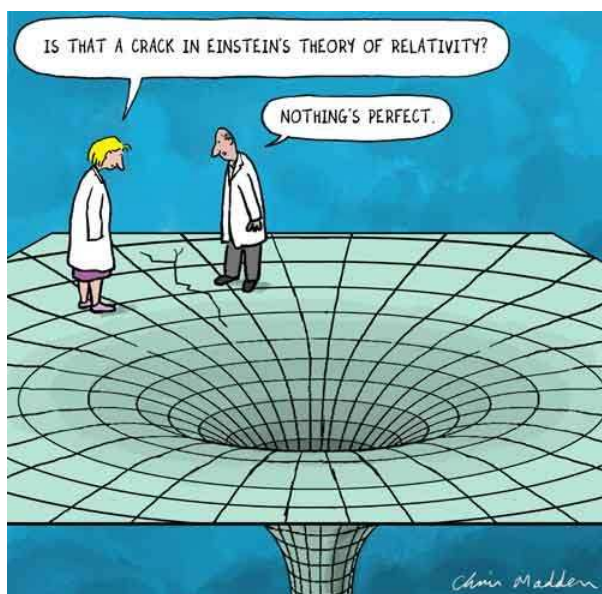

PHYS-201: FUNDAMENTALS OF PHYSICS III
Academic Year 2011/2012
Winter Quarter: 01/09/2012—03/24/2012

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

E-mail: brigita@drexel.edu

Phone: (215) 895-2726

Office: Disque Hall 909 (12-909)

Course Website: www.physics.drexel.edu/~brigita/COURSES/PHYS-201_WINTER-2011-2012

Lectures: MON & WED, 09:00am—09:50am, NSBITT 125

[Note: First Lecture on Monday 01/09/2012; Last Lecture on Wednesday 03/14/2012]

Recitation TAs: Joey Lambert, Sean Lynch, Matthew Voelker

E-mails: jgl29@drexel.edu, sml72@drexel.edu, matthew.j.voelker@drexel.edu

Recitations/Discussions:

- 001 Tuesday 05:00 pm—06:20 pm CAT 77 Matthew Voelker
 - 002 Tuesday 11:00 am—12:20 pm STRATN 219 Sean Lynch
 - 003 Tuesday 02:00 pm—03:20 pm PISB 109 Matthew Voelker
 - 004 Tuesday 03:30 pm—04:50 pm STRATN 219 Joey Lambert
 - 005 Tuesday 06:30 pm—07:50 pm CURTIS 352 Matthew Voelker
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Lab Director: Prof. Alexey Aprelev

E-mail: aprelev@drexel.edu

Lab TAs: Vinothini Gunasekaran, Sean Lynch, Vivek Madhavan

E-mails: vg347@drexel.edu, sml72@drexel.edu, vm379@drexel.edu

Lab Sessions in DISQUE 820A

- 060 Thursday 09:00 am—10:50 am (even weeks): Sean Lynch
- 061 Thursday 11:00 am—12:50 pm (odd weeks): Sean Lynch
- 062 Thursday 11:00 am—12:50 pm (even weeks): Vinothini Gunasekaran
- 063 Thursday 09:00 am—10:50 am (odd weeks): Vinothini Gunasekaran
- 064 Thursday 01:00 pm—02:50 pm (even weeks): Vinothini Gunasekaran
- 065 Thursday 01:00 pm—02:50 pm (odd weeks): Vinothini Gunasekaran
- 066 Thursday 05:00 pm—06:50 pm (odd weeks): Vivek Madhavan

Important: A detailed week-by-week lab schedule is posted on the course website at www.physics.drexel.edu/~brigita/COURSES/PHYS-201_WINTER-2011-2012.

Help/Office hours: Address all questions and scheduling issues related to (a) labs to Prof. Alexey Aprelev (b) recitations to Joey Lambert, Sean Lynch, and Matthew Voelker; and (c) lectures & exams to Prof. Brigita Urbanc. Please, contact all instructors using the above e-mail addresses.

Course Material:

- Course Textbook:

TITLE: Physics for Scientists and Engineers with Modern Physics

AUTHORS: Raymond A. Serway and John W. Jewett

PUBLISHER: Brooks Cole

EDITION: 8th Edition (January 11, 2010)

ISBN-13: 978-1-4390-4844-3; ISBN-10: 1-4390-4844-4

- Lab Description:

Download the pdf file of each lab from the course website,

(www.physics.drexel.edu/~brigita/COURSES/PHYS-201_WINTER-2011-2012,

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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Recitations/Homework Assignments/Physics Help:

