

Physics 253 - Modern Physics

Syllabus - Spring 2011

Dr. Frosso Seitaridou

Welcome to Modern Physics! This course covers the physical concepts developed in the 20th century. The concepts we will learn this semester are concepts that almost everybody has heard of (e.g., Relativity, x-rays, quantum physics, etc.). Needless to say that these concepts have provided the inspiration for many works of science fiction.

A good understanding of modern physics will help you a) understand modern technology (e.g., GPS, x-rays, etc.), b) hone your thinking skills, d) recognize the philosophical implications these concepts have! Since you have already taken Introductory Physics, by the end of Physics 253 you will have seen and understood almost all physics concepts! I hope you are excited!

Goals of the Course

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

1. Have a fundamental understanding of the physical concepts developed in the 20th century.
2. Apply these concepts in order to solve simple problems in modern physics.
3. Recognize the reasons why some of the concepts are subject to different interpretation by physicists.
4. Appreciate the philosophical implications of these concepts.
5. Recognize the physics concepts behind modern technological advances.

To achieve these goals, we will solve problems, use laboratory exercises, and, depending on interest, I will be giving you some reading assignments that are outside our textbook.

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.

Prerequisite: Math 112 and either Physics 142 or Physics 152

Textbook: Tipler and Llewellyn, *Modern Physics*, Fifth Edition

Homework: All homework assignments (reading and problems) together with their due dates are shown on the next page. It will be very helpful for you if you have read the section before we talk about it in class.

Week	Dates	Section	Assigned Problems
1	12-Jan	1.1	
	14-Jan	1.1	
2	17-Jan	No class	
	19-Jan	1.2	
	21-Jan	1.2	

3	24-Jan	1.3	
	26-Jan	1.3	
	28-Jan	1.4	Ch1: 4,6,8,10
4	31-Jan	1.4	
	2-Feb	1.6	
	4-Feb	1.6	
5	7-Feb	2.1	
	9-Feb	2.2	
	11-Feb	2.2	Ch1: 16,18,20,26,28
6	14-Feb	2.3	
	16-Feb	2.4	
	18-Feb	2.4	Ch2: 3,8,10,12,14
7	21-Feb	3.1	
	23-Feb	3.2	
	25-Feb	3.3	Ch 2: 16,17,20,22
8	28-Feb	3.4	
	2-Mar	4.1	
	4-Mar	4.2	Ch 3: 2,4,6,13,16
9	14-Mar	4.2	
	16-Mar	4.3	
	18-Mar	4.3	Ch 3: 18,21,28,30,34,38
10	21-Mar	4.4	
	23-Mar	4.5	
	25-Mar	5.1	Ch 4: 2,4,6,8,10,14,16
11	28-Mar	5.2	
	30-Mar	5.2	
	1-Apr	5.3	Ch 4: 18,19,22,26,28,34,36
12	4-Apr	5.4	
	6-Apr	5.5	
	8-Apr	6.1	Ch 5: 2,6,14,17,18
13	11-Apr	6.2	
	13-Apr	6.2	
	15-Apr	6.3	Ch 5: 24,30,32,38,41
14	18-Apr	6.4-6.5	
	20-Apr	6.6	
	22-Apr	7.1	Ch 6: 2,4,6,10,16
15	25-Apr	7.2	

Tests and Exams: There will be three Friday 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. However, I might make mistakes when I grade. If you would like me to re-grade a test or 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 (not just the specific problem you requested).

Attendance: I find attendance and class participation to be vital for this course. 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, 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. **Grades to the following assignments will be given based on correctness, not completion.** So, especially for the homework make sure that you solve the problems correctly!

Homework: 30%

Exams: 10% each test (30% total), 20% for the final

Labs: 20%

Course Content: Relativity, Atoms, wave-particle duality, quantum physics

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

Date	Description
Friday, Feb. 11, 2011, 2pm-4pm	Test 1
Friday, March 4, 2011, 2pm-4pm	Test 2
Friday, April 8, 2011, 2pm-4pm	Test 3
Monday, May 2, 2011, 9am-12pm	Final exam: Cumulative

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

Friday 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 reports: On these assignments you can only collaborate with your lab partner(s)

Homework assignments: You are encouraged to work on the assignments **by yourselves first, before consulting other classmates for help.**

Study groups: 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 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, and problems. In your solutions to all problems 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 when applicable.
3. Label all the quantities in the diagram, those that are given and those that you need to find.
Also, **show your coordinate system if applicable and show which direction you have defined as positive!**
4. State the Physics Laws that apply to that problem. For example: "Particle in 1D box"
5. Write the law in equation(s) form.
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

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 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. These answers together with your data will be handed in in the form of a lab report (more details on that later). Failure to present these lab reports will affect your lab grade.
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.