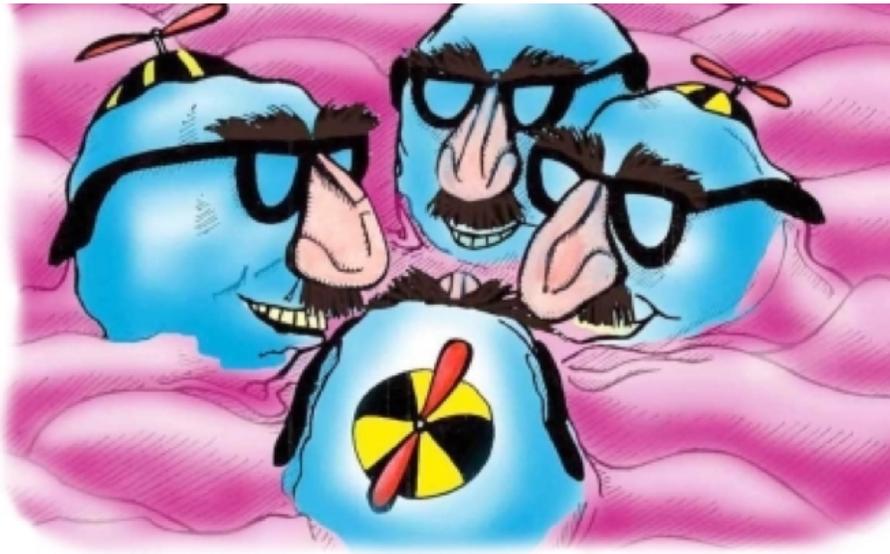


**PHYS 350 Quantum Mechanics:
MWF 11-11:50 AM
The College of Wooster
Spring 2012**

Instructor: Cody Leary
Office Hours: Mon 3-4 PM, Tues 2-4 PM, and by appointment
Office: Taylor 108
Office phone: 330 263 2274 (x2274)
Email: cleary@wooster.edu

Text: Principles of Quantum Mechanics, Hans C Ohanian

Course Website: <http://woodle.wooster.edu>



At a resolution of 10^{-24} metres, isolated clumps of strange matter pop briefly out of the quantum foam to debate the possible existence of particle physicists.

About This Course

Quantum mechanics is the greatest intellectual accomplishment of the human race.

Before quantum mechanics, humans understood motion, gravity, gases, and a little bit about electricity and magnetism. With quantum, we understand the underlying behavior of everything you are likely to experience in your lifetime(!) including the properties of all basic materials (why are metals shiny and usually silver? Why is glass clear? Why is rubber stretchy?), properties of light and other electromagnetic waves, and how light interacts with matter. Quantum mechanics is the basis for all modern technology.

In this course, we will cover the foundations of quantum theory, including:

- The quantum mechanics of free particles and particles in potentials
- An axiomatic mathematical formulation of quantum mechanics
- The time evolution of quantum states
- The use of operator methods as an alternative to differential equations in quantum physics
- Angular momentum, spin, the exclusion principle and applications to atomic physics
- Interpretation and paradox in quantum mechanics

Grading

Your grade will be calculated as follows:

Homework:	40%
Exams:	60%

Final Grade:

A 92.5-100%, A- 90.0-92.4%, B+ 87.5-89.9% . . . , C- 70.0-72.4%, D 60.0-69.9%, F 0-59.9%

This course is designed so that the average student will do well, corresponding to a B. You are not competing against each other; it is possible for everyone to earn an A in this course. If I find that I have made the exams more difficult than I intended, I may relax the above final grade standards slightly, but they will not be raised.

About Homework

In order to really understand quantum mechanics, one must spend a considerable amount of time working through problems about quantum mechanics. This is reflected in the weighting of the course homework in the final grade. I encourage you to work problems together with your peers and clarify any remaining questions with me outside of class. However, the homework solutions you hand in must be your own work.

When writing your problem solutions, being able to explain what you have learned is an essential step in the learning process. Thus, for all homework your thought process should be clear. Neatness and clarity both count toward each assignment grade. Your steps should be explained using short phrases. Any sketches or graphs should be clearly labeled.

