Physics 202H - Introductory Quantum Physics I

Fall 2004

Class readings:

Week 1, starting Monday, September 13:

– Read Chapter 1 "Relativity" in "Simple Nature" by Crowell
– Read Appendix A "The Special Theory of Relativity" in Eisberg & Resnick

Week 2, starting Monday, September 20:

– Read Chapter 1 "Relativity" in "Simple Nature" by Crowell
– Read Appendix A "The Special Theory of Relativity" in Eisberg & Resnick
– Read Chapter 1 "Thermal Radiation and Planck's Postulate" in Eisberg & Resnick

Week 3, starting Monday, September 27:

– Read Chapter 2.2 "Light as a Particle" in "Simple Nature" by Crowellk
– Read Chapter 2 "Photons – Particlelike Properties of Radiation" in Eisberg & Resnick
– – Section 2.1 "Introduction"
– – Section 2.2 "The Photoelectric Effect"
– – Section 2.3 "Einstein's Quantum Theory of the Photoelectric Effect"
– – Section 2.4 "The Compton Effect"
– – Section 2.5 "The Dual Nature of Electromagnetic Radiation"
– – Section 2.6 "Photons and X-Ray Production"

Week 4, starting Monday, October 4:

– Read Chapter 2.2 "Light as a Particle" in "Simple Nature" by Crowellk
– Read Chapter 2 "Photons – Particlelike Properties of Radiation" in Eisberg & Resnick
– – Section 2.7 "Pair Production and Pair Annihilation"
– – – Note that you should probably not spend too much time and energy pondering Dirac's "negative energy levels" of the vacuum. The idea crops up in more advanced particle physics and in solid state physics too, but we will not be making further use of it right now.
– – Section 2.8 "Cross Sections for Photon Absorption and Scattering"
– Read Chapter 2.3 "Matter as a Wave" in "Simple Nature" by Crowellk
– Read Chapter 3 "De Broglie's Postulate – Wavelike Properties of Particles" in Eisberg & Resnick
– – Section 3.1 "Matter Waves"
– – Section 3.2 "The Wave-Particle Duality"

Week 5, starting Monday, October 11:

– Read Chapter 2.3 "Matter as a Wave" in "Simple Nature" by Crowellk
– Read Chapter 3 "De Broglie's Postulate – Wavelike Properties of Particles" in Eisberg & Resnick
– – Section 3.3 "The Uncertainty Principle"
– – Section 3.4 "Properties of Matter Waves"
– – Section 3.5 "Some Consequences of the Uncertainty Principle"
– – Section 3.6 "The Philosophy of Quantum Theory"
– Read Chapter 2.4 "The Atom" in "Simple Nature" by Crowellk
– Read Chapter 4 "Bohr's Model of the Atom" in Eisberg & Resnick
– – Section 4.1 "Thompson's Model"
– – Section 4.2 "Rutherford's Model"
– – Section 4.3 "The Stability of the Nuclear Atom"
– – Section 4.4 "Atomic Spectra"

Week 6, starting Monday, October 18:
– Read Chapter 2.4 "The Atom" in "Simple Nature" by Crowellk
– Read Chapter 4 "Bohr's Model of the Atom" in Eisberg & Resnick
– – Section 4.5 "Bohr's Postulates"
– – Section 4.6 "Bohr's Model"
– – Section 4.7 "Correction for Finite Nuclear mass"
– – Section 4.8 "Atomic Energy States"
– – Section 4.9 "Interpretation of the Quantization Rules"
– – Section 4.10 "Sommerfeld's Model"
– – Section 4.11 "The Correspondence Principle"
– – Section 4.12 "A Critique of the Old Quantum Theory"

Week 7, starting Monday, November 1:
– Mid term test Thursday November 4, up to and including material from Chapter 4.
– Review Section 2.3.6 "The Schrödinger equation" in "Simple Nature" by Crowellk
– Read Chapter 5 "Schroedinger's Theory of Quantum Mechanics" in Eisberg & Resnick
– – Section 5.1 "Introduction"
– – Section 5.2 "Plausibility Argument Leading to Schroedinger's Equation"
– – Section 5.3 "Born's Interpretation of Wave Functions"

Week 8, starting Monday, November 8:
– Review Section 2.3.6 "The Schrödinger equation" in "Simple Nature" by Crowellk
– Read Chapter 5 "Schroedinger's Theory of Quantum Mechanics" in Eisberg & Resnick
– – Section 5.4 "Expectation Values"
– – Section 5.5 "The Time-Independent Schroedinger Equation"

Week 9, starting Monday, November 15:
– Read Chapter 5 "Schroedinger's Theory of Quantum Mechanics" in Eisberg & Resnick
– – Section 5.6 "Required properties of Eigenfunctions"
– – Section 5.7 "Energy Quantization in the Schroedinger Theory"
– – Section 5.8 "Summary"

Week 10, starting Monday, November 22:
– Read Chapter 6 "Solutions of Time-Independent Schroedinger Equation" in Eisberg & Resnick
– – Section 6.1 "Introduction"
– – Section 6.2 "The Zero Potential"
– – Section 6.3 "The Step Potential' (Energy Less Than Step Height)'
– – Section 6.4 "The Step Potential (Energy Greater Than Step Height)"

Week 11, starting Monday, November 29:
– Read Chapter 6 "Solutions of Time-Independent Schroedinger Equation" in Eisberg & Resnick
– – Section 6.5 "The Barrier Potential"
– – Section 6.6 "Examples of Barrier Penetration by Particles"
– – Section 6.7 "The Square Well Potential"
– – Section 6.8 "The Infinite Square Well Potential"

Week 12, starting Monday, December 6:
– Read Chapter 6 "Solutions of Time-Independent Schroedinger Equation" in Eisberg & Resnick
– – Section 6.9 "The Simple Harmonic Oscillator Potential"
– – Section 6.10 "Summary"
– Review notes, review texts, review assignments, learn material, do well on exam