Physics 115A  Spring 2004

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   Room 437 (Physics-Geology)
   Office hours MW 11-12 (or email for an appointment: carlip@physics.ucdavis.edu)

TA: Jason Dick (Room 113)
   Office hours MT 1-2, W 12-1, Th 3:30-4:30 (for general questions)
TA: Aleksander Zujev (Room 112)
   Office hours M 3-4 (for questions about grading)

Required text:
   D. J. Griffiths, Introduction to Quantum Mechanics

Recommended supplement:
   N. Zettili, Quantum Mechanics: Concepts and Applications

Griffiths gives a good, focused explanation, and is generally considered to be clear, focused, and well-written; it is probably the most widely used undergraduate textbook. But it contains few examples or worked-out problems, and some key points are left as exercises. Zettili is much longer—too long and unfocused for a two-quarter course—but is useful for filling in details and has a lot of good worked-out problems. I will have several other texts on reserve at Shields for further reference.

Grading:
   Homework 35%
   Midterm 25%
   Final 40%

Late homework will be accepted, but with a substantial deduction in the grade. (You need to keep up with the homework in order to understand the course!)

Rough course plan—details will certainly change over the quarter!
(“G x” means “Griffiths section x”)

April 5-9  Wave functions and the Schrödinger equation (G 1.1-1.4, Prob. 1.9)
April 12-16 Momentum, operators, uncertainty principle (G 1.5-1.6, Prob. 1.12)
April 19-23 Stationary states, infinite square well (G 2.1-2.2)
April 26-30 Harmonic oscillator (G 2.3)
May 3      Review by TA
May 5      Midterm
May 7      Free particle (G 2.4)
May 10-14  Other simple potentials; the scattering matrix (G 2.5-2.7)
May 17-21  More math: linear algebra, Hilbert spaces, operators (G 3.1-3.2)
May 24-28  Math and meaning (G 3.3-3.4, Prob. 3.57)
May 31-June 2  Two-state systems (G Prob. 3.58, extras from Feynman Lectures)
June 4 and 7 Fun stuff: EPR paradox, Bell’s inequality (G Appendix A)
June 9     review
June 16    Final exam
Some general advice:

The course assumes basic knowledge of calculus and of mathematical methods in physics, as well as classical mechanics (including the Hamiltonian formulation). If you have trouble with the background material, please see me.

It would be a very good idea for you to read ahead—use the outline on the front of this syllabus and be sure to read each section before it is the class topic.

In my lectures, I will assume that you have done and understood the homework. If you get stuck on a point, there are lots of office hours available. If you get stuck and you think you are not alone, though, tell me—it may mean that I should cover some issue in more detail in lecture.

Two thoughts to keep in mind when you get confused during this course:

“Because atomic behavior is so unlike ordinary experience, it is very difficult to get used to, and it appears peculiar and mysterious to everyone—both to the novice and to the experienced physicist. Even the experts do not understand it the way they would like to, and it is perfectly reasonable that they should not, because all of direct, human experience and of human intuition applies to large objects. We know how large objects will act, but things on a small scale just do not act that way. So we have to learn about them in a sort of abstract or imaginative fashion and not by connection with our direct experience.”

– Richard Feynman

“Anyone who is not shocked by quantum theory has not understood it.”

– Neils Bohr