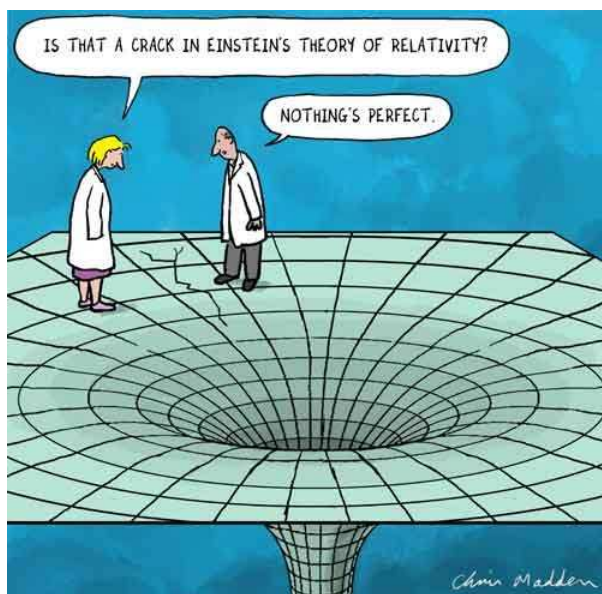

PHYS-201: FUNDAMENTALS OF PHYSICS III
Academic Year 2011/2012
Spring Quarter: 04/02/2012—06/11/2012

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_SPRING-2011-2012

Lectures: MON & WED, 01:00pm—01:50pm (12-108) & 02:00pm—02:50pm, DISQUE 103 (12-103)

[Note: First Lecture on Monday 04/02/2012; Last Lecture on Monday 06/11/2012]

Recitation TA (E-mail Address):

Vinothini Gunasekaran (vg347@drexel.edu),
Sean Lynch (sml72@drexel.edu),
Ryan Michaluk (rmm622@drexel.edu),
Nicholas Ridella (nicholas.ridella@drexel.edu),
John Schreck (jsschreck@gmail.com),
Matthew Voelker (matthew.j.voelker@drexel.edu)

Recitations/Discussions:

001 T 09:30 am - 10:50 am PISB 109 Matthew
002 T 09:30 am - 10:50 am STRATN 219 John
003 T 11:00 am - 12:20 pm PISB 109 Matthew
004 T 12:30 pm - 01:50 pm PISB 109 Nicholas
005 T 02:00 pm - 03:20 pm PISB 109 John
006 T 03:30 pm - 04:50 pm PISB 109 Matthew
007 W 09:30 am - 10:50 am PISB 107 Vinothini
008 W 09:30 am - 10:50 am RANDEL 120 Sean
009 R 09:30 am - 10:50 am STRATN 219 John
010 R 09:30 am - 10:50 am PISB 107 Viniiothini
011 R 12:30 pm - 01:50 pm RANDEL 328A Nicholas
012 M 08:00 am - 09:20 am PISB 109 Vinothini
013 M 08:00 am - 09:20 am STRATN 219 Sean
014 T 11:00 am - 12:20 pm STRATN 219 Ryan
015 R 11:00 am - 12:20 pm CURTIS 258 Ryan

Lab Director: Prof. Alexey Aprelev

E-mail: aprelev@drexel.edu

Lab TA (E-Mail Address):

Kamna Arya (ka474@drexel.edu),
Manasi Dahibawkar (mnd34@drexel.edu),
Vivek Madhavan (vm379@drexel.edu),
Rutvi Vyas (rutvi.vyas@drexel.edu),
Elizabeth Segelken (elizabeth.katherine.segelken@drexel.edu),
Christina Peters (christina.m.peters@drexel.edu)

Lab Sessions in DISQUE 820A

060 W 03:00 pm - 04:50 pm (even weeks): Manasi
061 W 03:00 pm - 04:50 pm (odd weeks): Manasi
062 W 07:00 pm - 08:50 pm (even weeks): Rutvi
063 W 07:00 pm - 08:50 pm (odd weeks): Rutvi
064 R 11:00 am - 12:50 pm (even weeks): Vivek
065 R 11:00 am - 12:50 pm (odd weeks): Vivek
067 R 09:00 am - 10:50 am (odd weeks): Kamna
068 W 05:00 pm - 06:50 pm (even weeks): Rutvi
069 W 05:00 pm - 06:50 pm (odd weeks): Rutvi
070 R 01:00 pm - 02:50 pm (even weeks): Vivek
071 R 01:00 pm - 02:50 pm (odd weeks): Vivek
073 W 09:00 am - 10:50 am (odd weeks): Rutvi
074 W 09:00 am - 10:50 am (even weeks): Kamna
075 W 11:00 am - 12:50 pm (odd weeks): Kamna
082 W 11:00 am - 12:50 pm (even weeks): Kamna
084 R 09:00 am - 10:50 am (even weeks): Kamna
085 R 03:00 pm - 04:50 pm (odd weeks): Christina
086 R 03:00 pm - 04:50 pm (even weeks): Elizabeth
66H F 01:00 pm - 02:50 pm (even weeks): Christina
72H F 03:00 pm - 04:50 pm (even weeks): Christina
76H F 09:00 am - 10:50 am (even weeks): Vivek
78H F 11:00 am - 12:50 pm (even weeks): Elizabeth
88H F 05:00 pm - 06:50 pm (even weeks): Elizabeth

