

Physics 221, Physics with Calculus I

Sections 1 & 2, Fall 2009

Dr. Yost

Office:	216 Grimsley Hall	Textbook:	Serway & Jewitt, Physics for Scientists and Engineers, 7 th ed. ISBN: 0-495-11245-3
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Classes:	112 Grimsley Hall, MWF: 8AM (section 1) 9AM (section 2)	Web Page:	www.vic.com/syost/phys221
Office Hours:	MWF 10-11 AM or by appointment	Homework:	www.webassign.net

Welcome to Dr. Yost's sections of **Physics 221, Physics with Calculus I!** This course is a first step in the study of the classical foundation of physics: Newtonian mechanics. More generally, the course is designed to give practice in elementary mathematical modeling of natural phenomena and problem solving in the physical sciences. Developing these skills is an essential prerequisite for further study in engineering and science. By the end of the course, you should have a basic understanding the Galilean concept of motion and Newton's Laws of mechanics, and be able to apply them to solve problems relating to simple systems. You should begin to develop the skills necessary to apply mathematical reasoning to new physical situations. Topics covered include motion in one to three dimensions, forces, Newton's Laws, energy and momentum, circular motion, rigid body motion, statics, universal gravitation, and basic fluid mechanics.

This course assumes some knowledge of calculus: MATH 131, 107, or HONR 131 is a prerequisite. Calculus may be taken concurrently, since we will use only the more basic aspects this semester, but if that is the case, you may expect to see some concepts of calculus for the first time in this course. This should not be a problem. Newton invented calculus precisely to formulate his laws of mechanics, and the two subjects should reinforce one another when studied simultaneously. Mathematics, including calculus, is the *language* of physics, not merely a computational tool, and our most important need for calculus is in formulating the laws of mechanics in their full generality.

Grades

The final course grade will be determined by a combination of factors:

Hour Exams (three)	50%
Final Exam	25%
Homework	25%

Individual course work will be graded numerically. The interpretation of these grades in arriving at a midterm or final letter grade will be based on a comparative study of the performance of the cadets. As a rough guide, I expect the average grade in the course to be a low B, and approximately 20% of the grades to be A's. No student who truly puts in an adequate effort should fail this course. If you feel that you are falling below expectations, seek help quickly.

Exams

A comprehensive final exam will be given at the end of the course. Three "hour exams" will be given throughout the semester, covering 3 – 4 chapters each. The dates of these are scheduled in advance, and will not be subject to change unless absolutely necessary. If you have a known conflict with an exam, you must notify me before the exam to request an excused absence. One exam grade may be dropped with a **valid excuse**. Excuses will be granted after a missed exam only in the event of a documented unforeseen emergency. If you are too sick to take an exam, you may contact me the day of the exam, if possible.

The exams are designed to test your acquisition of problem solving skills and your conceptual understanding of the material, and do not reward memorization. You will be given basic equations for the hour exams, and may bring your own page of equations to the final. The best preparation for an exam is practice. If necessary, do more than the assigned problems.

You must bring a scientific calculator to the exams, and may not share them. You are responsible for being sure the batteries work. The calculator should have trigonometric functions, logarithms, and powers, but need not have advanced features for solving equations or calculus. Advanced calculators may be used on exams, but the advanced functions, beyond trigonometry, logarithms, and powers, may not be used. All other electronic devices, including cell phones, must be turned off and not visible during exams.

WebAssign

Homework is turned in using WebAssign. You will need an access code purchased through the Cadet Store to use the system. If you do not have it at the beginning of class, the system gives you a two-week grace period to acquire it. To log in, go to www.webassign.net, and enter your log-in information under **Account Log In**. Your user-id is your first initial and last name, your institution is Citadel, and your password is the last four digits of your Citadel ID number. For example, if your name is John Smith and your ID number is CIT-07-1234, then your user-id is jsmith and your password is 1234.

Instructions for answering WebAssign questions are provided by the system. Please take the time to read them, because you normally only have five attempts to answer a questions, and errors in entering the answer count toward the total. WebAssign will understand answers only in a very specific format. Do not guess what this format is. The first problem set has some questions designed to illustrate some common answer types. WebAssign is particularly fussy about symbolic answers. In particular, remember that capitalization counts.

No submissions are accepted after 7:00 AM on the due date, by WebAssign's clock. After that, the answers are available on-line, and may be discussed in that morning's class. Extensions for known conflicts require previous approval, and are given only in rare cases. Emergency extensions are possible only if you have not viewed the set after it was due.

Do not wait until the last night to start a problem set. This does not leave enough time to learn from working the problems, and does not give you the hands-on preparation you need to fully understand the classes. Successful students often begin work on the problems as soon as they are posted. WebAssign will not give credit for incorrect answers, so you must allow time for multiple attempts, in case your first attempts are wrong.

