

# Quantum Mechanics - PHYS 401

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TTH 8:30 - 9:45 AM LSF 108

Office Hours: T 10 - 11 AM, W 12:30 - 1:30 PM, TH 3:30 - 4:30 PM (or by appointment)

Textbook (**required**): *Introduction to Quantum Mechanics* (3rd Edition), David J. Griffiths and Darrell F. Schroetter, ISBN-13 978-1-107-18963-8

## Rule 0.

No one is born knowing how to do physics. If you are struggling, please speak with me (and/or accept my help when offered). If you are concerned that you “don’t have what it takes,” please speak with me so that I can tell you that ***that is not a real thing***.

## Learning Goals

By the end of this course, the student will be able to

- Solve the Schrödinger Equation analytically and numerically in several model systems
- Analyze quantum systems using both wave and matrix mechanics
- Simulate the dynamics of simple quantum systems
- Use perturbation theory to analytically solve problems beyond simple models

## Tentative course outline

1. Introduction to Quantum Theory
2. Time Independent Schrödinger Equation
3. Quantum Harmonic Oscillator
4. Finite Potentials
5. Operators and Observables
6. Dirac Notation
7. Time Independent Perturbation Theory
8. The WKB Approximation
9. Three-dimensional Systems
10. Angular Momentum
11. Two-particle Systems
12. Two-level systems and Fermi’s Golden Rule

## Evaluation

The final grade will be broken down in the following way

- Participation: 5%
- Homework: 10%
- Mid-term: 30%
- Computational Projects: 20%
- Final Exam: 35%

Attendance of all class sessions is expected and will be factored into the participation portion of the grade. I maintain an interactive classroom, and attendance will significantly improve your understanding of the course as well as your grade. Absences do not need to be documented, but all students are responsible for all material covered and all assignments regardless of attendance. Medical or other legitimate documented emergencies will be handled on a case-by-case basis, and I will do my best to work with you to make up missed material in these circumstances (**as long as I receive advance notice**).

Homework will generally be assigned at the beginning of each week and will be due the first class period of the following week. Homework is graded for completeness, which means that you will receive full credit if you fully work out a solution to the problem, regardless of whether that solution is correct. You must show all work and use proper units to receive full credit.

## Academic Integrity

All work must be the sole product of each student's brain and effort (in other words, all cheating or plagiarism will be reported and handled as detailed in the Student Handbook). For my part, I will not discriminate against any student for any reason and will make any reasonable accommodations necessary to meet a student's needs. No discriminatory or hostile behavior toward fellow students will be tolerated. If you experience or witness discriminatory, abusive, or other unwanted behavior, you should contact me, the Title IX Coordinator, and/or the Vice President for Student Affairs, as appropriate.