Preparation for the Midterm for C474b, Tuesday, March 6, 2007

1.) The exam will be held in CB127 and will start at 7:00 pm. SHARP. The exam will be 2 hours long.

2.) The midterm will cover all the material from the beginning of the course, up to, and including time-dependent perturbation theory. The problem sets which cover this material are #1 through #4.

3.) The exam will be primarily problem solving. No emphasis will be placed on derivations. However, it is conceivable that you may be asked to briefly define or explain a concept.

4.) Topics covered include:

Introductory Concepts: postulates of quantum mechanics, stationary states, complete sets, the expansion theorem, superposition states and how the coefficients are related to probabilities.

Time-independent Non-degenerate Perturbation Theory: first and second order corrections to the energy via both the differential and spectral approaches. This includes the first order spectral correction to the wave functions.

Time-independent, Degenerate Perturbation Theory: superposition principle, the Schmidt orthogonalization procedure, secular determinants for the first order corrections to the energy, the "correct" first order wave functions, the second-order correction to the energy using the correct zeroth-order wave functions.

Matrix Algebra: you are responsible to know how to add, subtract, multiply matrices, and how to find their eigenvalues and eigenvectors. Understand self-adjoint matrices, matrix representations of quantum mechanical operators and states.

Time-independent Perturbation Theory: the exact solution and the first order perturbation solution to the time-dependent coefficient, transition probabilities, solution for an oscillating perturbation, absorption and stimulated emission terms, electric dipole approximation, and selection rules.

5.) **Study** your lecture notes and problem set solutions provided. Equations and integrals will be provided as needed.

GOOD LUCK !!