PHYS 213: Elementary Modern Physics Syllabus Fall 2018

Instructor: Prof. Hui Zhang
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Time: Lectures: Mondays, Wednesdays, and Fridays, 1-2pm;
Labs: Thursdays, 9:30am-12:30pm

Place: Lectures: REIC 165; Labs: REIC 253

Office Hours: Mondays, Wednesdays, and Fridays 2:00-3:00pm, 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

One of the following two books:

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

Physics for Scientists and Engineers: A Strategic Approach with Modern Physics, Randall D. Knight, 3rd edition, 2013, ISBN-10: 0321740904, ISBN-13: 978-0321740908

Other Relevant/Useful Books:

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

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	5%
Problem Sets (one every week)	10%
Quizzes (closed book)	10%
Two Mid-term Exams (closed book)	30%
Cumulative Final Exam (1-3pm on December 10, Monday, closed book)	20%
Project	10%
Labs	15%
Total	100%

> 95 %	A+
90 % -- 95 %	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 doctor's 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.

- Project: The project will be in the form of a web page on a topic in physics that you find interesting and we agree on together. These topics could include biographies of important scientists, scientific projects and scientific ideas. The topic must be agreed on by Oct. 3 and must be completed by Nov. 26. They will be graded both for presentation and content.

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

  Each student is required to have a bound lab notebook. A lab notebook will be given to you at the first lab meeting. 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 19th-20th. 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	M Aug 27	Introduction/Syllabus	
	W Aug 29	Geometric Optics	Problem Set 1
	F Aug 31		
2	M Sep 3	**Labor Day (no classes)**	
	W Sep 5		
	F Sep 7	Lenses and Optical Instruments	
3	M Sep 10		Problem Set 1 is Due
	W Sep 12	Wave Optics	
	F Sep 14		
4	M Sep 17		Problem Set 2 is Due
	W Sep 19		
	F Sep 21	Special Theory of Relativity	
5	M Sep 24		Problem Set 3 is Due
	W Sep 26		
	F Sep 28		
	M Oct 1	The Particlelike Properties of EM Radiation	

6	W Oct 3		Project topic due
	F Oct 5	Mid-term Exam 1	
7	M Oct 8		Problem Set 4 is Due
	W Oct 10		
	F Oct 12	The Wavelike Properties of Particles	
8	M Oct 15		Problem Set 5 is Due
	W Oct 17		
	F Oct 19	"Oil Drop" Experiment	
9	M Oct 22	The Schrödinger Equation	Problem Set 6 is Due
	W Oct 24		
	F Oct 26	The Bohr Model of the Atom	
10	M Oct 29	The Hydrogen Atom in Wave Mechanics	
	W Oct 31		
	F Nov 2	Mid-term Exam 2	
11	M Nov 5	Many-Electron Atoms	Problem Set 7 is Due
	W Nov 7		
	F Nov 9	Molecular Structure	
12	M Nov 12	Statistical Physics	Problem Set 8 is Due
	W Nov 14		
	F Nov 16	Nuclear Structure and Radioactivity	
13	M Nov 19		Problem Set 9 is Due
	W Nov 21	**Thanksgiving Holidays (no classes)**	
	F Nov 23		
14	M Nov 26	Nuclear Reactions and Applications	Project due
	W Nov 28		
	F Nov 30	Elementary Particles	Problem Set 10 is Due
15	M Dec 3	Cosmology	
	W Dec 5		
	F Dec 7	Review	Problem Set 11 is Due
16	M Dec 10	1-3pm, Final Exam	