due date of each set will be announced under the "Assignments" tab on Blackboard. I will be collecting one or more of the problems in each set on the due date. Understanding how to do these problems will help you in preparation for the tests, as the tests will have problems of the same level of difficulty as these advanced problems. Submission of these problems will count towards your Advanced 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 not receive a grade 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.

Tests and Exams: There will be three tests and one final exam (for dates, see below). 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). The final exam will be cumulative. There is no such thing as a make-up test/exam!

Re-grading Assignments: I am very careful when I grade assignments. 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 really easy 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 are absent from class on a day when there is an Organic Chemistry or a Math test, 10 points will be taken off of your next Physics test. If you exceed the 3 absences, there will be a 5% deduction 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:

Practice problems and review questions: 10%
Advanced problems 10%
Quizzes: 10%
Exams: 10% each test (30% total), 20% for the final
Labs (pre-lab and post-lab quizzes, lab questions, report, project): 20%

Course Content: Mechanics, Wave Motion, and Thermodynamics

Important dates: Make sure you include these important dates in your planner/calendar. The actual times for the tests will be determined during class.

Date	Description
Sept. 21, 2012	Test 1
Sep. 27, 2012, 7:30pm-9pm	Please, attend the Lyceum talk on the Higgs particle
Oct. 15, 2012	Draft for first full lab report due in my office by 5pm
Oct. 19, 2012	Test 2
Oct. 29, 2012	First full lab reports due in my office by 5pm
Nov. 16, 2012	Test 3
Dec. 6, 2012	Second full lab report or final project presentation during lab session
Tuesday, Dec. 18, 2011, 2pm-5pm	Final exam: Cumulative

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

Quizzes, tests, and final 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.

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

Study groups: Even though you cannot work together on quizzes, 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. However, as mentioned above, you are strongly encouraged to work on the homework assignments by yourself first, before consulting your classmates for help.

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, and advanced 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: =
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 manual at the beginning of the semester. You are expected to have read the lab handout for each week's lab 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