PHYS 213: Elementary Modern Physics Syllabus Fall 2014

Instructor: Prof. Hui Zhang
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Reichardt 108 (during office hours)

Time: Lectures: Mondays, Wednesdays, and Fridays, 1-2pm; Labs: Thursdays, 8-11am

Place: Lectures: REIC 203; Labs: REIC 253

Office Hours: Mondays, Wednesdays, and Fridays 12:00-1:00pm, or by appointment.

Credits: 4 credits, 3 hours/week of lecture and 3 hours/week of lab

Text Book (required):
Modern Physics, Kenneth S. Krane, 3rd Edition, 2012, ISBN 978-1-1180-6114-5

Other Relevant/Useful Books:

University Physics with Modern Physics, Wolfgang Bauer and Gary Westfall, 2nd edition, 2013, Publisher: McGraw-Hill Companies, Inc., ISBN-13: 9780073513881, ISBN: 0073513881

Modern Physics for Scientists and Engineers, Author: Stephen T. Thornton and Andrew Rex, Publisher: Cengage Learning (2012), ISBN-10: 1133103723, ISBN-13: 978-1133103721

Before the Fallout-From Marie Curie to Hiroshima, Author: Diana Preston, ISBN 9780425207895, 2006

The Fabric of Cosmos: Space, Time, and the Texture of Reality, Author: Brian Greene, Publisher: Vintage (February 8, 2005), ISBN-10: 0375727205, ISBN-13: 978-0375727207 (Hard copy and electronic copy available in the GI-IARC Library and Rasmuson Library)

Course Description

Modern physics refers to physics developed in the 20th century including the special theory of relativity, quantum mechanics, atomic and nuclear physics, particle physics and cosmology. While classical physics is generally concerned with matter and energy on the normal scale of observation, much of modern physics is concerned with the behavior of matter and energy under extreme conditions or on the very large (the universe) or very small (sub-atomic level) scale.

Physics 213 offers a comprehensive review of modern physics. It is the third semester of the introductory physics sequence designed for undergraduate students majoring in science or engineering. Since optics is not covered in the second semester course (Physics 212), in this course we will begin with a review of optics before moving on to modern physics. Since the materials covered in each chapter of the textbook is equivalent of one-semester courses, it will

be impossible for us to take very rigorous approach to the subjects in this course. Thus, the purpose of this course is to introduce the wide variety of subjects in modern physics, and familiarize students with the basic concepts of modern physics.

Grading

Attendance and In-class Exercise	10%
Problem Sets (one every week)	10%
Quizzes (closed book)	10%
Two Mid-term Exams (closed book)	30%
Cumulative Final Exam (1-3pm on December 15, Monday, closed book)	20%
Labs	20%
Total	100%

> 90 %	A
85 % -- 90 %	A-
80 % -- 85 %	B+
75 % -- 80 %	B
70 % -- 75 %	B-
65 % -- 70 %	C+
60 % -- 65 %	C
55 % -- 60 %	C-
50 % -- 55 %	D+
45 % -- 50 %	D
40 % -- 45 %	D-
< 40 %	F

Course Policies

- Problem sets will be given in class and are due in class on the due date stated in the problem sets. You are expected to show not only your answer but also steps leading to that answer. Your work should be clean and clear enough for the instructor and TA to understand.

- NO MAKE-UP QUIZZES OR EXAMS WILL BE GIVEN.

  If the student must miss a quiz or an exam, under rare circumstances where the student has a legitimate reason, the student must notify the instructor that the exam will be missed and present written verifiable proof of the reason for missing the exam, e.g., a doctors note, police report, court notice, etc., clearly stating the date AND time of the mitigating problem. If these conditions are met, the score on the comprehensive final exam will be substituted for the quiz or exam the student missed. Otherwise, a zero score will be assigned for the missed quiz or exam. In the event the Final Exam is not taken, under rare circumstances where the student has a legitimate reason for missing the final exam, a makeup exam will be administered.

- Labs: A PASSING GRADE IN THE LAB IS NECESSARY TO PASS THE COURSE.

  Each student is required to have a bound lab notebook. This is the place where all notes, diagrams, data records, math, etc. are to be kept. The lab exercise written up in your lab notebook is due at the end of each lab and will be graded for content each week. In addition, there will be a 15-minute quiz at the beginning of each lab session. The quiz questions will pertain to material covered in the previous week's lab exercise. There will also be one question taken from the current week's lab manual, as you are expected to read the lab manual and think about it before coming to lab. The lab notebooks may be used to complete

the quiz.

Please plan on attending all lab sessions; missing lab is strongly discouraged. Please contact the Lab Supervisor or your TA immediately if you intend to be or have been absent. If your absence is not documented you will not be allowed a make-up lab. *Missed labs that are not made up result in an automatic failing grade of both the laboratory and the course.* Make-up labs are offered November 24th-26th. Questions about the lab should be directed to the teaching assistant in charge of your lab.

- High ethical standards are essential for maintaining credibility. Plagiarism is defined as appropriating passages or ideas from another person's work and using them as one's own. You may work with your classmates on problem sets, however, you should submit your own work, not a copy from another source. Keep in mind that you will be required to do similar problems on your own during an exam. Plagiarism on homework or on an exam will result in a failing grade.

Students with Disabilities Notice

The University of Alaska Fairbanks is committed to equal opportunity for students with disabilities. Students with disabilities are encouraged to contact the coordinator of Disability Services (Mary Matthews) at the Center for health & Counseling (x7043). See section on "Disability Services" of the UAF Class Schedule (http://www.uaf.edu/schedule/).

Tentative Weekly Schedule

Week	Date	Lecture Subject	Problem Sets
1	F Sep 5	Introduction/Syllabus	
2	M Sep 8	Geometric Optics	Problem Set 1
	W Sep 10		
	F Sep 12		
3	M Sep 15	Lenses and Optical Instruments	
	W Sep 17		Problem Set 1 is Due
	F Sep 19	Wave Optics	
4	M Sep 22		
	W Sep 24		Problem Set 2 is Due
	F Sep 26		
5	M Sep 29	Special Theory of Relativity	
	W Oct 1		Problem Set 3 is Due
	F Oct 3		
6	M Oct 6		
	W Oct 8	The Particlelike Properties of EM Radiation	
	F Oct 10	Mid-term Exam 1	
7	M Oct 13		
	W Oct 15		Problem Set 4 is Due
	F Oct 17		
8	M Oct 20	The Wavelike Properties of Particles	
	W Oct 22		Problem Set 5 is Due

	F Oct 24		
9	M Oct 27	"Oil Drop" Experiment	
	W Oct 29	The Schrödinger Equation	Problem Set 6 is Due
	F Oct 31		
10	M Nov 3	The Bohr Model of the Atom	
	W Nov 5	The Hydrogen Atom in Wave Mechanics	Problem Set 7 is Due
	F Nov 7		
11	M Nov 10	Many-Electron Atoms	
	W Nov 12		
	F Nov 14	Mid-term Exam 2	
12	M Nov 17	Molecular Structure	
	W Nov 19	Statistical Physics	Problem Set 8 is Due
	F Nov 21		
13	M Nov 24	Nuclear Structure and Radioactivity	
	W Nov 26		Problem Set 9 is Due
	F Nov 28	**Thanksgiving Holidays (no classes)**	
14	M Dec 1	Nuclear Reactions and Applications	
	W Dec 3		
	F Dec 5	Elementary Particles	Problem Set 10 is Due
15	M Dec 8	Cosmology	
	W Dec 10		
	F Dec 12	Review	Problem Set 11 is Due
16	M Dec 15	1-3pm, Final Exam	