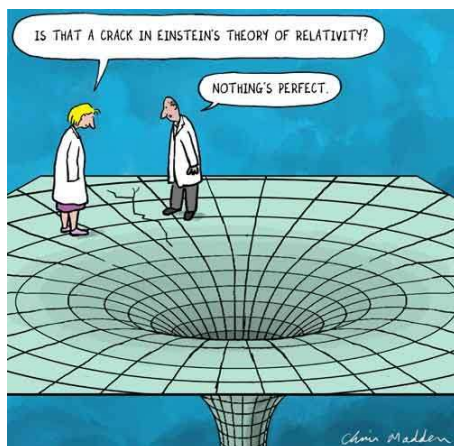


PHYS-201: FUNDAMENTALS OF PHYSICS III
Winter Quarter 2010/2011: 01/03/2011—03/19/2011

Course Objective: The course *Fundamentals of Physics III* introduces the basic conceptual understanding of modern physics needed to keep up with rapidly developing frontiers of science and technology of the 21st century. The end of the 19th and beginning of the 20th century faced dramatic changes in understanding of basic physics principles. Prior to this time, physics dealt with Newton's laws of motion and gravitation, Maxwell's theory of electromagnetism, thermodynamics, and kinetic theory. However, new problems surfaced when scientists confronted very high velocities and very small lengthscales. These new puzzles led to new concepts and new theories: special and general relativity, quantum theory, modern models of atoms and molecules, lasers, superconductivity, and more. This course is a serious though relatively non-mathematical introduction to modern physics concepts. The course begins with a mathematical description of mechanical and electromagnetic wave propagation and proceeds to description of wave phenomena, such as interference and diffraction. In quantum mechanics which dominates physical world at small lengthscales the concepts of a particle and wave merge into one dual description. A particle (e.g. an electron) can be treated either as a particle or as a wave, depending on the experimental situation under consideration. Similarly, electromagnetic radiation can be mathematically described either as a wave or a particle (photon). When the relative velocity of an object with respect to the observer approaches the speed of light, special relativity phenomena have to be taken into account. The course covers some of special relativity phenomena such as length contraction, time dilation, relativistic momentum & energy, and mass-energy relationship.



Course Director and Lecturer: Prof. Brigita Urbanc

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Office: Disque Hall 909 (12-909)

Course Website: For Weekly Updates Check:

www.physics.drexel.edu/~brigita/COURSES/PHYS-201_2010-2011

Lectures: Mon & Wed 09:00am—09:50am (RANDEL 327)

[Note: first lecture: Monday 01/03/2011; last lecture: Monday 03/14/2011]

Recitation TAs: Benjamin Coy & Helenka Casler

E-mails: btc24@drexel.edu & hic27@drexel.edu

Recitations/Discussions:

001 Tuesday 09:30 am—10:50 am ACADMC 104 Benjamin Coy

002 Tuesday 11:00 am—12:20 pm STRATN 219 Benjamin Coy

003 Tuesday 02:00 pm—03:20 pm MAIN 301 Helenka Casler

004 Tuesday 03:30 pm—04:50 pm AEL 279 Helenka Casler

Lab Director: Prof. Joseph Trout

E-mails: joseph.jude.trout@drexel.edu, st92l7c3@drexel.edu

Lab TAs: Khushali Manseta & Swetaben Brahmhatt & Nirbhik Modi

E-mails: knm33@drexel.edu & sb882@drexel.edu & njm55@drexel.edu

Lab Sessions in DISQUE 820A

060 Thursday 09:00 am—10:50 am (even weeks): Khushali Manseta

061 Thursday 11:00 am—12:50 pm (even weeks): Nirbhik Modi

062 Thursday 11:00 am—12:50 pm (odd weeks): Swetaben Brahmhatt

063 Thursday 09:00 am—10:50 am (odd weeks): Khushali Manseta

064 Thursday 01:00 pm—02:50 pm (even weeks): Swetaben Brahmhatt

065 Thursday 01:00 pm—02:50 pm (odd weeks): Swetaben Brahmhatt

Important: A detailed week-by-week lab schedule is posted on the course website at www.physics.drexel.edu/~brigita/COURSES/PHYS-201_2010-2011.

