

Phys 2403: Modern Physics, Fall 2014

Instructor: Dr. Tom MacCarone, Sci 113, thomas.maccarone@ttu.edu

Office hours: MW 2-4:30 PM

Basic course philosophy:

Modern physics, at least as I plan to teach it, is aimed at familiarizing you with the basics of key physics discoveries made in the early 20th century, as well as those cutting edge topics that can be covered while starting from the background you should have from Physics I & II. As a result, this course will probably be a bit broader and shallower in scope than many other courses you will take in the TTU physics department - you may notice that many of the topics I will cover in one week are often the subject of full courses at a more advanced level, so we will cover only the real basics. I aim to familiarize you with a large range of topics so that (1) you have a broad range of knowledge that includes knowing at least a little something about all areas of physics and (2) you have a solid foundation for the basics of a large range of topics when you encounter them in greater detail and (3) you have the broad preparation you will need to do well on the GRE Physics exam, given that some topics are not covered until the senior year in our curriculum.

Topics to be covered, in order, with approximate time per topic:

- (1) Special relativity (2 weeks)
 - (2) Radiation as particles (1 week)
 - (3) Matter as waves (1 week)
 - (4) Bound states in quantum mechanics (1 week)
 - (5) Unbound states in quantum mechanics (1 week)
- October 8: First test
- (6) The hydrogen atom and QM in 3 dimensions (1 week)
 - (7) Atomic Physics (1 week)
 - (8) Statistical mechanics (2 weeks)
 - (9) Molecules and solids (1 week)
- November 14: second test
- (10) Nuclear physics
 - (11) Particles and cosmology

I plan to have a review session before the final exam in the last class period.

Course policies:

I will assign weekly homework. I expect you to work out the solutions yourselves, but you may discuss the problems with fellow classmates. Over-reliance on classmates will likely hurt your grades on the exams, so please use discussions with classmates to help yourself develop an understanding of the material, only.

Grading:

Labs: 20%

Homework: 20%

Test 1 and test 2: 15% each

Final exam: 30%