Physics 0030 Fall 2013 – Basic Physics

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Physics 0030 is an introductory course in physics, introducing students to mechanics, the quantitative description of the phenomena of motion and the mechanical properties of materials. It is the first part of a year-long introduction to physics (Physics 0030 & 0040) designed primarily for concentrators in sciences other than Physics, including pre-medical students, who do not expect to take additional courses in the physics curriculum. This course assumes no prior knowledge of physics. Students who have had some high school physics preparation and who are comfortable with basic calculus should strongly consider Physics 0050 instead. Students with a very strong background in physics might also choose Physics 0070 as their introduction to college physics.

The goals of Physics 0030 are for students to develop their physical intuition, their problem solving abilities and their understanding of the phenomena of mechanics. In addition, students will gain practice in quantitative and critical thinking and, hopefully, an appreciation and understanding of the value of a scientific approach to understanding the world around us. In this spirit, we will try to emphasize how our understanding of physics progresses from a small number of general principles, rather than being a collection of unrelated facts and formulas. Laboratory experiments and lecture demonstrations directly introduce the physical phenomena and highlight the fact that physics is an experimental science—it seeks to describe and explain real-world phenomena. Lectures and homework assignments provide the primary means for developing problem solving skills. The two midterms and the final exam serve to evaluate a student's grasp of the basic concepts and problem solving capabilities.

Mathematics Requirements

Algebra and trigonometry are used extensively in this course, as are the basic concepts of calculus. Students who have not taken any prior calculus course must take Math 0090 concurrently. For students needing a refresher on the mathematical relations we will use, Appendix M of the course text contains a useful math tutorial.

Instructors

Profs. Heintz and Spradlin are the lecture instructors for this course and will teach both the 11:00am and 12:00pm classes. Feel free to attend either one (or both!). Prof. Gaitskell is the lab instructor. Miquel Dorca is the course manager and will handle all administrative course details. In your emails to any instructor, please be sure to include "(Phys0030)" in the subject line.

Textbook

University Physics for the Physical and Life Sciences, Volume 1
Philip R. Kesten and David L. Tauck
ISBN 10: 1429204931
ISBN 13: 9781429204934

The textbook may be purchased at the Brown Bookstore, and it is also available as an e-book.

Lectures

Lectures are held on Mondays, Wednesdays, and Fridays from 11:00-11:50am and 12:00-12:50pm in Barus & Holley 166. Attendance at all lectures is strongly encouraged. In lecture, we will focus on developing a conceptual understanding of the material as well as

mathematical problem solving, using a variety of active learning methods. To get the most out of lecture, **please read in advance the chapter sections to be covered**, as given in the course calendar.

iClickers

Please sign out an iClicker from the basement of the Science Library and register it online at http://www.iclicker.com/registration/, using your login name (e.g. "jcarberr") as your student ID. Clicker questions are designed to encourage in-class discussion.

Workshop Sessions

During the weeks when the labs are not in session a one-hour "workshop" session will be conducted at the time of your assigned lab section. These sessions will take place in Barus & Holley 120, with discussions being led by a TA. They will include conceptual exercises and problem solving. The session coordinator will facilitate solving some selected problems and help step through the needed skills. The goal is to emphasize learning the main concepts of the week. The problems will be closely related to parts of the homework questions.

Homework

Weekly homework assignments will be posted on course website. You may work together to discuss a problem, but the work you submit must be your own. Please remember that homework is the best preparation you have for the course exams. **Your lowest homework grade will not be counted toward your final homework grade.**

Homework may be turned in during class (in the provided alphabetized homework boxes), or to Andria Smith in room 514 of Barus & Holley (or the "IN BOX" outside room 514) no later than 1:30 pm on the due date. **Assignments are due Fridays (beginning September 13), by 1:30pm. Late assignments will not be accepted.** Graded homework will be returned on the shelves outside room 111 and solutions will be posted online each week after the due date.

