PHYS 1710 – Fall 2015
Introductory Physics I: Mechanics, Waves, and Thermodynamics
MWF 8:45–9:50 AM, Room 204 JBL

Prof. Craig Group
rcg6p@virginia.edu
http://people.virginia.edu/~rcg6p
Phone at 113 HEP:(434) 243-5552
Office Hours: T 5-6, F 10-11:30, Room 302 Physics
(W 10-11 by appointment)

Course Description: Physics encompasses the study of the Universe; from the largest galaxies to the smallest subatomic particles. If that isn't enough to motivate you, basic physical laws can be used to understand, predict, and control almost everything that we encounter in everyday life. For example, space travel, playgrounds, surfing and most other sports are among the list of topics that rely critically on the topics of this course. To put it bluntly, understanding physics can make you a more productive and powerful human!

PHYS 1710 is the first course of a two-semester introductory physics sequence aimed at potential Physics or Astronomy/Physics majors. The primary goal of the course is to prepare you for success as a Physics major and to introduce you to: kinematics and dynamics, energy and momentum conservation, rotational motion, fluid dynamics, thermodynamics, oscillatory motion, waves, and sound. Using an interactive and diverse set of classroom techniques focused on learning, we will develop our problem solving skills in these areas and learn to critique the clarity and quality of our own and other classmate's work. Learning to "think like a scientist" and developing skills and strategies for success in college-level course work will also be constant themes. In modern science, collaboration is key to progress and therefore it will be encouraged in many aspects of the course. Finally, research is the ultimate goal of a scientist, so we will take some time to connect to modern research topics and other Physics department faculty so that students can begin to consider their interests for future research efforts.

Learning Objectives: Through course activities we will develop the ability to:

- Apply concepts and solve physical problems algebraically in a logical, clear, and concise manor and apply sound problem solving skills to new types of problems.
- Use calculus to derive relationships between mechanical equations and learn how to apply calculus to physical systems.
- Realize that an algebraic solution can be used to extrapolate to many problems and is therefore more powerful than a numerical result.
- Mindfully reflect on our own thoughts and learning process.
- Realize how we use problem-solving skills in everyday life.
- Assess and critique physics solutions, results, and predictions.

Learning Assessment:
Several activities will be used to assess and encourage student learning:

- **Exams (two midterms and a cumulative final)**: A major objective of this course is to apply concepts and to display a working knowledge of Classical Mechanics through problem solving. Exams will be a major way that I assess that objective. In order to learn from your mistakes, you will have the opportunity to retake parts of the midterm exams in a team environment in the following class meeting with the chance to improve your learning and even your score.

- **Homework**:The homework assignments are an important supplement to the in-class activities. Taking the homework seriously will increase the probability that you develop the objectives of this course and are able to apply your skills successfully on exams. You are encouraged to discuss problems with your colleagues; however, it is important that you are also able to work out the problems on your own.

  - *electronic*: We will use Mastering Physics (Course ID: GROUP1710YR2015). The online system is valuable because it provides immediate feedback and allows you to try again and still receive most credit.
  - *written*: Most weeks there will be a written assignment that we will discuss in class. We will use these examples to learn how to assess the quality of our written problem solving skills. Peer and self-assessment will be utilized based on a problem-solving rubric.

- **Course Participation**: Class activities have been designed based on techniques that have been proven to be effective for learning physics. For that reason, participation is strongly encouraged. Participation will be assessed for several activities:

  - *pre-class quizzes*: Reading in advance of lecture is critical in order to maximize learning in our interactive classroom environment. Pre-class quizzes will encourage reading and will offer opportunities for students to inform the lecture regarding material that they find interesting, challenging, or remarkable.
  - *clickers*: Use of this real-time response system in class will provide students and the professor with frequent and rapid assessment of student learning. Often, it will lead into a chance for students to discuss a challenging topic with their neighbor.
  - *misc*: Other class participation opportunities will include conceptual tests to understand learning progress, and daily learning reflection time to understand progress and identify concepts that may need more attention in class.

- **Weekly Quizzes**: Concepts and problem-solving skills will be developed further in weekly discussion sessions organized by a teaching assistant. The TA will also give weekly quizzes and provide problem-solving feedback.

- **Learning Portfolio**: Developing techniques to improve our learning is an important aspect of this course. Some in-class activities and pre-class reading quizzes will offer suggestions for reflecting on our own learning strategies and progress. The Course Learning Portfolio will be a more extended chance to reflect on learning progress over the entire semester. What did I learn? How best do I learn Physics? Am I ready for upper-level physics classes?

Prerequisite: MATH 1310 Calculus I
(A high school physics course is not a strict prerequisite, but students will likely struggle in this course if they have no past experience in the subject.)
Corequisite: MATH 1320 Calculus II
Teaching Assistant: Daniel Abrams, dla9bc@virginia.edu, Office hours:Thr. 4-5:30 pm, Rm 220
Grader: Rob Mina, ram2aq@virginia.edu, Office hours:Fri. 2-3 pm, Rm 220
Primary Text: *Physics for Scientists and Engineers*, 4th Edition, Vol.1 (with Mastering Physics access) **Author:** Giancoli;
Library Reserve: Several books that you might find useful can be found on the Physics 1710 reserve shelf at the Physics Library.

