<u>PHY 121</u> Syllabus for Dr. Christensen

Physics Office: S 222 (across from the lab)
Ass't Dean Office: Adjacent to the Theatre, diagonal from the Library

2016 Fall Semester: MWF 10:00–10:50, S 118

Textbook: "College Physics: Reasoning and Relationships" 2e by Giordano

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PHY 121 Elements of Physics I (3,3)
This is an introductory non-calculus course in Physics designed for students majoring
in disciplines other than math and the physical sciences.
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Prerequisites: MAT 115 or 151 or 145 (Working knowledge of algebra and trigonometry.)

This course covers the fundamentals of mechanics, including motion, vectors, momentum, rotational motion, gravity, mechanical energy, and possibly sound. The next course will cover rotational motion, thermodynamics, electrostatics, circuits, magnetism, light, and optics and will touch on fluid dynamics, waves and sound, and modern physics. Emphasis is placed on the concepts and problem solving techniques of physics in order to enable you to think from the perspective of a physicist.

1 Goals and Outcomes

1.1 Departmental Goals: To Provide Useful Knowledge, Skills, and Perspective

Through the class discussion and lecture, you will be exposed to *the principles and foundations of classical physics* at a level that *introduces* new material. **However, hearing information – even if it** *sounds reasonable* **– does not equate to understanding relationships or techniques.** Solving the homework problems, on the other hand, *will* help you to incorporate these physics principles into your general understanding of the physical world around you. Through this course, you will be trained in a variety of *problem solving techniques and skills* at an *introductory* level. The skills learned in this course will be *reinforced* in the second term.

1.2 Goals of the Instructor: To Provide Training to Think Like a Physicist

Using the three pillars of this course (**Motion**, **Force**, and **Energy**) will enable you to think about new topics in the manner of a professional physicist. Because of this, I consider the primary goal of this class as training for how to critically analyze the physical world around you. These three concepts are both *fundamental* and *powerful*, because they capture the essence of the discipline and enable one to understand previously unrecognized relationships.

1.3 Impact of Goals on Expectations

Your grades on the homework and exams will reflect your knowledge of the principles and foundations, your ability to express these mathematically, your ability to describe them in English, and your ability to reason through new situations. The point of turning in work is to <u>show me</u> how well you understand the material – **include your misunderstandings** so that I can adjust the way I teach to you as individuals. The point of grading work is to <u>show you</u> both how well you understand and how well you communicate that understanding in comparison (through my judgement and experience) to typical students at this same level of experience. Please review returned homework and exams to better learn what you didn't understand. I encourage your to compare your returned work to the posted solutions or to come ask me clarifying questions.

1.4 Student Learning Outcomes

The content of this course will be used as a platform to teach you how to self-assess your understanding and how to ask appropriate questions with the goal of developing your understanding. After successfully completing this course, students should be able to

1. find examples of fundamental physics throughout their daily life
2. use the fundamental and powerful concepts of motion, force, and energy to understand new topics
3. identify relevant and significant information in a physics textbook
4. use the fundamental and powerful concepts of motion, force, and energy to explain new concepts
5. interpret equations and variables for appropriate use in word problems
6. solve quantitative descriptions of physical situations.

2 Grading

3%   **JITT questions:** The syllabus provides a schedule of topics covered on each day. You should come to class prepared to answer questions about such topics. To help you prepare, there will be random JITT questions at the beginning of some class periods. These are intended to be straightforward, such as identify an equation that was boxed in the textbook, or define a boldfaced term, or state the main property that the section is about. Getting these wrong occasionally will not hurt your grade, but if you are consistently having trouble, then we should discuss the situation individually.

     You will also be asked to keep a running list of examples from your life that exemplify the topics discussed. Some of these will be discussed in class. You should keep all of these on a single sheet of paper that you will submit *for a grade* on the day after each exam. This will not count as homework, but will count towards your JITT grade.

20%   **Homework:** Homework will be assigned each chapter, due approximately once a week on the "boxed days" (see the schedule). Each problem is worth 5 or 10 points. Homework makes up 20% of your grade.

