

Physics 161 - Fall 2010

“General Physics: Mechanics and Particle Dynamics”

Instructor: Professor Fred Wellstood - (updated September 10, 2010)

Official Course Description: PHYS161 General Physics: Mechanics and Particle Dynamics; (3 credits) Grade Method: REG/P-F/AUD. CORE Physical Science (PS) Course. Prerequisite or co-requisite: MATH141. Credit will not be granted for PHYS171 and PHYS161 or PHYS141 or former PHYS191. First semester of a three-semester calculus-based general physics course. Laws of motion, force, and energy; principles of mechanics, collisions, linear momentum, rotation, and gravitation. Physics clinic, PHY 1214, MTWHF 11, 2. If purchasing used books additional software is required.

Lecture: MWF.....10:00 am-10:50 am, Room 1410 [Physics Building](#)

Discussion Section #	time that discussion section meets	room	Teaching Assistant
301	Th..... 3:00pm- 3:50pm	MATH B0427	Kristen Voigt
302	Tu..... 4:00pm- 4:50pm	PHYs 1204	Kristen Voigt
303	W..... 12:00pm- 12:50pm	PHYs 0405	Kristen Voigt

Instructor: Professor Fred Wellstood
Office: room 0367 Physics, Phone: 5-7649, e-mail: well@squid.umd.edu

Office Hours: Tu, W, Th 2-3 PM, room 0367 Physics and other times by appointment.

TA Contact Information: TBA

Name	e-mail	office	office hours
Kristen Voigt	kdvoigt@umd.edu	Physics 3103	M 12:30-1:30, Th 11-12

Pre or Co-requisites: Math 141 (Calculus 2). Make sure you are comfortable with calculus before taking this class. Better yet, you should *like* calculus since we will be using it extensively.

Labs: There are no labs with Physics 161.

Textbook: The required textbook is:

Physics for Scientists and Engineers, A Strategic Approach, with Mastering Physics,
Volume 1, **second edition**, by Randall D. Knight (Addison Wesley).

When you buy your textbook you must get a new copy that is packaged with an access number for Mastering Physics. The access number is needed to get on-line access to Mastering Physics, which is the web-based homework collection system. If you buy a used copy, you will need to also purchase an access number which you can get on-line at: www.masteringphysics.com for (\$44.50) or at the bookstore. Also, make sure you get the second edition! If you are wondering if you really need to get the book and access number, the answer is yes you do.

Recommended Texts. Knight's book is a good physics text, but there are many others that you may find helpful when you don't understand Knight, including: *Physics (Volume 1)* by Paul Tipler, *Fundamentals of Physics (Volume 1)* by Halliday and Resnick, *Feynman's Lectures on Physics (Volume 1)* by Feynman and Leighton, and *Physics for Engineers and Scientists (Volume 1)* by Ohanian and Markert.

Grades: A numerical score will be computed by summing your scores on the final exam, the three midterms, the homework and the quizzes with the following weight:

Final exam	24% (You must take the final exam to pass the course)
Three midterm exams (11 % each)	33% (No Exam scores are dropped)
Homework (written and electronic)	33% (No Homework scores are dropped)
Quizzes (lecture and discussion)	10% (No Quiz scores are dropped)

A histogram of total scores for the entire class will be plotted. Assuming that the distribution is reasonably bell-shaped, letter grades will be assigned so that students with scores in the top 20% will receive an A, the next lower 40% will receive a B, the next lower 25% will receive a C, and the remaining 15% will be split between D and F.

About the course: Physics 161 is the first course in the three-semester 161/260/270 sequence in introductory university physics intended for engineering students. Most students who take this class have already had a year of Physics in high school and that means Physics 161 tends to be faster paced, more challenging and more competitive than a typical high school physics course. Physics 161 is a CORE physical sciences course. There are no labs with this course. The course covers material in classical Newtonian Mechanics including motion of objects in 1, 2 and 3 dimensions, Newton's laws, work, energy, momentum, momentum conservation, and rotational dynamics. This is a calculus-based sequence and makes extensive use of material in Math 140 and 141. We will also make extensive use of vectors. We will also use some beginning vector calculus, including derivatives of vectors (to describe motion in more than one dimension) and line integrals (when we discuss work and potential energy). The course will stress qualitative understanding of physical phenomena as well as quantitative analysis through problem solving. If you miss a lecture, check the syllabus and homework assignments and get notes from a classmate or see Prof. Wellstood.

Exams: There are three midterm exams and one final exam. All exams will be closed book, with no crib sheets allowed, either electronic or paper. Calculators are allowed during exams, but you are not allowed to use any device with phone, photo, web, messaging or text display capabilities during an exam. You must take all the exams and no exam score will be dropped. If you cannot attend an exam at the scheduled time, see Professor Wellstood before the exam! If you miss an exam with a valid excuse, a makeup exam will be given and it is your responsibility to arrange this in a timely fashion with the instructor. Students are responsible for all material, including that covered in assigned reading, lectures and homework. Material from any part of the course can appear on a test, quiz or homework, whether or not it was covered in the lectures.