Grade Policy:

We use an absolute grading scale:

A	90-100 (A-: 90-92, A+: >97)
B	80-90 (B-: 80-82, B+: 87-90)
C	70-80 (C-: 70-72, C+: 77-80)
D	60-70 (D-: 60-62, D+: 67-70)
F	<60

Two Midterm Exams	20%
Final Exam	25%
Homework	30% (15% online, 10% written, 5% final review)
Class Participation	15% (clickers 5%, pre-class quiz 5%, misc 5%)
Quizzes	5%
Learning Portfolio	5%

Tips for success:

1. Actively participate in class activities.
2. Read related sections of the textbook **BEFORE** each lecture.
3. Clearly display your thought process on homework and exam problem solutions.
4. Always perform some "sanity checks" on you answers (check physical units and orders of magnitude). Think like a scientist!

Course Policies:

- Homework policy: Assigned problems will be announced at least one week before the set is due. Late homework will be penalized, unless arrangements are made with the instructor in advance.
- A short graded quiz will be given during most problem sessions.
- There will be no makeup exams or quizzes. Except in emergency cases (e.g. sudden illness), a valid excuse for a missed exam can only be obtained before the exam.
- We will use the iClicker2 in this course. You can purchase one at the UVa Bookstore.
- I trust every student in this course to fully comply with all of the provisions of the UVa honor system. Alleged honor violations, if brought to my attention, may be forwarded to the Honor Committee.

Course Schedule

Class	Date	Sections	Required Reading	Online Homework	Written Homework
		Kinetics and Dynamics			
1	W 8/26	Intro/pretest	Ch.1 (no quiz)		
2	F 8/28	1-D Motion Falling	Ch.2	MP1(Ch.1)*	
3	M 8/31	More 1-D Motion			
4	W 9/2	2-D Motion	Ch.3		
5	F 9/4	Projectile Motion		MP2(Ch.2&3)*	
6	M 9/7	Newton's Laws	Ch.4		
	Tu 9/8	*(Last day to add a course.)*			
7	W 9/9	Using Newton's Laws	Ch.5		
	W 9/9	*(Last day to drop a course.)*			
8	F 9/11	More Newton's Laws		MP3(Ch.4&5)*	WHW1†
9	M 9/14	Work and Energy	Ch.7		
10	W 9/16	Conservation of Energy	Ch.8		
11	F 9/18	More on Energy		MP4(Ch.7&8)*	WHW2†
12	M 9/21	Linear Momentum	Ch.9		
13	W 9/23	More Momentum			
14	F 9/25	More Momentum		MP5(Ch.9)*	WHW3†
15	M 9/28	Rotational Motion	Ch.10		
16	W 9/30	More Rotation	Ch.11		
17	F 10/2	More Rotation (post test)			WHW4†
	M 10/5	*(Reading Holiday – no class !)*			
18	W 10/7	Review		MP6(Ch.10&11)*	
19	F 10/9	Midterm Exam I	Ch.1-5,7-11		
20	M 10/12	Statics - exam redo	Ch.12		
21	W 10/14	Statics/Fluids	Ch.13		
22	F 10/16	Fluids			WHW5†
23	M 10/19	Fluids		MP7(Ch.12&13)*	
	Tu 10/20	*(Last day to withdraw.)*			
		Waves and Sound			
24	W 10/21	Oscillations	Ch.14		
25	F 10/23	More oscillations			
26	M 10/26	More oscillations		MP8(Ch.14)*	WHW6†
27	W 10/28	Waves	Ch.15		
28	F 10/30	More Waves			
29	M 11/2	Sound		MP9(Ch.15)*	WHW7†
30	W 11/4	More Sound	Ch.16		
31	F 11/6	More Sound		MP10(Ch.16)*	WHW8†
		Thermodynamics			
32	M 11/9	Temperature	Ch.17		
33	W 11/11	Kinetic Theory of Gas	Ch.18		
34	F 11/13	More Kinetic Theory		MP11(Ch.17&18)*	WHW9†
35	M 11/16	Heat	Ch.19		
36	W 11/18	Thermodynamics	Ch.20		
37	F 11/20	More Thermodynamics		MP12(Ch.19&20)*	WHW10†
38	M 11/23	Something important			
	W 11/25	*Thanksgiving Holiday – no class!*			
	F 11/27	*Thanksgiving Holiday – no class!*			
39	M 11/30	Exam Review			
40	W 12/2	Midterm Exam II	Ch. 12-20		
41	F 12/4	Exam redo			
42	M 12/7	Examples/Review		Final Review HW	
43	Th 12/17	Final Exam (2-5 pm)	1-5,7-20		

* Online HW due at 11:59 PM.

† Written Homework is to be brought to class on the day it is due.