Although the homework is only worth a small fraction of the course grade, it is very important. Doing the homework regularly is really the only satisfactory way to learn the material and to prepare for the exams. To get the maximum benefit from your work, you should take the time to compare the published solutions with your own solutions when they become available. To get any benefit from the homework, you must actually do the work yourself. You are encouraged to discuss the homework problems with your fellow students. It can be very helpful. The work that you hand in, however, must be your own. Directly copying homework is a violation of the academic code.

Laboratory Sessions and Reports

Labs are designed to deepen your understanding of physics by applying it experimentally. Lab sessions are two hours long and are held in Barus & Holley 111. There are six labs in total to complete. More information will be posted at:
https://wiki.brown.edu/confluence/display/PhysicsLabs/PHYS+0030+Basic+Physics.

You will need a special notebook for recording and reporting your lab work. Two good possibilities, obtainable in the Bookstore, are the "Science Notebook" and the "Engineering- Science Notebook". All lab data must be recorded in your notebook. Do not destroy your data until you have received your semester grade. Be sure to bring a calculator to each laboratory session.

Students are expected to complete all of the stipulated experiments in the laboratory. Incomplete laboratory work may result in an NC for the course, regardless of performance on the exams. Failure to complete any of the laboratory work, or completion of only a minor portion, will definitely result in a grade of NC for the course. If you have taken this course before, but not passed it, you may be able to get credit this year for lab work done previously. If this applies to you, consult Professor Gaitskell before labs start, and bring your old lab reports for him to see.

Please direct all lab questions to Prof. Gaitskell Richard_Gaitskell@brown.edu.

Midterm and Final Exams

Two midterm exams will be given *out of class* on the following dates:

Midterm #1 – Monday, September 30, 7:00 – 9:00 PM
Midterm #2 – Monday, November 4, 7:00 – 9:00 PM

The final exam will be cumulative and is scheduled for:

Final Exam – Sunday, December 15, 2:00 PM-5:00 PM

Please take account of these dates in planning your other activities. We cannot give tests at other times for individuals, except in cases of illness or other emergencies verified by a note from the contact Deans for this course. If you foresee an unavoidable conflict, discuss it with Miquel Dorca as soon as possible. Makeup exams will be given only during Reading Period, on a day to be specified, **and only to students with approved excuses**.

An exam paper may be returned for correction of grading errors no later than 3 days after the graded tests are made available (except for the final examination, for which re-grading requests can be submitted by the end of the first week in the second semester). The exam paper should be given to Miquel Dorca or Ms. Smith, together with a specific written explanation of why the assigned grade seems to be wrong. Re-grading can lead either to an increase or to a decrease in grade. **No requests for re-grading will be accepted if the problem in question has erasure marks on it.**

Course Grade

Your letter grade for the course will be determined on the basis of the total score you accumulate throughout the course. Each factor will contribute as follows:

Homework Assignments	**10%**
Lab Reports	**20%**
Midterm #1	**20%**
Midterm #2	**20%**
Final Exam	**30%**

The total for the course is then a maximum of 100% which is finally converted to the A,B,C,NC grades based on a curve. The median of this curve will be slightly above the B/C cutoff. Any student who receives at least 50% of the total score, and who completes all of the lab assignments, will pass the course. Any student with less than 50% of the total score will receive an NC. Around 20% of the students will be assigned an "A" grade for the overall course and we reserve the right to be more generous than this. While we cannot predict the exact cutoff for an "A" grade, achieving at least 90% of the total score will ensure an "A" for

the course. The makeup exams will not be graded independently, nor will their means be scaled to the corresponding curve for the main exam. The makeup exam grades will be merged with the corresponding exam to assess the overall performance.

Our philosophy for the course is to emphasize learning the concepts. Thus we will not entertain any questions or emails requesting feedback on how you can achieve a certain grade. We will post the score distributions for midterm 1, midterms 1+2 and the overall course. We will not post any grade cutoffs.