- (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) The homework assignments can be accessed through the *Enhanced Web Assign (EWA)* website:
<https://www.webassign.net/login.html>.
Your *Serway & Jewett* Textbook Package Contains an Individual Access Code for the account on EWA. Enter the EWA Website and click on "I have a class key" button. Choose an option to register as a new student for the PHYS 201 Class. You will be prompted to enter **PHYS 201 Class Key** for EWA: **drexel 2582 3128**.
 - (c) Each homework assignment consists of five problems that count against 100% of the homework grade and the extra credit problem that contributes additional 20% to the homework grade. The due day and time is **SUNDAYS at 11:59 PM**. No extension of this deadline will be granted. It is wise to start working on the homework assignment several days before the deadline. Note that all homework assignments will be visible and available to you from the first day of classes, 01/09/2012.
 - (d) It is important that you complete *Introduction to WebAssign* homework before starting **the first homework assignment, which is due on 01/22/2012**. This exercise will allow you to get acquainted with all available features of the EWA online homework system. You do not need to worry— *Introduction to WebAssign* homework assignment does not count toward your homework grade.
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Labs:

- (a) **To pass the PHYS 201 course, all four labs need to be completed and lab reports handed in time.**
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(b) 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 Prof. Aprelev (aprelev@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.

(c) 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_WINTER-2011-2012/).

(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.

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, 01/16/2012) there are NO classes scheduled. The last day to withdraw from the course is Friday, 02/17/2012.

Grading Information/Missed Exams Policy:

Your letter grade will be based on your total score, obtained from the components listed on Table 1. Dates, times, and classroom numbers for all three exams (Exam 1, Exam 2, and Final Exam) will be posted on the course web site:

www.physics.drexel.edu/~brigita/COURSES/PHYS-201_WINTER-2011-2012/.

Exam 1 and 2 are already scheduled (see Table 2). Note that lecture attendance is obligatory and will be counted towards your final letter grade.

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 zero score.

Table 1: GRADING

Grade Components	Contribution
Exam 1 (1hr)	15%
Exam 2 (1hr)	15%
Final Exam (2hrs)	30%
Four Lab Reports	20%
Homework Assignments (H1-H8)	20%

Table 2: TENTATIVE SYLLABUS

TIME TABLE	TOPIC	CHAPTER/SECTIONS	RECITATIONS	EWA	EXAMS
WEEK 1 01/09–13/07	Oscillatory Motion Oscillatory Motion (contd.)	Ch.15/Secs:1-3 Ch.15/Secs:4-7	Ch.15:2, 3, 6 Ch.15:11, 19, 24		
WEEK 2 02/16–20/14	Wave Motion	University Holiday Ch.16/Secs:1-6	Ch.15:33, 39, 45 Ch.16:2, 3, 7	HW-1 (01/22)	
WEEK 3: 01/23–01/27	Sound Waves Superposition & Standing Waves	Ch.17/Secs:1-3 Ch.18/Secs:1-5	Ch.16:14, 29, 39 Ch.17:4, 24, 31	HW-2 (01/29)	
WEEK 4 01/30–02/03	Electromagnetic Waves Electromagnetic Waves (contd.)	Ch.34/Secs:1-3 Ch.34/Secs:4-7	Ch.18:2, 3, 38 Ch.34:2, 7, 20	HW-3 (02/05)	
WEEK 5 02/06–02/10 02/07	Wave Optics Diffraction Chs. 15-18, 34	Ch.37/Secs:1-5 Ch.38/Secs:1-5	Ch.34:32, 36, 40 Ch.37:5, 6, 29	HW-4 (02/12)	Exam 1
WEEK 6 02/13–02/17	Introduction to Quantum Physics Introduction to Quantum Physics (contd.)	Ch.40/Secs:1-2 Ch.40/Secs:3-5	Ch.38:2, 18, 30 Ch.40:1, 3, 17		
WEEK 7 02/20–02/24	Introduction to Quantum Physics (contd.) Atomic Physics	Ch.40/Secs:6-8 Ch.42/Secs:1-3	Ch.40:22, 25, 30 Ch.40:43, 51, 53	HW-5 (02/26)	
WEEK 8 02/27–03/02	Relativity Relativity (contd.)	Ch.39/Secs:1-3 Ch.39/Secs:4-5	Ch.42:10, 13, 15 Ch.39:3, 5, 7	HW-6 (03/04)	
WEEK 9 03/05–03/09 03/06	Relativity (contd.) Relativity (contd.) Chs. 37-40, 42	Ch.39/Secs:6-7 Ch.39/Secs:8-9	Ch.39:8, 12, 16 Ch.39:24, 29, 30	HW-7 (03/11)	Exam 2
WEEK 10: 03/12–03/16	Quantum Mechanics Quantum Mechanics	Ch.41/Secs:1-3 Ch.41/Secs:4-5,7	Ch.39:38, 43, 51 Ch.41:6, 17, 31	HW-8 (03/18)	
WEEK 11: Final-TBA	Chapters: 15-18, 34, & 37-42				Final