

Tentative Schedule and Suggested Reading
(books are listed on the web under *Additional text books*)

I Fundamentals

- A Theory of Measurement. *Sep 9, 14, 16* [Resolution of the identity covered by Lorch and by Reisz & Nagy]
- B Commutation and Uncertainty Relations. *Sep 21*
- C Time Development. *Sep 23, 28*
 - 1 Translations in space
 - 2 Translations in time and the Schrödinger equation
 - 3 Canonical quantization [for the classical part see Goldstein, Chapters 7 & 8.]
- D Simple Harmonic Oscillator. *Sep 28, 30, Oct 5* [Coherent states are discussed in Gottfried and Yan, p 181.]
- E Semiclassical Limit. (WKB method) *Oct 5, Oct 7, Oct 12* [Messiah, Vol I, Bender & Orszag Chapter 10 and Heading. Classical Hamilton-Jacobi theory is presented in Goldstein, Chapter 9 while Ahlfors' book is a good place to review the complex variable theory used to derive the WKB connection formulae.]

II Applications

- A Angular momentum. *Oct 12, 14, 19, 21* [Standard discussion using the raising and lowering operators $J_x \pm iJ_y$ found in most texts.]
- B α -decay. *Oct 26, 28* [WKB determination of time dependence appears not to be available in text books.]
- C Hydrogen atom. *Oct 28, Nov 4*
- D Magnetic field and vector potential. *Nov 4, Nov 9*

*** Midterm Exam - *Nov 11* ***

III Perturbation theory [Standard treatment found in most texts.]

- A Rayleigh – Schrödinger. (non-degenerate) *Nov 16*
- B Wigner – Brillouin. *Nov 16*
- C *He* Atom, variational method. *Nov 18*
- D Degenerate Perturbation Theory. *Nov 18, 23*

IV Relativistic Hydrogen Atom [Standard treatment found in most texts.]

A Fine Structure. *Nov 25*,

B Addition of Angular Momenta. *Nov 25*

C Wigner 3j Symbols. *Nov 30*

D Fine Structure in a Magnetic Field and Wigner-Eckart Theorem.
Dec 2

E Hyperfine structure. *Dec 7*

V Quantum Computing [Nielsen and Chuang]

A Computing Paradigm and Quantum Mechanics. *Dec 7*

B Deutsch-Jozsa algorithm. *Dec 9*

VI Time Dependent Perturbation Theory. [Standard treatment found in most texts.]

A General results. *Dec 14*