

PHY355 Introduction to Modern Physics

First Day Handout Fall 2016

Class: Unique number 56310 Meetings MWF 1-1:50 in RLM 6.104

Instructor: Greg O. Sitz, Office: RLM 10.313, Office Hours: Th 4-5:30 and F 10:30-11:30 or by appointment. Phone: 471-0701, email: gositz@physics.utexas.edu

Grader: TBA

Prerequisites: PHY316, PHY317L or PHY303L.

Text - *Modern Physics from α to Z^0* , by J. W. Rohlf.

On reserve in the PMA library - *Special Relativity*, by A. P. French and *Spacetime Physics*, by Taylor and Wheeler.

Grading - The breakdown is: Homework 25% (assigned approximately weekly), pre-class online quizzes 5%, In-class exams (2): 15% each, Final Exam 40%. Homework, quizzes and test scores will be weighted as just described and a composite score (S) of between 0 and 100 for the course will be calculated. The final grades for the course will be determined using this composite score as follows: $S \geq 85 \Rightarrow A$; $85 > S \geq 70 \Rightarrow B$; $70 > S \geq 60 \Rightarrow C$; $60 > S \geq 50 \Rightarrow D$; $50 > S \Rightarrow F$. The composite score will not be rounded, that is 84.99 is less than 85. Plus/Minus grading may be used for final scores close to the cutoffs given.

Homework - Homework will be assigned approximately weekly and distributed via Canvas. You are encouraged to discuss homework with anyone you wish; however, all written homework must be prepared independently (by you). Homework is due at the beginning of class on the specified day. Homework that is between 1 minute and 1 week late will be accepted with a 50% penalty. Homework later than this will not be accepted.

Pre-class Quizzes - Prior to each lecture, there will be a few multiple choice questions administered through Canvas related to assigned reading for that day's lecture. These questions are to be answered before class and their availability will be cutoff before class starts. These are intended to get you to read the material *before* it is covered in class and attend class. The material covered in this class is not mathematically difficult; it is, at times, conceptually subtle and it helps to go over it several times.

Exams - There will be two in-class exams, tentative dates: Friday, September 23 and Friday, October 29, plus a comprehensive final. The final is required. It is scheduled for Friday December 9, 9-noon. If you are absent from an examination for the observance of a religious holy day you may complete the work missed within a reasonable time after the absence, if proper notice has been given. Notice must be given at least seven days prior to the exam.

The exams will be closed book and closed notes, and no calculators, smart phones, tablets or other aids of any type are allowed. A cover sheet with relevant formulas and constants will be provided. This cover sheet will be available in advance of the exams. The final exam will be cumulative, and the best way to prepare for the final is to keep up with the material as it is covered in class. This means being prepared for and taking the in-class exams.

If your final exam score is greater than one of both of your mid terms and you have a homework average greater than 50%, your final exam score will replace either or both of your lower mid terms.

Academic Dishonesty: You are encouraged to seek and provide assistance freely in working on homework assignments. However, the work that you submit should clearly be your own. DO NOT COPY from any source and submit it as your own work.

Other: The last day to drop the course for academic reasons is November 1.

If you are absent for the observance of a religious holy day you may complete the work missed within a reasonable time after the absence, if proper advance notice has been given.

Unless a *substantial* illness or family emergency is documented with a note from a physician or the dean's office, no make-up exams will be given. Any potential absences must be discussed with Dr. Sitz *prior* to the exam in order to have a make-up.

The University of Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, see:

<http://www.utexas.edu/diversity/ddce/ssd/>
or contact the Office of the Dean of Students at 471-6259.

Syllabus

Week of August 24:	Introduction, Special Relativity, spacetime
August 29:	Special Relativity, transformations and invariants
September 5:	Special Relativity, energy & momentum
September 12:	Special Relativity, applications
September 19:	Finish relativity, and Test 1 on 9/23
September 26:	Statistical and Thermal Topics
October 3:	Thermal radiation, Planck's constant, Photoelectric effect
October 10:	X-rays, line spectra, discovery of the electron
October 17:	Atomic structure, Bohr model, Rutherford scattering
October 24:	Matter waves and Test 2 on 10/28
October 31:	The Schrodinger wave equation
November 7:	One-dimensional problems, barriers
November 14:	One-dimensional problems continued, The Hydrogen atom
November 21:	Electron spin and quantum statistics
November 28:	Particle physics and current questions
December 5:	wrap up

Quotes

"The interpretation of these results is that there is no displacement of the interference bands"
-A. A. Michelson (1881)

"In classical physics it was always assumed that clocks in motion and at rest have the same rhythm, that rods in motion and at rest have the same length. If the velocity of light is the same in all coordinate systems, if the relativity theory is valid, then we must sacrifice this assumption. It is difficult to get rid of deep-rooted prejudices, but there is no other way." - Albert Einstein (1938)

"What led me more or less directly to the special theory of relativity was the conviction that the electromotive force acting on a body in motion in a magnetic field was nothing else but an electric field" - Albert Einstein (1952)

"In the autumn of (1905) . . . Einstein published a paper which set forth the relativity theory of Poincare and Lorentz with some amplifications, and which attracted much attention" - E. T. Whittaker (1953)

"How often have I said to you that when you have eliminated the impossible, whatever remains, however improbable, must be the truth?" - Authur Conan Doyle