

**PHYSICS 211
GENERAL PHYSICS**

Spring 2012

<http://www.pa.uky.edu/~nmartin/phy211>

TR 11:00 a.m.

CP155

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Office Hours: Tuesday & Thursday 1:00 pm – 2.00 pm (or by appointment)

Overview of course

PHY211 is the first part of a two-semester survey of classical and modern physics, focusing on the motion of solids and fluids as governed by Newton's Laws and by the conservation laws of energy, momentum, and angular momentum. Lecture, two hours; recitation, two hours; laboratory, two hours. Credit is not given to students who already have credit for PHY 231 and 241.

Prereq: A working knowledge of algebra as obtainable in MA 109 or MA 110 or MA 112, or an ACT math score of 25 or above, or a SAT math score of 590 or above. Algebra, geometry and trigonometry will be used constantly. You can find a summary of what's needed in the text book: Appendix A, Chapter 1, Chapter 3.

The course includes **lectures** (2 meetings per week) and **recitations** (1 meeting per week). Lectures will discuss basic physical principles, their derivations, and implications; recitations will discuss the use of these principles in solving problems. Since examinations will emphasize problem solving, attendance at recitations is essential. Experience has shown that formation of small study groups with friends and classmates to discuss physics concepts and problem-solving methods is a valuable component of the learning process, and we encourage this activity.

Course Objectives

The aim of this course is to show you how physics can explain the world around us by a few fundamental principles, and enable you to predict the outcome of a wide range of events using these ideas. The course emphasizes the fact that the laws of physics as we know them today have taken hundreds of years to evolve, and are the result of extraordinary insights by the finest minds that have ever lived. In particular it should be realized that these laws are not "self evident", and in fact a lot of them are counter-intuitive. Thus early attempts to understand the universe involved some bizarre explanations of natural phenomena – what we would now label as "pseudoscience". In fact the true explanation of some apparently simple phenomena can be very complicated. For example, the fact that all objects fall at the same rate (as found by Gallileo), requires an understanding of both Newton's second law of motion, and Newton's law of

gravitation – both covered in PHY211. (Actually a complete understanding requires Einstein's *general* theory of relativity – not covered in PHY211!)

Learning Outcomes

1. Acquire scientific knowledge and distinguish scientific fact from pseudoscience.

A good example (to be discussed in class) is the history of artillery aiming. In the fifteenth century, the “pseudoscience” of the elements earth, fire, air, and water was used to explain the flight of a cannonball. Galileo's experiments were some of the first to do controlled experiments that enquired about how the universe actually worked.

2. Learn fundamental principles in mechanics.

This is what the course is actually all about. For example, Newton's laws of motion, which are covered extensively, are the most fundamental laws of physics. The course will also cover the two equivalent forms of Newton's laws — conservation of momentum and conservation of energy.

3. Apply fundamental principles to interpret and make predictions.

Students will learn how to use the fundamental principles to do calculations and make predictions. For example, the students learn how to work trajectory problems – if a ball is thrown off a cliff, where will it land?

4. Demonstrate an understanding how scientific discovery can change the way scientists understand the world.

We will discuss Galileo's experiments that proved that all bodies fall at the same rate. This discovery led to Newton's laws of motion. These laws were the first to give a broad understanding of exactly how the universe works.

5. Understand the interaction between science and society.

“Society” as we know it would not exist without an understanding of the fundamental physics taught in PHY211. It is inconceivable that the technology around us could have been invented without Newton's laws of motion, etc. PHY211 mostly covers mechanics, a “pre-requisite” for the industrial revolution and modern civilization

6. Hands-on project using scientific methods to include design, data collection, analysis, summary of the results, conclusions, alternative approaches, and future studies.

There is a laboratory component to the course which amply fulfills this requirement. For example, at the end of each lab report the students have to answer questions which include suggesting experiments which would test the validity of certain of the equations used in the data analysis.

7. Ability to find, evaluate and use effectively sources of scientific information.

Again, this is dealt with in the laboratory component. Students will analysis experiment data by different techniques. They have to consult the textbook and other reference sources to find values of physical constants and compare the values with their experimental results. Student will learn how to evaluate discrepancies and explain different sources of errors.