Help/Office hours: Address all questions and scheduling issues related to (a) labs to Prof. Joseph Trout (b) homework and recitations to Benjamin Coy & Helenka Casler; and (c) lectures & exams to Prof. Brigita Urbanc. Please, contact all instructors using e-mail.

Course Material:

- Course Textbook:

Young & Freedman

University Physics, 12th Edition

Pearson/Addison Wesley, 2007

ISBN-10: 080532187X; ISBN-13: 978-0805321876

- Lab Description:

Download the pdf file of each lab from the course website, (www.physics.drexel.edu/~brigita/COURSES/PHYS-201_2010-2011), print it out, and bring the hard copy to the lab session

Lectures:

- (a) Read the relevant chapter(s) from the course textbook **before** each lecture.
 - (b) 100% lecture attendance is required. Failure to attend the lectures will result in reduction of your final grade at instructor's discretion.
 - (c) All cell phones and other distracting electronic devices should be turned off during the lecture.
 - (d) Active participation in the classroom is expected and encouraged.
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Labs:

- (a) Attendance at all scheduled labs is required. Failure to attend and complete the labs will result in a non-completed course grade at the instructor's discretion. If you must miss a lab for legitimate reasons (i.e. illness, etc.), please inform your lab instructor and Dr. Trout (joseph.trout@drexel.edu) as soon as you know. Time is allotted at the end of the quarter for students to make up labs missed for *legitimate* reasons, and make-up labs will be granted to students at the discretion of the lab director. In week none an announcement will be made in lecture with instructions on how to schedule a make-up lab during week nine or ten. There are no make-up labs for make-up labs.

- (b) Lab grades will be computed as follows:

- (i) **Prelabs** : 20%

Prelabs for each lab are to be completed and submitted *before* the start of each lab session. Prelabs submitted after the first 20 minutes of the lab session will not receive more than half credit.

- (ii) **Experiment** : 70%

You are expected to read the lab instructions before you arrive at the lab. Any lab member that appears to be unfamiliar with the lab material (i.e. expecting the lab instructor or other group members to complete the entire lab) will lose points. Each group must submit a copy of the data collected with all members signing it before leaving the lab. Each student should also keep a copy of the experimental data for use in his/her lab report. Lab material is available on the course web site (www.physics.drexel.edu/~brigita/COURSES/PHYS-201_2010-2011).

- (iii) **Lab Report** : 10%

You need to prepare your report at home and submit it at the next regularly scheduled lab (submission procedures for the final lab will be discussed in lab by your lab instructor). Grades for late lab reports will be reduced by 10%. Lab reports submitted one (1) week after the due date will receive NO credit. Each report should consist of: (1) a brief summary of the purpose and procedures of the experiment; (2) one or more tables of raw data and results, including the graphs; (3) a description of your final results with an assessment of the factors affecting their accuracy; (4) answers to any questions posed in the lab; and (5) a discussion of what you personally learned from doing the experiment.

Recitations/Discussions:

- (a) 100% attendance at all scheduled recitations is required. Failure to attend the recitations will result in reduction of your final grade at instructor's discretion.
- (b) There will be six homework assignments which you will download from the course web site (www.physics.drexel.edu/~brigita/COURSES/PHYS-201_2010-2011). Each assignment will consist of solving standard problems, which will count towards 100% of the homework grade. An additional bonus problem at an advanced level will be provided to enable you to gain extra points.
- (c) Hand in your homework assignments at Tuesday recitation session **on or before due date** (see the last page of the syllabus). Helenka Casler will be picking up the homeworks that were not handed in at your recitation session after her last recitation session (3:30 – 4:50 pm in AEL 279). **DO NOT INTERRUPT THE RECITATIONS SESSION: WAIT UNTIL THE SESSION ENDS.** Late homeworks (after 5:00 pm on the due date) will NOT be accepted.

Academic Honesty: All work during the exams must be your own unaided effort. The homework that you submit must be your own final product, although discussion of strategies and numerical results with others is acceptable. Each member of a lab group must take her/his own notes and write her/his own summarizing essay. In all other situations, active cooperation and peer teaching among students is strongly encouraged.

Tentative Course Schedule: Note that on the Martin Luther King Jr.'s Birthday (Monday, 01/17/2011) there are NO classes scheduled. The last day to withdraw from the course is Friday, 02/11/2011.

