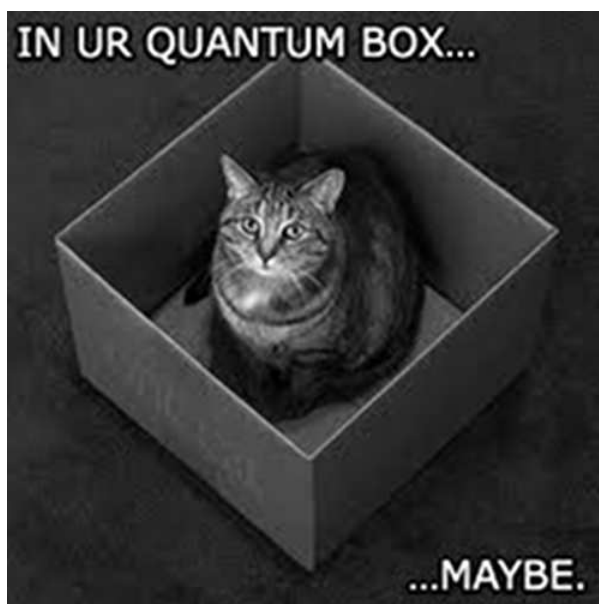

PHYS-201: FUNDAMENTALS OF PHYSICS III
Academic Year 2012/2013
Fall Quarter: 09/24/2012—12/15/2012

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

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Phone: (215) 895-2726

Office: Disque Hall 909 (12-909)

Course Website: www.physics.drexel.edu/~brigita/COURSES/PHYS-201_FALL-2012-2013

Lectures: MON & WED, 01:00pm—01:50pm (12-108) & 02:00pm—02:50pm, CAT 61

[Note: First Lecture on Monday 09/24/2012; Last Lecture on Wednesday 12/05/2012]

Recitation TA (E-mail Address):

Michael Brewer (michael.t.brewer@drexel.edu),
Karsten Chu (karsten.s.chu@drexel.edu), Sean Lynch (sml72@drexel.edu),
Allyson O'Brien (amo45@drexel.edu),
Michael Schlenker (mjs538@drexel.edu),
Robert Stone (robert.b.stone@drexel.edu),
Matthew Voelker (matthew.j.voelker@drexel.edu)

Recitations/Discussions:

001 MON 09:30-10:50 PISB 109 Allyson O'Brien
002 MON 11:00-12:20 PISB 105 Matthew Voelker
003 WED 05:00-06:20 PISB 109 Robert Stone
004 TUE 11:00-12:20 PISB 109 Matthew Voelker
005 TUE 12:30-01:50 PISB 109 Michael Schlenker
006 FRI 12:30-01:50 STRATN 219 Michael Schlenker
007 MON 05:00-06:20 PISB 109 Karsten Chu
008 FRI 02:00-03:20 CURTIS 255B Sean Lynch
009 TUE 05:00-06:20 PISB 105 Robert Stone
010 THR 11:00-12:20 PISB 109 Allyson O'Brien
011 FRI 09:30-10:50 CURTIS 454 Allyson O'Brien
012 FRI 11:00-12:20 STRATN 219 Karsten Chu
013 TUE 03:30-04:50 PISB 109 Michael Schlenker
014 THR 03:30-04:50 PISB 109 Michael Brewer
015 MON 03:00-04:20 PISB 107 Matthew Voelker
016 MON 03:00-04:20 CURTIS 454 Michael Brewer
017 THR 05:00-06:20 CURTIS 352 Robert Stone
018 THR 05:00-06:20 CURTIS 454 Michael Brewer
019 WED 05:00-06:20 CURTIS 454 Karsten Chu

Lab Director: Prof. Alexey Aprelev

E-mail: aprelev@drexel.edu

Lab TA (E-Mail Address):

Michael Brewer (michael.t.brewer@drexel.edu),

Manasi Dahibawkar (mnd34@drexel.edu),
Vivek Madhavan (vm379@drexel.edu),
Joey Lambert (jgl29@drexel.edu),
Vignesh Ravichandran (vr332@drexel.edu),
Rajath Soans (rs865@drexel.edu),
Zechariah Thrailkil (zet23@drexel.edu)

Lab Sessions in DISQUE 820A

TBA

Important: A detailed week-by-week lab schedule will be posted on the course website at www.physics.drexel.edu/~brigita/COURSES/PHYS-201_FALL-2012-2013.

Help with Labs, Recitations, and Lectures:

Address all questions related to the labs, including honors labs and scheduling of the make-up lab, to Prof. Alexey Aprelev. Questions about the recitation problems need to be addressed to your recitation TA. Lecture and exam preparation issues will be handled by Prof. Brigita Urbanc. Note that the exam grading will be done by recitation TAs, who will be available to answer all your exam grading questions. Please, contact all instructors using the e-mail addresses provided in the syllabus.