Textbook

The required **textbook** is *College Physics*, by Serway and Vuille (8th Edition, Brooks Cole, 2009). Before each Wednesday recitation session you must do the problems assigned in the online Schedule at the course home page. Solutions will be presented in recitation. There will be a recitation grade; at the first meeting of the semester your recitation instructor will explain how this will be assessed. Sample problems, similar to the homework problems, will also be given during lectures.

Another textbook is on reserve for PHY211 in the **Science Library**. (For the location see <http://www.uky.edu/Libraries/lib.php?lib id=19>). If you have difficulty in understanding something in your book, it may help to see a different point of view. You should also feel free to visit the lecturer or your recitation instructor with questions during their office hours. Finally, a study room, the **Physics Resource Room, 301J** in the **Science Library**, (For the location see <http://www.uky.edu/Libraries/lib.php?lib id=19>), is staffed with physics graduate students equipped to answer questions from students in the General Physics classes.

There is a **web page** for this course <http://www.pa.uky.edu/~nmartin/phy211>. **Old Exams** are available in pdf format.

Laboratory

Students registered for PHY 211 take a laboratory course. The laboratory covers similar material to the lecture (but at different times). You need to attend all laboratory sessions and complete all assigned work before receiving a laboratory grade. Consult the laboratory syllabus for make up policy in the occasion of excused absence.

Course Evaluation

Course evaluations are an important component of our Department's instructional program. To access the system during the evaluation window, simply go the Department of Physics Web page at <http://www.pa.uky.edu> and click on the link for Course Evaluations; then follow the instructions. All your comments and scores are anonymous. *Students completing the online course evaluations will get a 5 point bonus.*

Examinations and Grading

There will be three 1 hour examinations given during the semester and a final exam given at the end of the semester. Your course grade will be determined from your total score, which includes

the recitation and laboratory. Students in PHY211 *must* satisfactorily complete the laboratory portion of the course in order to receive an overall passing grade for the course.

Hour exams (3 × 100 pts)	300 pts
Recitation grade	50 pts
Laboratory grade	100 pts
Course evaluation bonus	5 pts
Final exam	150 pts
TOTAL	605 pts

The dates of the three one hour exams and the final are given on the web page. **The three one hour exams are given during regular class times.**

Grades will be determined as follows (600 = 100%):

80 – 100%	A
65 – 79%	B
50 – 64%	C
35 – 49%	D
0 – 34%	E

If you miss an exam without an acceptable excuse (i.e., a valid university excuse), you will receive a zero for that exam. If you have an acceptable excuse, it should be presented in writing to your recitation instructor; he or she may request further documentation. It will minimize confusion if you notify your instructor in advance of your absence, if possible. If you miss one hourly exam with a valid excuse you will have a grade assigned to you for that exam based on your performance on the other exams (as compared to the class average). If you miss the final exam or two (or more) hourly exams but are otherwise doing satisfactory work, you will receive an “I” for the class, which must be removed at a later time. No make-up exams will be given in general, although in some circumstances an exception may occur. If you have any queries over the grading of an examination, consult your recitation instructor *within a week*.

In the mid of the semester, you will receive a midterm grade tabulated according to the above weight of different activities. This midterm grade just reflects your performance in the class up to that point, and you should not consider this as your final grade.

Academic offense policy

All assignments, projects, exercises and tests completed by students for this class should be the product of the personal efforts of the individual whose name appear on the corresponding assignment. Misrepresenting others’ work as one’s own in the form of cheating or plagiarism is unethical and will lead to those penalties outlined in the University Senate Rules (6.3.1 & 6.3.2) http://www.uky.edu/Faculty/Senate/rules_regulations/index.htm . The minimum penalty for plagiarism or cheating is a zero on the assignment for a first, “minor offence”; more severe penalties may be recommended and are mandated by the faculty senate for “major” and subsequent offences. Students should also be aware that according to faculty senate rules, those

charged with plagiarism may not withdraw for any reason from the course in which the offense occurred.