     You will be given three categories of homework: There are "Due" problems, which will be turned in and for which the solutions will be posted after the due date. There are "Assigned" problems, which will not be turned in and for which the solutions will be posted to the MyTMC class website before the "Due" problems are due to help you figure out the solutions to the "Due" problems. I expect you to look over and to attempt these problems. There are "Extra" problems, which are problems that I like and have selected for useful practice. The solutions to these will not be posted, but you are welcome to ask, in class or during office hours, about how one might solve them.

Laboratory: Laboratory will meet once a week. Your lab grade will be recorded separately and will not count towards the lecture grade.

4×4%
-4%
15%
15%
15%
+20%

Exams and Quizzes: There will be four quizzes, three tests, and a final exam. Each quiz looks like one test question and is worth 4% of your grade. I will drop your lowest quiz grade (total 12%). Each test is worth 15% of your grade (total 45%). The final is comprehensive and is worth 20%. The quizzes and exams will be primarily word problems with algebraic solutions (very modified homework problems). There will also be one or two questions on the exams which will require you to explain a relationship using plain English. There may also be a few questions that are conceptual (short answer, multiple choice, or true/false).

100%   **Grades:** Final grades will be reported as a percentage of the total earned points weighted by the percentages above. If at any time during the semester you are curious about your grade, I have an Excel worksheet which can printout a summary of your individual grades. Expect the grading scale to be 90-80-70-60, although I reserve the right to adjust this slightly. I consider a score of 75% (mid-C) to be average for junior-level Biology majors.

Expectations: A grade of "D" is *poor* ("D"ang, I just can't get this!). A grade of "C" is *good enough* ("C"ompetent). A grade of "B" is *well done* ("B"etter...). A grade of "A" is *excellent* ("A"men!). If you find yourself saying, "Oh...That's good enough..." then you are likely headed for a C.

Extra Credit: granted to those who find mistakes in the book, lecture, and/or homework solutions. You must write up and hand in a brief explanation of *what* is wrong, *why you think* it is wrong, and what it *should* say.

3   Policies

Just as sports, music, carpentry, and any other skill requires practice, to do well in physics requires practice: Expect to spend time on this class. If you feel you are spending too much time on it, feel free to come to office hours and ask for hints. Please bear in mind that an hour before class begins is usually too late to ask.

Attendance: Physical attendance is expected. Mental attendance is appreciated (not to mention helpful). If "something comes up," contact me (note, email, or voice mail) **beforehand**. If you cannot contact me, then tell a friend to contact me that same day. I can be contacted via the information at the top of the page.

Athletics: It is your personal responsibility to inform me if you will miss class **before** you miss class. Even if you think an email is being sent on your behalf, see me before or after class so that I can let you know of any variations from the syllabus. If your sport requires you to have a grade report filled out during the semester, I consider it your personal responsibility to inform me that you are going to bring the grade updates before you bring them so that I can have a grade available. Please reread **Attendance** and **Missed Exams**.

Late Policy: No credit will be given for any homework worked in class regardless of who is actually in attendance during the class. In addition, homework assignments which are turned in late lose 5 points per day. The weekend counts as a single day.

Missed Exams: Make up exams **must** be scheduled before regular exam time. Documented, unforeseen events will be dealt with on a case-by-case basis.

Office Hour Policy My office hours are posted on my schedule located on the wall by my office door as well as on the MyTMC website. I prefer that you visit during office hours, but I am in my office most days from about 8:00am to about 4:30pm. You are welcome to stop by whenever you have a question. Be aware that my posted schedule also lists times which I will *probably* be in my office. If you call ahead and I am busy, we can find a time that suits us both. Be aware that in the unlikely event we cannot match our schedules, there is a tutor center available.

Students with Accommodations: In compliance with Thomas More College policy and section 504 of the Americans with Disabilities Act, appropriate accommodations for students with disabilities are available. If you have a documented physical or learning disability for which you require special accommodations, please see John Hennessey, Assistant Director of the Institute for Academic Excellence at 344-3507 or hennesj@thomasmore.edu, as soon as possible. This includes students who have previously received accommodations at TMC.

Tutor Services: Thomas More College provides some tutoring services for all students (details can be found at http://www.thomasmore.edu/academics/support.cfm), these include:

- a face-to-face writing center, located in room 2207,
- a face-to-face math and physics tutoring center, located around the corner from the elevator on the second floor of the Science wing,
- students can request a personal tutor for these or other subjects at this website (http://www.thomasmore.edu/academics/support_request.cfm)
- students have access to SmartThinking online tutoring. For details, contact John Hennessey, Assistant Director of the Institute for Academic Excellence, at 344-3507 or hennesj@thomasmore.edu.

