PHYS 121 **Summer Session I, 2012**

INTRODUCTORY PHYSICS I

Instructor: **Dr. Laszlo Takacs,**
Office: Physics 309
Tel: 410-455-2524
takacs@umbc.edu
Office hours: Tu 3:00-5:00 pm, F 12-1 pm, or by appointment.

Teaching assistant: **Matthew Wilcox**
Office hours: TuThF 1-2 pm in Physics 226 (Tutorial Center)

Lecture: 9 am - 11:40 am, TuThFr, Academic IV, Room 145
Discussion: 11:40 am – 12:45 pm, TuTh (no discussion of Fridays), AC IV, Room 145

Text: Young and Freedman, University Physics, 13th edition

This course is the first part of the calculus-based introductory physics sequence. Its subject is mechanics, essentially the material covered in chapters 1-11 and 13-14 of Young and Feedman's University Physics. The course uses some basic calculus and lots of algebra and trigonometry. It does **not** have a laboratory component. Introductory physics continues with thermodynamics and electrodynamics in PHYS 122.

Uninterrupted effort is the key to success in this course, especially in a compressed summer session. Plan to spend at least 25 hours per week on the material in addition to the time spent in the classroom. That is the absolute minimum. If you have difficulties with math or you have never taken a physics course before, you may need more. Each chapter builds on the material in the previous chapters. Therefore, you must always study the material **between** lectures, including Thursday afternoons and evenings. Read the assigned sections from the book, review your lecture notes, do the homework (all of it) and solve additional related problems from the book, if you found the problems too challenging. Also, read into the next chapter to become somewhat familiar with the next subject before the lecture. Attend the lectures regularly. I follow the book, but I do not repeat its words. I will emphasize the most important points, others will be left for reading. I will solve sample problems, but not the worked examples of the book. **Do not fall behind.** We cover about as much in one day as one would cover over an entire week during the regular semester. There is little time to catch up. A missed day is very difficult to make up; a missed week inevitably results in failing the course, independent of the reason.

Your understanding of the material will be evaluated based on your ability to solve problems. Keep in mind, however, that problem solving begins with understanding the fundamental concepts and applying them to the given situation, not with putting numbers into formulae. Do not use sample problems as "templates." Each case is

different; learn the proper way to set up a solution, not a rigid set of steps. If you are unable to solve an average problem without frequent help from the book, you need to work on that section more.

Physics is about understanding the laws of nature and about applying, not memorizing, equations. Therefore, I will attach a list of the basic equations and fundamental constants to each test (but not homework quiz.) The appropriate equation sheet will be posted in Blackboard well before each test; you must make sure that you know the meaning and proper use of each equation, as no verbal explanation will be given on the sheet and none will be provided during tests. You may not use any other help during tests: books, notes, self-compiled "cheat sheets" or marked-up copies of the equation sheet are not permitted. You will need a basic (~$10) scientific calculator, TI-30 or similar. Programmable calculators and graphing calculators are a waste of money and make the basic operations unnecessarily cumbersome. But if that's the tool you are used to, I will let you use it. Laptops are not allowed during tests and quizzes. Neither are cell phones or electronic listening devices. Do not plan on using your cell phone's calculator function. It is usually not adequate and the use of cell phones is not permitted.

When you work out a problem on a quiz or a test, the result has to be derived from equations found on the equation sheet or their close equivalents. Do not memorize the results of problems – there is a good chance that you will recall the wrong result on the test. Even if the correct one is given, you will loose most of the credit for lack of derivation. I expect complete solutions, much like the worked examples in the book, not only a "result" in the form of an equation or value.

Homework is extremely important, as it puts the material into proper context. It also helps you judge whether your understanding of the material is adequate. I often hear the claim "I understand the material very well, I am just unable to solve the problems." There is no such thing. Learning the facts is only the first step toward understanding. You must be able to imagine a new situation, identify which "formula" to use, apply it properly, work out the math, and interpret the result correctly. That is what you want to aim at on homework and that's what I expect on tests and quizzes.

