

## PHYSICS 20b: MODERN PHYSICS

Instructor: John F. C. Wardle  
Office: Abelson 329  
Telephone: 781-736-2889  
fax: 781-736-2915  
email: [wardle@brandeis.edu](mailto:wardle@brandeis.edu)  
Office hours: Monday, Wednesday, Thursday 10:00 – 12:00 AM, or by appointment

Prerequisites: PHYS 20a

Textbook: Serway, Moses and Moyer “Modern Physics” 3rd edition (required)

Course Goals: The aims of this course are threefold: first to introduce students to a wide range of phenomena and ideas that underlie and permeate modern physics, and second, to prepare students for a rigorous upper level course in quantum mechanics (PHYS 30b). Third, through the extensive homework sets, the students will become adept at solving a wide variety of physics problems.

Course Content: The course content is based heavily on the text book, with additional material from astrophysics and cosmology. We start wherever PHYS 20a ended, in the early chapters of the text book. In particular we cover chapter 3-- the quantum theory of light; chapter 4 -- the particle nature of matter; chapter 5 – matter waves; chapter 6 – quantum mechanics in one dimension; chapter 7 – tunneling phenomena; chapter 8 – quantum mechanics in three dimensions; chapter 9 – atomic structure; chapter 10 – statistical physics; some topics from chapter 12 – the solid state; chapter 13 – nuclear structure; some topics from chapter 14 – nuclear physics applications; chapter 15 – elementary particles; some topics from chapter 16 -- cosmology

Grading: There will be a 10 problem homework set every week. It will be handed out on Wednesday and collected the following Monday. Each set is worth 100 points. Late homework will be worth 50 points. Collaboration is permitted, but copying is not. Homework grades are not entered until the student has corrected each problem (using answer sheets that will be handed out). There will also be a take-home midterm exam (100 points) and a take-home final exam (200) points. No collaboration is permitted on the take home exams. The exams will count for about 25 -- 30% of the final grade.