Note that homework assignments will not be discussed during lectures and recitations because they are set within an independent, web-based system, which offers hints and automatically grades your assignment. However, Department of Physics offers **daily Physics Help** to all undergraduate students (see the website: <http://www.drexel.edu/physics/resources/undergraduate/helpcenter/> for details).

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

- Self-enroll to EWA Homework Assignments:

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 3327 2190** for Section A and **drexel 4315 6554** for Section B students.

- Lab Description:

Download the pdf file of each lab from the course website,
(www.physics.drexel.edu/~brigita/COURSES/PHYS-201_FALL-2012-2013),
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) All cell phones, laptops, and other distracting electronic devices should be **turned off** during the lecture.
 - (c) Active participation in the classroom is **expected and encouraged**.
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Homework Assignments and Practice Problems:

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 **SATURDAYS 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, 09/24/2012.

It is important that you complete *Introduction to WebAssign* homework before starting the first homework assignment, which is due at the end of Week 2. 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.

In addition to the homework assignments, you will also be able to use EWA to practice for each of the three midterm exams. These practice problems, which will not be graded, will also be enriched with hints and will be scored to provide you with a feedback on your problem solving skills.

Technical help is available to students on-line at the website:

http://webassign.net/user_support/student/.

This website provides online manuals and FAQs, a button to chat live with EWA student support staff, an e-mail contact form, and contact phone number. **IMPORTANT:** If the on-line technical help could not resolve your issue, you may contact Sean Lynch by e-mail with a detailed description of your EWA issue. Note that you need to time any such e-mail help request a couple of days before the homework assignment deadline.

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_FALL-2012-2013).

(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 Tuesday 10/02/2012 there are no classes between 10 AM and 1 PM due to the *Convocation*. There are also no classes scheduled on the Columbus Day (Monday, 10/08/2012). The last day to withdraw from the course is Friday, 11/02/2012.

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_FALL-2012-2013/.

Exams 1–3 are already scheduled (see Table 2).

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 provide a 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 09/24–09/28	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 10/01–10/05	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 (10/06)	
WEEK 3: 10/08–10/12	Columbus Day Holiday Superposition & Standing Waves	Ch.18/Secs:1-5	Ch.16:14, 29, 39	HW-2 (10/13)	
WEEK 4: 10/15–10/19	Electromagnetic Waves Electromagnetic Waves (contd.)	Ch.34/Secs:1-3 Ch.34/Secs:4-7	Ch.17:4, 24, 31 Ch.18:2, 3, 38	HW-3 (10/20)	
WEEK 5: 10/22–10/26 10/25	Wave Optics Diffraction Chs. 15-18	Ch.37/Secs:1-5 Ch.38/Secs:1-5	Ch.34:2, 7, 20 Ch.34:32, 33, 36, 40	N/A	Exam 1
WEEK 6: 10/29–11/02	Introduction to Quantum Physics Introduction to Quantum Physics (contd.)	Ch.40/Secs:1-2 Ch.40/Secs:3-5	Ch.37:5, 6, 29 Ch.38:2, 18, 30	HW-4 (11/03)	
WEEK 7: 11/05–11/09 11/08	Introduction to Quantum Physics (contd.) Atomic Physics Chs. 34, 37-38	Ch.40/Secs:6-8 Ch.42/Secs:1-3	Ch.40:1, 3, 17 Ch.40:22, 25, 30	HW-5 (11/10)	Exam 2
WEEK 8: 11/12–11/16	Relativity Relativity (contd.)	Ch.39/Secs:1-3 Ch.39/Secs:4-5	Ch.40:43, 51, 53 Ch.42:10, 13, 15	HW-6 (11/17)	
WEEK 9: 11/19–11/23	Relativity (contd.) Thanksgiving Holidays	Ch.39/Secs:6-7	Ch.39:3, 5, 7	N/A	
WEEK 10: 11/26–11/30 11/29	Relativity (contd.) Quantum Mechanics Chs. 39-40, 42	Ch.39/Secs:8-9 Ch.41/Secs:1-3	Ch.39:24, 29, 30 Ch.39:38, 43, 51	HW-7 (12/01)	Exam 3
WEEK 11: 12/03–12/07	Quantum Mechanics Overview & Multiple Choice Questions	Ch.41/Secs:4-5,7	Ch.41:6, 17, 31	HW-8 (12/08)	
WEEK 12: 12/10–12/14 Final-TBA	Term Examination Week Chapters: 15-18, 34, & 37-42				Final Exam