THE FINAL EXAM is on Tuesday, Dec 14, 6:30pm-8:30pm - the University still needs to set where the exam will be given! You can check the schedule at:

<http://www.testudo.umd.edu/soc/exam201008.html>

Unlike most courses, Physics 161 has a "common final exam" time and you need to look at section 4 in the above link. In the past, students have been confused about the time because they made the mistake of using the "standard final exam" schedule in section 1, rather than the common final exam schedule in section 4.

Excuses: Turning in late homework or missing an exam is not allowed without a valid documented excuse as defined by the University (medical problem, religious holiday, or serious family crisis). In all cases, a makeup assignment or makeup exam must be completed in a reasonable amount of time or you will receive a score of zero for the assignment or exam. The makeup test or assignment, and the due date, must be arranged by consulting with Dr. Wellstood as soon as possible after it becomes apparent that an exam or assignment due date will be missed. If you are going to miss an assignment because of a religious holiday, it is your responsibility to inform the instructor in advance so that suitable arrangements can be made.

Homework and Solutions: Homework will typically be assigned on Friday and due by the following Friday at the start of class. *You must submit your answers for the homework problems over the internet using the Mastering Physics web site (see below) and in addition you must turn in any required written work showing how you arrived at your answers to the problems.*

Solutions will generally be posted on the web by midnight the following Monday after the homework is due. To get the solutions, go to www.elms.umd.edu and log in to Blackboard.

There are several advantages to electronic homework submission:

- (1) You will know right away if your answer is right or wrong
- (2) If you give a wrong answer, you can go back and try again to see if you can get the correct solution. You will be allowed 5 attempts for each question, so don't waste them.
- (3) You are graded only on your final answers and get your score when you are done.
- (4) The site also has a tutorial capability that you may find helpful.

Note that the software will randomize the numbers each time you make a new attempt on a problem, so be careful and remember that other students working on exactly the same problems will have other numbers! The best way to do physics problems is first to work out carefully a general solution and then plug in the numbers at the end. This is especially true if the numbers are being randomized each time so everyone has different numbers. For calculating complicated expressions, I strongly recommend using an electronic spreadsheet, such as Excel, rather than a calculator.

Why You Better Do the Homework: One of the main ways you can understand Physics is by doing the homework. Do not wait until the night before it's due to start working on your homework. The homework is supposed to be hard and it counts a lot for your grade. A sure way to get an F in this course is to not do the homework or not give your self enough time to work on it.

Why You Need to Turn in Written Solutions to the Homework: A problem with the primitive form of electronic grading that is currently available is that it can only check simple equations or numerical answers. It can't check graphs, sketches, diagrams, logical arguments, or written explanations and it can't tell you what part of your argument was incorrect. This is a very serious shortcoming because, for many problems in engineering, the "answer" is actually the explanation, method, or argument that you used to find some number or particular result. For these reasons, you will be required to turn in **written solutions** to how you reached your answers on selected problems. Each week one or two of the problems will be chosen and the plan is to grade your work for reasoning, logic, completeness and clear explanations written in English. I should emphasize that we will only be trying to grade one or two problems each week, but you would be wise to write them all out. While I'd like to have all of your written work graded for all of the problems, there simply aren't enough resources to allow us to do that. On some occasions, you won't need to turn in written solutions. I'll let you know when this is the case.

Is it hard and time consuming to write out solutions? Yes, it can be. On the other hand, it's something you should be doing for all of your technical classes and is probably the most valuable lesson you can learn. If you aren't writing out solutions to the homework in your technical classes, then you have not been receiving adequate training as an engineer. I don't know any companies that will give you a paycheck (let alone a big one) for plugging numbers into a computer that then tells you that you just entered the right or wrong answer. If a computer can answer that question, then the company probably doesn't need you. Real engineers have to explain what they are doing, defend their ideas and analysis in front of other engineers and convince others (including managers who may know nothing about science, math or engineering) that they know what the heck they are doing. You need to be able to write down what you are doing and have it make sense to yourself and others. Learning how to do that does not get any easier in real life when your job, lot's of money, your company's future, or someone's life is on the line. Being a good engineer is not easy, but no one is looking to hire bad engineers.

Getting started in electronic homework submission: To turn in your homework, you need to go to:

<http://www.masteringphysics.com/>

The site is best accessed with a current version of Windows Explorer. If you run into problems, check the system requirements. I have posted a practice homework set and you should log in and try this before attempting any of the real homework sets.

