PHYSICS 741 – QUANTUM MECHANICS I

Monday, Wednesday, and Friday, 12:00-12:50, Olin 103

Instructor: Eric Carlson

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Office Hours

MWF 10:45 – 11:45, TR 10:00 – 12:00,

or any time by appointment

Text: *Quantum Mechanics*, by Eric D. Carlson. Available for free on the class website

Other Books: *Modern Quantum Mechanics* by J.J. Sakurai

Quantum Mechanics, a modern development by Leslie Ballentine

Quantum Mechanic Vol. I and II by C. Cohen-Tannoudji et al.

Quantum Mechanics by Leonard Schiff

Quantum Mechanics: Fundamentals by Gottfried and Yan

Description: This course is the first half of a one-year course designed to teach the fundamentals of quantum mechanics, the mathematical methods used in quantum, and details of interesting quantum mechanical systems. All of the books listed above are available in the library.

Materials: A scientific calculator is considered a necessity. It is highly advisable to have access to a symbolic manipulation program, like *Maple*.

Exams: There will be one mid-term exam and one final. The mid-term exam will be approximately two hours and will be scheduled around October 10. The final exam will probably be three hours from 2-5 pm on Monday, December 12.

Homework: There will be homework assignments almost every day, almost always chosen from the class notes. They will be posted on the web page well in advance. I suggest you get started on your homework early. You should attempt to do the homework by yourself, but if you get stuck, you should feel free to talk to your friends, or myself. In particular, you should also feel free to check your final answers with your friends. Part of doing physics is interacting with others. You must ultimately understand and have performed all the calculations in your homework yourself, but I do not mind if others have helped you with it.

Homework is due at the start of class days. Homework turned in late will receive a 20% penalty per day. You will be given two passes on homework which will grant an automatic extension until the next class period on one homework assignment. After that, the standard penalties will reassert themselves. Extensions may be granted for other reasons (illness, attendance at conferences, etc.). These will not count against your two passes.

Class Attendance and Class Participation: Class attendance is expected every class period, but if you have a conflict or are ill, simply inform me and you will be excused. More than two unexcused absences during the semester can be used to penalize your grade. Part of your grade will be based on class participation, which means asking questions, answering my questions, or working out problems in class.

Grading: The two tables at right are a not necessarily accurate guess as to what my grading scheme will be. In particular, I reserve the right to grade on a sliding scale.

Grading Breakdown	
Homework:	45%
Midterm:	20%
Final:	30%
Class Part:	5%

Grading Scale			
94%	A	80%	B-
90%	A-	77%	C+
87%	B+	73%	C
83%	B	70%	C-

I anticipate that most people in this class will get A's or B's. If you are getting C's on homework, you probably are confused and will get more confused, and it's time to get some help. If you are getting B's, you probably are understanding most of the material, though you may be having some difficulty. If you are getting A's, you are understanding a lot and are working hard.

Web: This class's website is **http://users.wfu.edu/ecarlson/quantum/index1.html**. Essentially all materials for this class can be found at this website, and some materials, like solutions to homework sets and the text itself, can be found *only* on the website.

Tentative Schedule:

August	22	24	26	Introduction, Schrödinger's Equation
Aug/Sept	29	31	2	Solving Schrödinger's Equation
September	5	7	9	Hilbert Space, Covectors, Coordinate Bases, Operators
September	12	14	16	Matrix Notation, Eigenvectors, Postulates of Q.M.
September	19	21	23	Expectation Values, Uncertainties, Time Independent S.E.
September	26	28	30	The Harmonic Oscillator, Discrete Symmetries
October	3	5	7	Continuous Symmetries, Generators, Angular Momentum
October	**10**	12		**Midterm Exam**, Spherically Symmetric Problems {fall break}
October	17	19	21	Hydrogen Atom, Spin
October	24	26	28	Addition of Angular Momentum, Wigner-Eckart Theorem
Oct/Nov	31	2	4	Electromagnetic Fields and Forces, Aharanov-Bohm Effect
November	7	9	11	Multiple Particles
November	14	16	18	Time Evolution, Propagator, Path Integrals, Heisenberg Picture
November	21			State Operator {Thanksgiving break}
Nov/Dec	28	30	2	Bell's Inequality, Measurement, Many Worlds Picture
December			**9**	**Final Exam Friday, 2-5 pm**