Course Policy on Classroom civility and decorum:

The university, college and department has a commitment to respect the dignity of all and to value differences among members of our academic community. There exists the role of discussion and debate in academic discovery and the right of all to respectfully disagree from time-to-time. Students clearly have the right to take reasoned exception and to voice opinions contrary to those offered by the instructor and/or other students (S.R. 6.1.2). Equally, a faculty member has the right -- and the responsibility -- to ensure that all academic discourse occurs in a context characterized by respect and civility. Obviously, the accepted level of civility would not include attacks of a personal nature or statements denigrating another on the basis of race, sex, religion, sexual orientation, age, national/regional origin or other such irrelevant factors.

Course Policy on Academic Accommodations due to disability

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address jkarnes@eamil.uky.edu) for coordination of campus disability services available to students with disabilities.

Schedule and Homework

We will cover material from Serway and Vuille (8th Edition) chapters 2 – 8, and chapter 13. A detailed schedule, including **homework assignments** as they are given out, is on the web page: <http://www.pa.uky.edu/~nmartin/phy211>

PHY 211

(TENTATIVE) SCHEDULE

SPRING 2010

Recitation problems are on material covered in the lectures.

Problems worked out in lectures serve as examples to help you do the Wednesday homework Problems.

(You are encouraged to attempt the lecture problems (if listed) beforehand!)

Q=Conceptual Question P=Problem

DATE	LECTURE	LECTURE PROBLEMS	RECITATION PROBLEMS (HOMEWORK)
W			Math Review
R	Ch 2: 1-D Motion	Click Here	
T	Ch 2: 1-D Motion, Gravity		
W			Ch2 Q8 P8 P30 P39 P53
R	Ch 3: Vectors	Click Here	
T	Ch 3: Vectors, 2-D Motion		
W			Ch2 P43 P44 Ch 3 Q1 P10. P15
R	Ch 3: Projectile Motion (Omit Ch 3 Section 5) Ch 4: Newton's Laws of Motion	Click Here	
T	Ch 4: Newton's 1st and 2nd Laws of Motion, Resultant forces		
W			Ch 3 P22 P23 P31 P59
R	Ch:4: Free Body Diagrams Normal Force, Slopes, Ropes, Pulleys (All without friction)	Click Here	
T	Ch:4: Free Body Diagrams Normal Force, Slopes, Ropes, Pulleys (All without friction)	Review of Ch 2 to 4	
W			Practice Exam 1 Print out and bring a copy! (no HW collected)
R	EXAM 1		

T	Ch 4: Friction, Newton's 3rd Law	Click Here	
W			Solution to Exam 1
R	Ch 4: Friction, Newton's 3rd Law Ch 5: Work, Potential and Kinetic Energy	Click Here	
T	Ch 5: Work, Potential and Kinetic Energy		
W			Ch 4 P53 P54 Ch 5 P1 P8 P18
R	Ch 5: Springs, Conservative and Non-Conservative Forces		
T	Ch 6: Conservation of Momentum		
W			TBA
R	Ch 6: Collisions		
T	Practice Exam 2		
W			TBA
R	EXAM 2		
T	Ch 7: Circular motion		
W			
R	Ch 7: Angular quantities and Kinematic Equations. Gravity.		
T	Ch 8: Torque and Equilibrium		
W			
R	Ch 8: Center of Mass and Statics Problems		
T	Ch 8: Rotational Dynamics		
W			
R	Ch 8: Rotational Dynamics		
T	Review of what we have covered in Chs 7, 8		

W			Practice Exam 3 Print out and bring a copy! (no HW collected)
R	EXAM 3		
T	Rolling(!)		
W			
R	Ch 13: Simple Harmonic Motion		
T	Ch 13: SHM, Intro to Wave motion (We will cover Ch 13 sections 1-5, 7, 8. We will omit section 6, and we may omit sections 9-11.)		
W			Practice Final Print out and bring a copy! (no HW collected)
R	Last Day Of Classes What we have covered.		
	FINAL EXAM CP 155		