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

Help/Office hours: Address all questions and scheduling issues related to (a) labs to Prof. Alexey Aprelev (b) recitations to Vinothini Gunasekaran, Sean Lynch, Ryan Michaluk, Nicholas Ridella, John Schreck, 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_SPRING-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.

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 Keys** for EWA: **drexel 1191 0613** for Section A and **drexel 4266 1635** for Section B students.
- (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, 04/02/2012.
- (d) It is important that you complete *Introduction to WebAssign* homework before starting **the first homework assignment, which is due on 03/15/2012**. 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.
- (e) Physics Help will be available daily. See the website:
<http://www.drexel.edu/physics/resources/undergraduate/helpcenter/>
for details.

Labs:

- (a) **To pass the PHYS 201 course, all four labs need to be completed and lab reports handed in time.**
- (b) Attendance at all scheduled labs is required. If you must miss a lab for a legitimate reason, please inform your lab instructor and Prof. Aprelev (aprelev@drexel.edu) as soon as possible. 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. There will be a SINGLE make-up lab scheduled during week nine or ten. Download and carefully read the document *What-You-Should-Know-About-PHYS-201-Lab.pdf* posted on the course website.
- (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_SPRING-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% per day late. Lab reports submitted *one week after the due date or later* will receive ZERO 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 Memorial Day (Monday, 05/28/2012) there are NO classes scheduled. The last day to withdraw from the course is Friday, 05/11/2012.

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 four exams (Exam 1, Exam 2, Exam 3, and Final Exam) will be posted on the course web site:

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

Exams 1–3 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)	10%
Exam 2 (1hr)	10%
Exam 3 (1hr)	10%
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 04/02–04/06	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 04/09–04/13	Wave Motion Sound Waves	Ch.16/Secs:1-6 Ch.17/Secs:1-3	Ch.15:33, 39, 45 Ch.16:2, 3, 7	HW-1 (04/15)	
WEEK 3: 04/16–04/20	Superposition & Standing Waves Electromagnetic Waves	Ch.18/Secs:1-5 Ch.34/Secs:1-3	Ch.16: 14, 29, 39 Ch.17:4, 24, 31	HW-2 (04/22)	
WEEK 4 04/23–04/27	Electromagnetic Waves (contd.) Wave Optics	Ch.34/Secs:4-7 Ch.37/Secs:1-5	Ch.18:2, 3, 38 Ch.34:2, 7, 20	HW-3 (04/29)	
WEEK 5 04/30–05/04 05/03	Diffraction Introduction to Quantum Physics Chs. 15-18	Ch.38/Secs:1-5 Ch.40/Secs:1-2	Ch.34:32, 33, 36, 40 Ch.37:5, 6, 29	HW-4 (05/06)	Exam 1
WEEK 6 05/07–05/11	Introduction to Quantum Physics (contd.) Introduction to Quantum Physics (contd.)	Ch.40/Secs:3-5 Ch.40/Secs:6-8	Ch.38:2, 18, 30 Ch.40: 1, 3, 17		
WEEK 7 05/14–05/18 05/17	Atomic Physics Relativity Chs. 34, 37-38	Ch.42/Secs:1-3 Ch.39/Secs:1-3	Ch.40:22, 25, 30 Ch.40:43, 51, 53	HW-5 (05/20)	Exam 2
WEEK 8 05/21–05/25	Relativity (contd.) Relativity (contd.)	Ch.39/Secs:4-5 Ch.39/Secs:6-7	Ch.42: 10, 13, 15 Ch.39:3, 5, 7	HW-6 (05/27)	
WEEK 9 05/28–06/01 05/31	Memorial Day Holiday Relativity (contd.) Chs. 39-40, 42	Ch.39/Secs:8-9	Ch.39:24, 29, 30	HW-7 (06/03)	Exam 3
WEEK 10: 06/04–06/08	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 (06/10)	
WEEK 11: 06/11/2012 Final-TBA	Finale & Multiple Choice Questions Chapters: 15-18, 34, & 37-42				Final Exam