Table 1: **Preliminary Class Schedule**

Week	Week of	Reading	Topic
1	1/16	Ch 1-2	Course Intro, Free Particle Wave Mechanics
2	1/23	Ch 2	Wave Packets, Expectation, Operators, Measurement
3	1/30	Ch 3	Potentials, Stationary States, Square Well. Energy Rep.
4	2/6	Ch 3-4	Barriers, Vector Spaces, Axioms of Quantum Mechanics
5	2/13 (Exam)	Ch 4	Axioms, Operators & Eigenvectors
6	2/20	Ch 4	Compatible Observables, Uncertainty
7	2/27	Ch 5	The Hamiltonian, Ehrenfest's Equations
8	3/5	Ch 5	Energy-Time "Uncertainty", State Reps, Transformations
9-10	3/12-3/23	...	Spring Break (two weeks)
11	3/26	Ch 6	Harmonic Oscillator
12	4/2	Ch 7	Angular Momentum
13	4/9 (Exam)	Ch 8	Central Potentials, Hydrogen Atom
14	4/16	Ch 9	Spin, Addition of Angular Momenta
15	4/23	Ch 9	Spin and the Exclusion Principle
16	4/30	Ch 12	Interpretation and Paradox, Bell's theorem

Final Exam: Mon 5/7 at 9:00 AM

Woodle

I will regularly update the Woodle course website (available through <http://woodle.wooster.edu>) with homework assignments and general course information. You should be automatically enrolled in this Woodle course within 24 hours of the time when Woosters Registrar officially adds you to this course, as this synching occurs around midnight each day. Once enrolled in the Woodle course, your login username and password for Woodle should match that of your Wooster email account.

Getting Help

Office Hours

I really enjoy teaching physics, I and am happy to help you outside of class, with either individual attention or in groups. If you would like help, please feel free to drop by my office during my regular office hours, or any other time you see my door open. If your schedule conflicts with my office hours, you can contact me about making an appointment outside of these times.

Learning Center

The Learning Center (ext. 2595) offers services designed to help all students improve their overall academic performance. The Learning Center also offers a variety of services and accommodations to students with disabilities based on appropriate documentation, nature of disability, and academic need. Any student with a documented learning disability needing academic accommodations is requested to speak with me and with Pam Rose, Director of the Learning Center (ext. 2595), as early in the semester as possible. All discussions will remain confidential.

Campus-Wide Policies

Academic Honesty and the Code of Academic Integrity

The academic program at the College seeks to promote the intellectual development of each student and the realization of that individual's potential for creative thinking, learning, and understanding. In achieving this, each student must learn to use his/her mind rigorously, independently, and imaginatively.

The College's understanding and expectations in regard to issues of academic honesty are fully articulated in the Code of Academic Integrity as published in *The Scot's Key* and form an essential part of the implicit contract between the student and the College. The Code provides a framework at Wooster to help students develop and exhibit honesty in their academic work. You are expected to know and abide by the rules of the institution as described in *The Scot's Key* and the Handbook of Selected College Policies at www.wooster.edu.

Dishonesty in any of your academic work is a serious breach of the Code of Academic Integrity and is grounds for an "F" for the entire course. Such violations include turning in another person's work as your own, copying from any source without proper citation, crossing the boundary of what is allowed in a group project, submitting an assignment produced for a course to a second course without the authorization of all the instructors, and lying in connection with your academic work. You will be held responsible for your actions. Particular attention should be directed to the appropriate use of materials available through the Internet. Whether intentional or not, improper use of materials is a violation of academic honesty. If you are unsure as to what is permissible, please contact your course instructor.

Policy Regarding Conflicts with Academic Responsibilities

The College of Wooster is an academic institution and its fundamental purpose is to stimulate its students to reach the highest standard of intellectual achievement. As an academic institution with this purpose, the College expects students to give the highest priority to their academic responsibilities. When conflicts arise between academic commitments and complementary programs (including athletic, cultural, educational, and volunteer activities), students, faculty, staff, and administrators all share the responsibility of minimizing and resolving them.

As a student you have the responsibility to inform the faculty member of potential conflicts as soon as you are aware of them, and to discuss and work with the faculty member to identify alternative ways to fulfill your academic commitments without sacrificing the academic integrity and rigor of the course.

Policy Regarding Final Examinations

The College sets the final exam date, and professors are not authorized to grant exceptions. Students who wish to reschedule a final exam must petition the Dean for Curriculum and Academic Engagement in writing in advance of the examination. The student must confer with the instructor before submitting a petition, and the instructor should indicate to the Dean if he or she supports the petition. Normally, such petitions are granted only for health reasons. If other reasons necessitate a request for a change in a final exam, the request must be submitted three weeks in advance of the examination.