PHY 6400 **Quantum Physics 1** **Winter 2015** **Sean Gavin**

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TEXT: D. Griffiths, *Introduction to Quantum Mechanics*, 2nd Edition, ISBN-10: 0131118927; ISBN-13: 978-0131118928

REFERENCES: **Same level:** S. Gasiorowicz*, Quantum Physics*
Higher level: R. Shankar, *Principles of Quantum Mechanics*

LEARNING OUTCOMES: After taking this course, you will:

1. Learn about the basic phenomena of the quantum world: stationary states, wave packets, tunneling, entanglement, and spin.
2. Become familiar with the basic problems of quantum mechanics for which exact solution of the Schrödinger equations are possible.
3. Be able to translate the physical description of a problem into equations that can be used to answer relevant questions.
4. Build skill in the mathematical methods needed for these problems:
    a. Work with differential equations, delta functions, Fourier transforms, and linear algebra (at the junior level).
    b. Visualize a problem in terms of relevant sketches or graphs.
    c. Recognize when and how to make useful approximations, i.e., which terms in a series expansion are important in a specific physical limit.
    d. Recognize when symmetries such as parity are useful.

MEETING: Physics 177, MWF 1:55 to 2:50 PM

OFFICE HOURS: MWF after class, or by appointment

HOMEWORK: Every 1-2 weeks. Homework handed in **on time in class** may be returned for re-grade. Re-graded homework may receive up to 80% of the total points. Late homework is not eligible for re-grading.

GRADES: There will be two midterm exams and a cumulative final. **Exam dates may change if the class departs from the expected schedule.**

Participation	10%
Homework	60%
Midterm Exams	20%
Final Exam	10%

FINAL EXAM: **Wednesday, April 29, 2015, 1:20 – 3:50 PM**

SCHEDULE – subject to change according to the needs and interests of the class

Week of	Chapter	Comments
1/12	1	Wave function, probability, expectation values
1/19	1-2	No class Monday Schrödinger equation in 1D; stationary states, infinite square well
1/26	2	Harmonic oscillator
2/2	2	Free particle, wave packets, delta function potential;
2/9	2	Finite square well
2/16	3	State vectors in Hilbert space Exam 1 on Chapters 1 and 2
2/23	3	Eigenfunctions of Hermitian operators
3/2	3	Uncertainty principle and Dirac Notation
3/9	4	Schrödinger equation in three dimensions; spherical coordinates, hydrogen atom
3/16	4	Winter break – no classes
3/23	4	Angular momentum
3/30	4	Spin
4/6	5	Examples: Spin and Spin-like systems
4/13	5	Identical particles; Bose and Fermi statistics Exam 2 on Chapters 3 and 4
4/20	5	Examples of multi-particle systems
4/27	5	Monday is the final class