

# PHY373 Quantum Mechanics

First Day Handout Fall 2009

**Class Meetings:** Unique number 59645 (TTh 11:00 am - 12:15 pm) RLM 5.122. Optional discussion section to be arranged.

**Instructor:** Greg O. Sitz, Office: RLM 10.313, Office Hours: W 1:00-2:30, M 10:30-11:30 or by appointment. Phone: 471-0701, email: [gositz@physics.utexas.edu](mailto:gositz@physics.utexas.edu)

**Grader:** Sohaib Alam email: [malam@physics.utexas.edu](mailto:malam@physics.utexas.edu)

**Prerequisites:** PHY336K Classical Dynamics I and PHY453, Modern Physics I: Introduction to Quantum Phenomena. This will be enforced, for good reason.

**Text -** *Introduction to Quantum Mechanics* Second Edition, by *David J. Griffiths*. (The first edition should work, but problems will be assigned out of the book, and there is no guarantee that they are the same between the editions.) The material covered and the order in which it will be covered are shown on the next page.

**Grading -** The breakdown is: Homework 20%, In-class exams: 40%, Final Exam 40%. Homework and test scores will be weighted as just described and a composite score ( $S$ ) of between 0 and 100 for the course will be calculated. The final grades for the course will be determined using this composite score as follows:  $S \geq 85 \Rightarrow A$ ;  $85 > S \geq 70 \Rightarrow B$ ;  $70 > S \geq 60 \Rightarrow C$ ;  $60 > S \geq 50 \Rightarrow D$ ;  $50 > S \Rightarrow F$ . The composite score will not be rounded, that is 84.99 is less than 85.

- **Homework - 20% of grade** - Homework will be assigned approximately weekly during the semester. All homework assignments will be weighted equally (even though they may cover different amounts of material and have different numbers of problems). The lowest score will be dropped in computing the average.
- **In-class Exams - 40%** - Two in-class exams will be given: dates are Oct. 8 and Nov. 19. Each will be worth 20%.
- **Final Exam - 40%** The final is comprehensive and it is *required*. It is scheduled for Monday, December 14, 2:00 to 5:00 pm.

The exams will be closed book and closed notes, and no calculators or other aids of any type are allowed. A cover sheet with relevant formulas and constants will be provided. This cover sheet will be available in advance of the exams. The final exam will be cumulative, and the best way to prepare for the final is to keep up with the material as it is covered in class. This means being prepared for and taking all the in-class exams.

Unless a *substantial* illness or family emergency is documented with a note from a physician or the dean's office, no make-up exams will be given. Any potential absences must be discussed with Dr. Sitz *prior* to the exam in order to have a make-up. Make-up exams will be oral and taken within 72 hrs. of the missed exam.

If you are absent from an examination for the observance of a religious holy day you may complete the work missed within a reasonable time after the absence, if proper notice has been given. Notice must be given at least seven days prior to the exam.

**Other:** The last date to drop the course without possible academic penalty is September 23, 2009. The last day to drop the course for academic reasons is October 21, 2009.

The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-6441 TTY.

**Alternatives:** This document (as well as other course related material, including homework and test scores) will be available on BlackBoard.

## Syllabus

(probable, but subject to change)

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| Week of August 27: | Review, The Schrödinger equation and $\Psi(x,t)$ (Griffiths, Sections 1.1-1.4)     |
| August 31:         | momentum, uncertainty (Section 1.5-1.6), Time independent problems I               |
| September 7:       | Infinite and finite square well (Sections 2.1-2.2, 2.6)                            |
| September 14:      | the harmonic oscillator (Section 2.3)  |
| September 21:      | free particle and delta function potential (Sections 2.4 and 2.5)                  |
| September 28:      | barrier problems (Section 2.6), Formalism, Hilbert space (Section 3.1-3.2)         |
| October 5:         | Operators, observables, Dirac notation (Section 3.3-3.6) and Test 1 (on October 8) |
| October 12:        | QM in 3-D, variable separation, angular equation (Section 4.1)                     |
| October 19:        | The hydrogen atom, the radial equation (Section 4.2)                               |
| October 26:        | Angular momentum (Section 4.3)   |
| November 3:        | Spin (Section 4.4)   |
| November 10:       | Addition of angular momentum (Section 4.4.3)                                       |
| November 17:       | Review and Test 2 (on November 19)   |
| November 24:       | Identical Particles, multi-electron atoms (Sections 5.1 and 5.2)                   |
| December 1:        | Solids and band structure (Section 5.3)  |

## Quotes

“I think I can safely say that nobody understands Quantum Mechanics” -R. P. Feynman

“It is often stated that of all the theories proposed in this century, the silliest is quantum theory. In fact, some say that the only thing that quantum theory has going for it is that it is unquestionably correct.” - Michio Kaku

“If quantum mechanics hasn’t profoundly shocked you, you haven’t understood it yet.” - Niels Bohr

“How often have I said to you that when you have eliminated the impossible, whatever remains, however improbable, must be the truth?” - Sherlock Holmes (Sir Authur Conan Doyle)

“The paradox is only a conflict between reality and your feeling what reality ought to be.” -R. P. Feynman

“It appeared to me that hydrogen . . . more than any other substance is destined to open new paths to the knowledge of the structure of matter and its properties.” -Johann Jacob Balmer (1884)

“Had I known that we were not going to get rid of this damned quantum jumping, I never would have involved myself in this business!” -Erwin Schrödinger