In the event of a wrong answer, don't be overconfident in your result: grading errors are very rare, and the problem is almost always with the answer. A common error is to enter too few digits, or to keep too few in intermediate calculations. WebAssign normally expects an answer to be correct within 1%, which requires at least three digits to be used throughout calculations. If you are in doubt about an answer, you can send me an e-mail if you start early enough.

Do not expect to solve all of the problems while seated at the computer. Most are too difficult for this. A successful strategy is to do all your work symbolically on paper first, and put in numbers only in the later stages. This makes it easier to check and understand your work, and makes it easier to review for an exam. Keep a record of all of your problem-solving steps, and draw a lot of pictures: much of physics problem solving is geometrical.

Physics is a Hands-On Subject

You would not expect to learn to play a violin by watching an expert, or to excel at football by watching football games. Similarly, you cannot effectively learn physics merely by attending classes or reading the book. **To learn physics, you have to do physics.** It is only through struggling with the problems that you will acquire the problem-solving skills needed to reach the next level and successfully complete the course. The first steps are always the most difficult, but the more effort you put into them, the stronger you will become. If you find the material difficult, you must confront it head-on, since every step you take to bypass the difficulty will only make you weaker, and create more difficulties as the course progresses.

When beginning a new chapter, your first step should be to read the material. You should begin this reading before the first class on a topic. The classes will ordinarily assume some exposure to the material being discussed. The amount of time we have in class is not sufficient to “cover” the material: you must do this on your own through the reading. The classes should reinforce the reading, guide you through difficult concepts, and give practice in problem-solving. Remember that the goal is conceptual understanding and problem solving, not memorization. The more problems you can work, the better you will understand the concepts.

Getting Help

If you find yourself in trouble, get help without delay. This is a fast-paced, cumulative course. Any difficulties encountered early will compound as the course progresses. If you have any doubt about who to see, talk to me. Come to office hours, send an e-mail, or make an appointment. My goal is for every one of you to succeed in this course. The Physics Department has tutors, and The Citadel Writing and Learning Center provides tutoring in Mathematics and Physics. You can, and should, help each other. I do not consider it to be cheating to receive help from other cadets on the homework, provided that they are not doing the work for you.

Keep in mind that seeking too much help may give you a good grade on the homework, while preventing you from doing well on the exams, even if you think you have understood the material. Some essential parts of the learning come from the painful hours of struggling that come from working through a new concept on your own, so you should try not to try too hard to get around this. If another student comes to you for help, try not to undermine their learning, as well as their grade, by doing too much of the work for them.

Topics

The following topics in Serway and Jewitt will be covered this semester.

Ch. 1	Physics and Measurement	Ch. 8	Conservation of Energy
Ch. 2	Motion in One Dimension	Ch. 9	Linear Momentum and Collisions
Ch. 3	Vectors	Ch. 10	Rigid Body Rotation – Fixed Axis
Ch. 4	Motion in Two Dimensions	Ch. 11	Angular Momentum
Ch. 5	The Laws of Motion	Ch. 12	Static Equilibrium and Elasticity
Ch. 6	Circular Motion	Ch. 13	Universal Gravitation
Ch. 7	Energy of a System	Ch. 14	Fluid Mechanics

Calendar

The following calendar is subject to change, except for exam dates, which may be considered to be final unless a change is unavoidable. WebAssign due dates are indicated by a “WA” number.

Dates	Monday	Wednesday	Friday
Aug. 26 - 28		Introduction, Ch. 1	Ch. 2, WA 1
Aug. 31 – Sept. 4	Ch. 2	Ch. 2, WA 2	Ch. 3
Sept. 7 - 11	Ch. 3	Ch. 3-4, WA 3	Ch. 4
Sept. 14 - 18	Ch. 4, WA 4	Exam 1: Ch. 2 - 4	Ch. 5
Sept. 21 - 25	Ch. 5	Ch. 5, WA 5	Ch. 6
Sept. 28 - Oct. 2	Ch. 6	Ch. 6-7, WA 6	Ch. 7
Oct. 5 - 9	Ch. 7, WA 7	Ch. 8	Ch. 8
Oct. 12 - 16	Ch. 8, WA 8	Exam 2: Ch. 5 - 8	Ch. 9
Oct. 19 - 23	Ch. 9	Ch. 9, WA 9	Ch. 10
Oct. 26 - 30	Ch. 10	Ch. 10, WA 10	Ch. 11
Nov. 2 - 6	Ch. 11	Ch. 11, WA 11	Ch. 12
Nov. 9 - 13	Ch. 12	Ch. 12, WA 12	Exam 3: Ch. 9 - 12
Nov. 16 - 20	Ch. 13	Ch. 13	Ch. 13, WA 13
Nov. 23 - 27	Thanksgiving Break		
Nov. 30 – Dec. 4	Ch. 14	Ch. 14	Ch. 14, WA 14
Dec. 7	Review / Questions		

Final Exam: Section 1 – Monday, Dec. 14, 13:00
 Section 2 – Saturday, Dec. 12, 13:00