There will be 17 homework assignments, each containing about a dozen problems. The problems will be posted in Blackboard in three sets, one for the material covered before each test. Given the fast pace of the course, there is not enough time to grade homeworks between lectures. Therefore, rather than collecting sets of solutions, I will give a roughly 10-minute quiz during the following lecture. The quiz will consist of a single homework problem – or a part of a longer homework problem – exactly the way it was asked on the homework. Only some numerical values or notations will be changed. The use of the book, notes, etc. during quizzes will be strictly prohibited. There will be no equation sheet for quizzes either. A scientific calculator is needed, other electronic devices are not permitted. The "homework" part of your grade will be based on the quizzes. There will be no separate quiz on test days, but one of the test questions will come from the last homework. Although homework solutions are not collected, they should be worked out completely. If you do not do the homework, you will pay dearly

with low quiz and test results. The time given for a quiz will be sufficient only if you worked out the same problem a day or two earlier and remember the general method. If the problem is new to you, chances are you run out of time.

There will be three tests, 60 min. each. The last test is cumulative, but with significantly higher weight on the material after the second test. My tests tend to be difficult and I am a harsh grader. The class average is typically around 60%; on my scale; that corresponds to a solid C. Do not panic, if your first test is not over 95%.

A typical class will begin with a question and answer period. If you had difficulties with a homework problem or a concept from the previous day's material, this is a good time to ask questions. The review period is not a substitute for individual study, but an opportunity to clarify the hardest points. Your questions may make this part of the class a very useful component. The quiz or test will be given next, followed by the new material presented in traditional lecture form. Given the available time, much will remain for individual learning. Relevant questions and participation are welcome at any time, distractions are not.

On Tuesdays and Thursdays, the class will be followed by a more interactive **discussion/ problem-solving** session with the help of a teaching assistant. You will solve problems in small groups where the less formal environment allows you to ask questions and help each other. It is also a good place to find partners for study groups. The discussions will end with a short quiz that is very similar to a problem solved during the discussion. The discussion part of your grade will be determined by the result of those quizzes.

Classes will start on time. If you arrive 5 minutes late, you already risk getting "we have just discussed that" as the answer to your question. If you are 30 minutes late, you may have missed the quiz and you cannot make it up. I am a little more "flexible" at the end of the class. I will not stop in the middle of a sentence, if a few more minutes are needed. Please, be patient and pay attention, there is a lot to cover in a very limited time; every minute is valuable.

Academic integrity. Signing up for this course implies your promise to work according to the best of your ability and with full academic integrity. As a minimum, the first proven case of simple cheating results in getting zero on the test or quiz in question. If there is a second offence or a more serious case of cheating, the result is failing the course. I may ask you to move to a different seat without explanation before or during a test or quiz. In such a case, do not waste time by asking for a reason; just move. To show good intention and to avoid temptation, do not sit next to your best friend or study partner during tests.

On my side, I promise well-prepared lectures, openness, professional but friendly atmosphere, and careful and prompt grading.

Grades will be determined based on the sum of the points earned during the semester. There will be 14 quizzes for 5 points each and 3 tests for 60 points each. As there is no time to make up missed quizzes, I will drop the lowest (or missed) two quiz grades. There will be 12 more quizzes at the end of the discussions for 3 points each, the lowest two will not count. Therefore, you can earn a total of 270 points:

3	Tests	60 points each =	180
12	Quizzes	5 points each =	60
10	Discussion quizzes	3 points each =	30
	Total		**270**

I do not drop test grades. Make every effort to take the tests on time. If you must miss a test for a justified and proven reason, notify me as soon as possible, preferably before the test. You must make it up within a week. See me to schedule a time.

I do not give special "extra credit" assignments. Make sure to secure a good grade with your test and quiz scores. "Incomplete" is given only in exceptional cases, almost never. I will only consider an incomplete, if you will have taken the first two tests and most of the quizzes when you become incapacitated and your standing at that time is C or better. I do "curve" to the highest actual total. Approximately, A will be given for 90% or better of the highest total, B above 75%, C above 60%, D above 50%, F below 50%. (I expect the actual highest result to be around 230 points.)