Resources

There are a variety of resources available for help with the course. The course web page on "Canvas" will have solutions to the weekly homework problems, some sample exams from past years, information and links regarding the labs, and occasional course announcements.

Problem Solving Help:

We will offer 5 hours of problem solving help sessions in Barus & Holley each week. These are drop-in sessions, where a Teaching Assistant will be available to answer questions or help you with the course in other ways. No appointment is necessary. Rooms and times will be announced shortly.

Tutoring

The Science Center, located on the third floor of the Science Library, will be offering drop-in tutoring sessions as well as facilitated study groups weekly throughout the semester.

Academic Conduct

Students enrolled in this course are expected to follow the University Academic Code. For more information, please visit the following website:
http://www.brown.edu/Administration/Dean_of_the_College/curriculum/academic_code.php

PHYS0030 - Fall 2013 - Lecture Schedule

NO.	DATE	TOPIC	READING	pages		HW
1	4-Sep	Introduction	1/1-6	1	18	
2	6-Sep	Linear motion	2/1-2	25	43	
3	9-Sep	Motion with constant acceleration	2/3-4	43	58	
4	11-Sep	Motion in 2D, vectors	3/1-3	69	79	
5	13-Sep	Projectile motion	3/4	79	90	#1
6	16-Sep	Uniform circular motion	3/5	90	97	
7	18-Sep	Newton's 1st and 2nd laws	4/1-4	105	118	
8	20-Sep	Newton's 3rd law	4/5-6	118	135	#2
9	23-Sep	Friction	5/1-4	145	162	
10	25-Sep	Dynamics of circular motion	5/5	162	170	
11	27-Sep	Work and kinetic energy	6/1-4	179	196	#3
	30-Sep	**Review Lecture, then EXAM #1 7:00-9:00 PM**	**chapters 1-5**			
12	2-Oct	Potential energy and conservation of energy	6/5-6	196	204	
13	4-Oct	Conservation of energy	6/7-8	204	221	#4
14	7-Oct	Linear momentum	7/1-2	233	243	
15	9-Oct	Collisions	7/3-5	244	258	
16	11-Oct	Center of mass	7/6	258	266	#5
	14-Oct	**Fall weekend holiday - no class**				
17	16-Oct	Rigid body rotation	8/1-2	275	289	
18	18-Oct	Rotational kinematics	8/3-5	290	300	#6
19	21-Oct	Rotational dynamics	8/6	300	306	
20	23-Oct	Rotational dynamics	8/7-8	306	318	
21	25-Oct	Stress	9/1-3	333	346	#7
22	28-Oct	Elasticity and fracture	9/4	346	351	
23	30-Oct	Newton's law of gravitation	10/1-2	361	373	
24	1-Nov	Gravitational potential energy, Kepler's laws	10/3-4	373	388	#8
	4-Nov	**Review Lecture, then EXAM #2 7:00-9:00 PM**	**chapters 6-10**			
25	6-Nov	Fluid statics	11/1-6	397	412	
26	8-Nov	Buoyancy	11/7	412	419	#9
27	11-Nov	Fluids in motion	11/8-9	419	432	
28	13-Nov	Viscous fluids	11/10	432	437	
29	15-Nov	Simple harmonic motion	12/1-3	449	464	#10
30	18-Nov	Pendulum	12/4-6	464	474	
31	20-Nov	Damped and forced oscillations	12/7-8	474	482	
32	22-Nov	Waves	13/1-3	493	508	#11
33	25-Nov	Superposition and interference	13/4-5	508	514	
	27-Nov	**Thanksgiving recess - no class**				
	29-Nov	**Thanksgiving recess - no class**				
34	2-Dec	Standing waves and beats	13/6-7	514	528	
35	4-Dec	Volume, intensity, sound level	13/8	528	533	
36	6-Dec	Doppler effect	13/9	533	544	#12
		Reading period Dec 8-12				
	15-Dec	**FINAL EXAM 2:00 pm**	**cumulative**			