Registering and Gaining Access to Mastering Physics: In order to turn in your homework, you will need to register at the Mastering Physics website <http://www.masteringphysics.com/>. To register, you need two things - an access number and the class ID. The access number will be packaged with new copies of the Knight textbook. **In other words, when you buy your textbook you need to get a new copy that comes packaged with a Mastering Physics access number.** The class ID is MPWELLSTOOD08832.

Academic honesty: I expect you to get together in small groups and discuss the problems. However, do not use these discussions as an excuse to copy someone else's solution to the homework or let someone else copy your solution. That is cheating. The right way to proceed is first to work through the problems on your own and arrive at a definite answer. With this preparation you can then discuss with others and see if you have missed something. All work you submit must be your own and should reflect your own understanding. Academic dishonesty, including copying homework, Googling for solutions on the web, using solutions to the homework that are available on-line, or cheating on an exam, is a very serious offense which may result in suspension or expulsion from the University. Don't do it. Details on the policy can be found at www.testudo.umd.edu/soc/dishonesty.html.

Help with understanding the material: Physics 161 is cumulative in the sense that to understand material in later parts of the course, you will need to apply knowledge that you learned at earlier stages. If you think you might fall behind, or already know that you are in trouble, get help now by:

- Attending all your discussion sections and asking questions
- Visiting the Slawsky Clinic in room 1140 Physics Building
- Contacting your instructor or TA and going to office hours
- Visiting the Learning Assistance Service (2201 Schoemaker Bldg., 301-314-7693) to get help with time management, reading, note taking, and exam preparation skills.

If you find that you are having more general academic problems, or are having trouble figuring out what you want to do, I'd recommend that you stop by Room 1120 Physics and talk to Tom Gleason, the Physics Coordinator of Student Services. Tom graduated from Maryland and also used to be an advisor in Letters and Science (undeclared majors). He knows all the University rules and is a great person to talk to because of his perspective on Physics and other programs at the University.

Note on Discussion Sections: You must attend the discussion section you are assigned and you are supposed to go to your discussion section each week. Your TA will give quizzes during the discussion sections and these will be included in your course grade. Also, your TA will cover material (homework, quizzes and exams) that may not be covered elsewhere. Please come prepared and ask lots of questions, *i.e.* read the chapters, review your lecture notes, and try the homework problems. The TA is there to help you understand the physics of a situation when you are stuck, not to dole out answers. Don't forget that your TA is also a student, in this case a graduate student, and also has to take classes, do homework and teach other sections - TA's are still learning, are very busy and are not highly paid for all their effort. Please be respectful and understanding.

PRELIMINARY
Schedule of Physics 161 topics, exams, and holidays for Fall 2010

Lecture #	Dates	Main Topics	Chapter in Knight
-	Monday August 30	Start of Fall semester	
1	Monday August 30	First Day of Physics 161 - Introduction	Chapter 1
2	September 1	Concepts of Motion, Units, and Dimensions	Chapter 1
3	September 3	1-D Motion	Chapters 2
-	Monday September 6	Labor Day Vacation	
4,5	September 8, 10	1-D Motion	Chapters 2
6, 7, 8	September 13, 15, 17	Vectors	Chapter 3
9, 10, 11	September 20, 22, 24	2-D motion	Chapter 4
12	Monday, Sept. 27	2-D Kinematics and	Chapter 4
13	Wednesday, Sept. 29	Exam I	Chapter 1-4
14	Oct. 1	2-D Kinematics and Dynamics	Chapter 5
15, 16, 17	October 4, 6, 8	Circular Motion	Chapter 6
18, 19, 20	October 11, 13, 15	Newton's 3rd law	Chapter 7
21, 22, 23	October 18, 20, 22	Analyzing Systems Using Newton's 3 Laws	Chapter 8
24	Monday, Oct. 25	Exam II	
25, 26	October 27, 29	Impulse and Momentum	Chapter 9
27, 28, 29	Nov. 1, 3, 5	Momentum and Inelastic Collisions	Chapter 9
30, 31, 32	November 8, 10, 12	Conservation of Energy	Chapter 10
33, 34, 35	November 15, 17, 19	Work	Chapter 11
36, 37	November 22, 24	Rotational Motion	Chapter 13
-	November 25-26	Thanksgiving Holiday	-
38	Monday November 29	Exam III	
39, 40	December 1, 3	Angular Momentum	Chapter 13
41, 42, 43	December 6, 8, 10	Gravity	Chapter 12
	Friday December 10	Last Day of Classes	
	Saturday December 11	Exam study day	
	Monday December 13 5pm-7pm	Review Session for Final Exam	
	Tuesday, Dec 14 6:30pm-8:30pm	Final Exam is Tuesday, Dec 14, 6:30pm-8:30pm	Chapt. 1 - 13