I try to establish an atmosphere that promotes learning. Therefore, avoid private conversations, making unnecessary noises, anything that distracts us from the main task. By the end of the lecture, everyone will be tired; it is difficult enough to keep focus even without distractions. Do not listen to music during class or tests, not even with headphones. **Turn off your cell phone; a single ring wastes about half a minute of class time.** If you repeatedly disrupt class I will ask you to leave. Do not "multitask." Nobody can concentrate on the lecture and text her/his friends at the same time. I prefer that you take notes in a notebook, not on your computer. You may be able to type text fast enough, but you certainly cannot type equations and sketch graphs very fast on the computer. There is also a lot of temptation to keep more than one window open…

Suggestions

If you have any comment or suggestion on the course, do not hesitate to talk to me. Every semester is different, what worked last year may not be working this summer. If you feel more comfortable that way, write me an email. I know that this is a difficult course, and I want to make it doable for you. Make suggestions as soon as possible so that you (not only the students next summer) can benefit from it.

Disabilities

If you have a UMBC sanctioned learning disability, you must see me on the day of the first class to make arrangements.

Getting HELP

If you have a problem, do not sweep it under the rug. The course goes very fast, you have no time to catch up later. You can do several things:

1. Try to figure out as much as possible on your own. Active individual learning results in the deepest level of understanding and the highest intellectual satisfaction. If you need more time, set aside more time. This course must be your primary task for the next six weeks.

2. Ask your classmates. Study groups are useful supplements, although not a substitute, for individual learning. Make sure that you are participating actively, not just tagging along. If you learned something in your study group, go over it on your own again to make sure that you still understand.

3. Ask the TA during discussion or office hours.

4. The first part of every class is dedicated to the previous lecture's material and the related homework. You can ask your questions then. It is the latest moment, reserved for crucial but short points. I might sketch the solution of a difficult homework problem, but usually will not solve it completely in class to save time.

5. You can see me during office hours or drop in at any time when I am in my office and not urgently working on something else. The only exception is right before class in the morning; I need that time to get ready for the lecture. Set up an appointment, if you need more substantial help. Come alone or in groups. Be prepared, with a list of specific questions, stickies marking the problems in your book or notes, etc. Know what you want to ask. It is hard to answer, if you do not know the question. "I am clueless about this chapter" is not a good question, although I will try to identify the source of the problem.

6. I will <u>not</u> discuss questions on the material, homework, etc. on the phone or by email. They are ineffective, as they lack the ability to draw, point, and interact. Reserve those modes of communication for making appointments, for letting me know that you will miss class for a serious reason, or for similar subjects. I prefer emails to calls, whenever immediate response is not necessary.

Date		Topic for lecture (L) and discussion (D)	Book Chapters

5.29	L	Estimation, vectors; velocity, constant velocity motion	1.1-2.1
	D	Stories, graphs; constant velocity motion	
5.31	L	Constant acceleration motion, x-v-a-t relationships	2.2-6
	D	Vectors, 1-d kinematics	
6.1	L	Motion in 2(3) dimension; circular motion	3
6.5	L	Newton's laws	4
	D	Free body diagrams, Newton's laws	
6.7	L	Newton's laws - applications	5.1-2
	D	Newton's law problems	
6.8	L	Newton's laws - friction	5.3
6.12	L	**Test**, dynamics of circular motion	5.4
	D	Newton's laws - circular motion, multi-object problems	
6.14	L	Work, kinetic energy	6
	D	Work - energy problems	
6.15	L	Potential energy, conservation of energy	7
6.19	L	Momentum, collisions	8
	D	Conservation of energy problems, collisions	
6.21	L	Rotation of rigid bodies, kinetic energy	9
	D	Kinematics of rotation, moment of inertia	
6.22	L	Rotation of rigid bodies, dynamics	10.1-4
6.26	L	**Test**, angular momentum	10.5-7
	D	Rotation of rigid bodies	
6.28	L	Statics, elasticity and plasticity	11
	D	Statics	
6.29	L	Gravitation	13
7.3	L	Simple harmonic motion	14.1-14.4
	D	Gravity, kinematics of simple harmonic motion	
7.5	L	Pendulum, damped and driven oscillators; review	14.5-14.8
	D	Simple harmonic motion, review problems	
7.6	L	**Test**	