Physics CS 140
(Quantum Mechanics and Path Integrals) T, Th 9:30 – 10:50, Winter 2014

webpage: www.physics.ucsb.edu/~physCS140/winter2014/

F. Roig: Office Hours **T 1:00 – 3:00 and Th 1:30-3:30** (Broida 4309, x5669, roig@physics.ucsb.edu)

T.A: **Daniel Ish.** Office Hours TBA. **e-mail: dish@physics.ucsb.edu**

Prerequisite for this course: Physics 102, AND 115A.

Quantum Mechanics and Path Integrals:

The action principles in classical mechanics.

Application of the action principles.

The double slit experiment revisited.

The quantum mechanical amplitude. The classical limit.

The path integral.

Examples for calculating path integrals.

Direct evaluation of path integrals.

Derivation of the Schrödinger equation from the path integral for a particle in a potential.

The path integral for quadratic lagrangians.

Linear oscillator with time-dependent frequency.

The Feynman propagator. Expansion in energy eigenfunctions.

Simple applications of propagator functions.

The trace of the time-development operator. The Feynman-Kac Formula.

The path integral derived from the Schrödinger equation. Generating Functional.

The perturbation expansion. Path integral description. Introduction to Feynman diagrams

The WKB Approximation to path integrals.

OVER

Texts: R. P. Feynman, A.R. Hibbs, "Quantum Mechanics and Path Integrals" (required)

L.S. Schulman, "Techniques and Applications of Path Integrals" (optional)

HOMEWORK:

Weekly problem sets will be assigned. Each set will consist of four or five problems.

The weekly problem sets will be due on Tuesdays by 5:00PM. Dan Ish will set up a box outside the study room Broida 1019.

There will be one graded pass only for each problem set (no re-dos).

UNITS:

The total average for all the problem sets will be used to curve the units earned in this course (up to 4.0).