4   Schedule

Final Exam: The final will cover everything from the three other tests as well as whatever was not covered by those tests. You have two hours to complete the final; the final exam will be as long as one and a half single-hour exams.

Week	Day	Topic	Pre-class Readings
8/15	M	1. Intro, Background concepts, Basics	1.1-6
no lab	W	2. Vectors, Vector Addition, Components	1.7-8
	F	3. The relationship between Position, Velocity and Acceleration	2.1-3
8/22	M_1	4. Graphs: x vs t, v vs t, a vs t	2.1-3
Meaningful Measurements	W	5. Newton's First and Second Laws: Inertia and $\vec{F}_{net} = m\vec{a}$	2.3-4
	F_2	6. Newton's Third Law: Action/Reaction	2.4-6
8/29	M	7. Relating Newton's Laws to Motion	3.1-2
Stand. Dev.	W	8. Friction – Static and Dynamic (kinetic) } **substitute**	3.3
	F	9. Free Fall	3.4
9/5	M	==== **Labor Day - No Class** ====	
no lab	W	10. Tension and Pulleys	3.5-8
	F	11. **Quiz 1** & Inclines, Vectors, Projectiles	4.1-2
9/12	M_3	12. Inclines, Friction, Dynamic Pulleys	4.3-5
Const Accel	W	13. Relating Newton's Laws to 2-D Motion – Dynamics	4.3-5
	F_4	14. Centripetal vs Centrifugal	5.1-2
9/19	M	15. Review	Chap. 1–4
9/21	W	16. $\boxed{\Rightarrow \textbf{Test 1} \Leftarrow}$	Chap. 1–4
Newton's Laws	F	17. Gravity and Tides	5.3,5-6
9/26	M	18. Kepler's Laws	5.4
Friction	W_5	19. Work-Energy Theorem	6.1-2
	F	20. Conservation of Energy	6.3-4
10/3	M	21. **Quiz 2** & Nonconservative Forces	6.5-8
Centripetal Force	W_6	22. Nonconservative Forces	6.5-8
	F	==== **Fall Break - No Class** ====	
10/10†	M	23. Review	Chap. 5-6
10/12	W	24. $\boxed{\Rightarrow \textbf{Test 2} \Leftarrow}$	Chap. 5-6
Conserve∗ Energy	F	25. Post Test & Momentum!	7.1-3
10/17	M	26. Collisions!	7.4-5
Springs Pendula	W	27. Collisions!	7.4-5
	F	28. Additional ideas (Center of Mass, etc.)	7.6-8
10/24	M_7	29. **Quiz 3** & Rotational Motion (spin)	8.1
Peer−Review	W	30. Rotational Equilibrium	8.2-3
	F	31. Rotational Dynamics	8.4-6
10/31	M_8	32. Energy and Rotational Motion	9.1-2
Ballistic Pendulum	W	33. Energy and Momentum in Rotational Motion	9.1-4
11/4	F	34. Rotational Examples	9.5-6
11/7	M_9	35. Pressure and Density	10,1-2
Election Day	W	36. Review	Chap 7-9
	F	37. $\boxed{\Rightarrow \textbf{Test 3} \Leftarrow}$	Chap 7-9
11/14	M	38. Post Test & Pressure	10,1-2
Human Forearm	W	39. Hydraulics & Buoyancy	10.3
	F	40. Simple Harmonic Motion	11.1-3
11/21	M_{10}	41. Mechanisms of oscillating, examples	11.4-6
Make-up	W	} **Thanksgiving Break**	
	F		
11/28	M	42. **Quiz 4** & Review: **BRING QUESTIONS**	Chap. 9-11
Lab Final	M_{11}	43. Review: **BRING QUESTIONS**	Chap. 1-11
	F	(Additional Review if desired)	
12/5	M		
	W	43. $\boxed{\Rightarrow \textbf{Final Exam} \Leftarrow}$: 8:30–10:30 am	Comprehensive

† - 10/10: Midterm Reports.

∗ - 10/14: Last day to drop.