

Phys 139A, Quantum Mechanics, UC Santa Cruz, Spring 2008

Instructor Gey-Hong Gweon, ISB 249, gweon@ucsc.edu, (TEL) 9-1806

Lecture hours 10-11:45 am, Tuesday and Thursday, PSB 114

Office hours End of class – 1:30 pm, Tuesday and Thursday (or just drop by or make an appointment)

Website <http://physics.ucsc.edu/~gweon/teaching/current/>

Teaching Assistant Sean Echols, ISB 314, sechols@physics.ucsc.edu, (TEL) 9-4138

TA discussion session hour 7-8:30 pm, Wednesday, ISB 231 (no registration; attendance optional)

TA office hour 4-5 pm, Wednesday

Graders Glenn Gray, gpaulgray@gmail.com, NS II 338, Jediah Pixley, jpixley@ucsc.edu

Text Introduction to Quantum Mechanics, 2nd Ed. (D. J. Griffiths)

References [The following books, in addition to the text, are on reserve in the library]

The Principles of Quantum Mechanics (P. A. M. Dirac)

Interactive Quantum Mechanics (book and CD; S. Brandt, H. D. Dahmen, T. Strohm)

Feynman Lectures on Physics, Vol. 3 (R. P. Feynman, R. B. Leighton, M. Sands)

Introductory Quantum Mechanics (R. Liboff)

Quantum mechanics is the basis of almost all modern science and technology. It is the best example of a working, deterministic scientific principle. In this course, we will discuss foundation principles of quantum mechanics, closely following the [excellent] textbook. We will cover most of part I, and a bit of time-independent perturbation theory of part II as well. A tentative lecture schedule is the following (NOTE: It is required that you read the uploaded lecture notes and the relevant parts of the book before class.)

Week	Date	Topics
1	Apr 1	Superposition, Photons
	Apr 3	Schrödinger Equation, Probability
2	Apr 8	Momentum, Uncertainty Principle
	Apr 10	Stationary States
3	Apr 15	Stationary States, Infinite Potential Well
	Apr 17	Infinite Potential Well
4	Apr 22	Harmonic Oscillator
	Apr 24	Harmonic Oscillator
5	Apr 29	Free Particle, Scattering State
	May 1	Delta-Function Potential, Finite Square Well
6	May 6	Formalism
	May 8	Midterm
7	May 13	Formalism, Pictures
	May 15	Schrödinger Equation in Spherical Coordinates
8	May 20	Hydrogen Atom, Bohr Quantization Rule
	May 22	Angular Momentum
9	May 27	Spin
	May 29	Spin
10	June 3	Two Particle States, Entanglement
	June 6	Time-Independent Perturbation Theory

Note: The above syllabus has changed quite a bit, consistent with the old note, part of which I still keep here. [The above schedule is subject to adjustment as the course goes along. The time independent perturbation theory is a truly quantum mechanical subject of immense importance, and some of you who do not plan to take 139B may never actually learn this in college. I do not want this disaster to happen. So, if, near the end of the course, it comes down to the decision whether to do 6.1,2 or 5.3,4, I will do 6.1,2.]

Lecture style This plan has changed quite a bit. Power point will not be used much, unless it is very helpful. Detailed lecture notes will continue to be available on the web. You are still encouraged to take notes, especially, on details that you find useful during the lecture. Think amply and ask questions during, or after, the lecture. [The plan is that I will give lectures based on three things – power point outline, traditional style “chalk-and-board” lecture of detailed steps and example problems, and computer demonstration (using the CD by BDS above). Power point files and any other notes that I deem helpful will be uploaded in the course web site (given above). However, most of lectures will be aimed at clarifying details, which will not be downloadable. So, you are strongly encouraged to follow the lecture and take notes.]

Evaluation Your grade will be based on your performance in **homework (30 %)**, **quiz (10 %)**, mid-term exam (30 %), and final exam (30 %).

- Evaluation will be ABSOLUTE, not relative. In principle, all of you can get A, or worse. Form buddy groups and help each other on homework – that will help yourself and will hurt no one [but please, do not just copy your buddy’s homework – that is very easy to notice]. While homework score is nominally only 20 % of all scores, doing homework is the core process by which you build your own understanding. My experience tells me that there will be a strong positive correlation between your homework score and your other scores.
- Homework will be distributed weekly, and will be due in about a week. The current plan is distribution on Thursday, and due by the end of the next Friday. Late homework will be accepted, but a reduction factor = $\max(1 - 0.15n, 0.55)$ for n -week-late homework will be applied.
- Quiz will be conducted every Thursday in class, except for the first week. Generally quiz will consist of short questions testing your understanding of core concepts, presented in lecture and homework. If you miss a class, and thus a quiz, it is in your interest to inform me so that I can have you do the quiz outside the class.
- Mid-term and final exams will be traditional closed-book, closed-everything, no-peer-discussion exams. If you like, you are allowed to bring your notes on one piece of letter size paper.

Last remarks Please keep asking questions to me, TA, your peers, and yourself. No question is worth not asking. Especially if you do not have enough time to think things through, it is a very good strategy to use the “distributed intelligence” by asking people around you.