Grading Information/Missed Exams Policy:

Your letter grade will be based on your total score, obtained from the components listed on Table I. Dates of all exams (Exam 1, Exam 2, and Final Exam) will be posted on the course web site (www.physics.drexel.edu/~brigita/COURSES/PHYS-201_2009-2010/). **THERE WILL BE NO MAKE-UP EXAMS!** If you miss an exam and have a documented, valid reason for doing so, contact the course director as soon as possible. It is not enough to just send an e-mail message about your absence from the exam. You must state in writing why you missed the exam. If the course director renders the reason valid, your remaining exams will be reassigned a different weight to compensate for the missed exam. If you fail to send your written statement within 48 hours after the exam, the missed exam will be automatically assigned a score of zero.

TABLE I: GRADING

Grade Components	Contribution
Exam 1 (1hr)	15%
Exam 2 (1hr)	15%
Final Exam (2hrs)	30%
Four Lab Reports	20%
Homework Assignments (H1-H6)	20%

TABLE II: TENTATIVE SYLLABUS

TIME TABLE	TOPIC	CH/SEC	RECITATIONS	HOMEWORKS	EXAMS
WEEK 1 01/03–01/07	Periodic Motion Periodic Motion (contd.)	Ch.13/Secs: 1-4 Ch.13/Secs: 5-8	Ch.13:2,8,18 Ch.13:24,28,32	No Homework	
WEEK 2 01/10–01/14	Mechanical Waves Mechanical Waves (contd.)	Ch.15/Secs: 1-4 Ch.15/Secs: 5-8	Ch.13:44,52,57,61 Ch.15:1,7,8	No Homework	
WEEK 3: 01/17–01/21	Sound and Hearing	University Holliday Ch.16/Secs: 1-8	Ch.15:14,21,24 Ch.15:32,65,74	HW1: Due (01/21/2011) Ch.13:11,33,58,81; Ch.15:19(B)	
WEEK 4 01/24–01/28	Electromagnetic Waves Electromagnetic Waves (contd.)	Ch.32/Secs: 1-3 Ch.32/Secs: 4-5	Ch.16:17,33,43 Ch.32:1,3,8	No Homework	
WEEK 5 01/31–02/04 02/03/2011	Interference Diffraction Chs. 13, 15-16	Ch.35/Secs: 1-4 Ch.36/Secs: 1-3	Ch.32:13,26,53 Ch.35:4,17,32	HW2: Due (02/01/2011) Ch.15:41,47,53; Ch.16:44,81(B)	Exam 1
WEEK 6 02/07–02/11	Diffraction (contd.) Photons, Electrons, and Atoms	Ch.36/Secs: 4-7 Ch.38/Secs: 1-3	Ch.36:3,16,20 Ch.36:31,39,49	No Homework	
WEEK 7 02/14–02/18	Photons, Electrons, and Atoms (contd.) Photons, Electrons, and Atoms (contd.)	Ch.38/Secs: 4-6 Ch.38/Secs: 7-9	Ch.38:2,6,10,17 Ch.38:22,26,28	HW3: Due (02/15/2011) Ch.32:5,14,43; Ch.35:18,46(B)	
WEEK 8 02/21–02/25	Relativity Relativity (contd.)	Ch.37/Secs: 1-3 Ch.37/Secs: 4-6	Ch.38:33,38 Ch.37:4,7,11,17	HW4: Due (02/22/2011) Ch.36:6,8,32,40,70(B)	
WEEK 9 02/28–03/04 03/03/2011	Relativity (contd.) The Wave Nature of Particles Chs. 32, 35-38	Ch.37/Secs: 7-9 Ch.39/Secs: 1-3	Ch.37:21,29,43 Ch.39:1,4,6	HW5: Due (03/01/2011) Ch.38:25,56,58,75,39(B)	Exam 2
WEEK 10: 03/07–03/11	The Wave Nature of Particles (contd.) Quantum Mechanics	Ch.39/Secs: 4-5 Ch.40/Secs: 1-3	Ch.39:10,16,31 Ch.40:10,26,30	No Homework	
WEEK 11: 03/14 Final-TBA	Quantum Mechanics (contd.) Chapters: 13, 15-16, 32, & 35-40	Ch.40/Secs: 4-5		HW6: Due (03/15/2011) Ch.37:59,66; Ch.39:12,38; Ch.40:47(B)	Final