Physics 0477: Principles of Modern Physics I

Course Summary, Requirements, and References

Fall, 2014

1 Course Summary

1. A Brief History of Light : Optics versus Mechanics.

2. Death of the aether: Einstein's Special Theory of Relativity, relativistic kinematics.

3. Dynamical applications : relativistic mechanics (mass, momentum and energy).

4. Brief Introduction to Classical Thermodynamics.

5. Brief Introduction to Statistical Mechanics.

6. From the Arrow of Time to Planck: Birth of Quantum Theory.

7. Wave-Particle Duality in Early Quantum Theory.

8. The Old Quantum Theory: the Bohr atom.

9. Basics of Wave Mechanics: the Schrödinger Equation.

10. Complementarity: the Uncertainty Principle and Indeterminism in Quantum Theory.

11. Applications of Quantum Mechanics: Tunneling Phenomena, Bound States.

12. The Hydrogen Atom according to Schrödinger.

2 Course Requirements

The course text will be "Modern Physics", by Jeremy Bernstein, Paul Fishbane and Stephen Gasiorowicz, (publisher Cummings, April 2000). If you are unable to get this from Amazon, the book store will make copies on request. The grade will be based on problem sets (20%), two quizzes (10% each), a midterm exam (20%) and a final exam (40%). Problem sets will typically be handed out on Fridays and due in class the following Friday.

3 Fall Break: class Oct. 13 switched to Oct. 14

The class on Monday Oct. 13 will meet instead Tuesday Oct. 14 (same place, same time).

4 Contact information- Tony Duncan

Office hours (400 Allen Hall) will be MWF 9:30-10:30 AM, or by appointment. I can be reached at email address tony@dectony.phyast.pitt.edu (for scheduling of appointments, etc *only*: assistance with physics questions will be provided in office hours!).

5 Disability accommodations

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412)228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

6 References

The following texts may be consulted for supplementary material, and are on reserve in the Engineering Library, Benedum Hall:

1. Halliday, Resnick, Walker, "Fundamentals of Physics" (Ninth Edition).
2. Serway, Moses, Moyer, "Modern Physics" (Third Edition).
3. Thornton, Rex, "Modern Physics for Scientists and Engineers" (Fourth Edition.)
4. R. Resnick and D. Halliday, "Basic Concepts in Relativity and Early Quantum Theory".
5. E.F. Taylor and J.A. Wheeler, "Spacetime Physics" (W.H. Freeman, 1966).
6. E.H. Wichmann, "Quantum Physics", vol. 4, Berkeley Physics Course (McGraw-Hill, 1971).
7. R. Eisberg and R. Resnick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles", (Wiley 1985).