

Quantum Mechanics II
Course Information for Spring 2002 Semester
January 11, 2002

Course Number: PHYS6520
Course Name: Quantum Mechanics II
Meeting Times: Monday and Thursday 8:30-9:50am
Classroom: Darrin (DCC) 235

Instructor:	Jim Napolitano	Grader:	Yury Varshavsky
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Office Hours:	By appointment	Hours:	Thursday 2pm-4pm

Course Web Page: <http://www.rpi.edu/~napolj/QMII/>
Course Email List: PHYS6520-L@lists.rpi.edu

This course is a continuation of PHYS6520 Quantum Mechanics I, as taught by this instructor in the Fall of 2001. If you were *not* enrolled last semester, please see me so that we can discuss your preparation for this course.

The required textbook for this course is the same as last semester, that is *Quantum Mechanics, Third Edition*, by Merzbacher. (Wiley, 1998.) I will refer to other textbooks from time to time, including *Modern Quantum Mechanics, Revised Edition*, by Sakurai; *Principles of Quantum Mechanics, Second Edition*, by Shankar; *Quantum Mechanics: A Modern Introduction*, by Das and Melissinos; and *Angular Momentum in Quantum Mechanics*, by Edmonds.

Your course grade will be based on seven problem sets throughout the term. You are strongly encouraged to collaborate with other students on working these problem sets **except for the midterm and final sets** on which you must work independently. Due dates and times for all problem sets will be strictly enforced. The midterm and final problem sets will account for about half the total course grade. The grading scale is at the discretion of the grader, so please see him if you have questions about your grade, but you are of course welcome to come to me if you think that is necessary.

I try hard not to make the homework problems tedious, but nevertheless, working through these problem sets generally requires a good deal of thought. **Pease don't leave these homework assignments until the last minute.**

The reverse side of this page outlines the class schedule we will follow. It will be helpful if you can read the material in the text before coming to class. (We will try hard to stick close to this schedule, but it may be subject to change.)

Week	Date	Topic	Textbook	Date	Topic	Textbook
1	14 Jan	Spin Phenomenology	Merzbacher 16.1,2 (Sakurai 3.2)	17 Jan	Rotations	Merzbacher 11.1, 16.3 (Sakurai 3.1)
2	21 Jan	No Classes		24 Jan	Spin Operators, Dynamics	Merzbacher 16.4,5 (Sakurai 3.2)
3	28 Jan	Density Matrix, Polarization, Scattering	Merzbacher 16.6,7 (Sakurai 3.4)	31 Jan	The Rotation Group	Merzbacher 17.1-4 (Sakurai 3.3,3.5)
4	4 Feb	Addition of Angular Momenta	Merzbacher 17.5,6 (Sakurai 3.7)	7 Feb	Wigner-Eckart Theorem	Merzbacher 17.7,8 (Sakurai 3.10)
5	11 Feb	Perturbation Theory : Introduction	Merzbacher 18.1,2 ; also see 8.3 (Sakurai 5.1)	14 Feb	General Solution; Examples	Merzbacher 18.3,4 (Sakurai 5.1)
6	19 Feb (Tues)	Degenerate Perturb. Theory & Applications	Merzbacher 18.5,6 (Sakurai 5.2, 5.3)	21 Feb	Variational Method and the Helium Atom	Merzbacher 18.7,8 (Sakurai 5.4)
7	25 Feb	Time-Dependent Perturbation Theory	Merzbacher 19.1-3 (Sakurai 5.5, 5.6)	28 Feb	Atoms and Radiation; Cross Sections	Merzbacher 19.4,5 (Sakurai 5.7)
8	4 Mar	The Photoelectric Effect	Merzbacher 19.5,6 (Sakurai 5.7)	7 Mar	The Golden Rule	Merzbacher 19.7,8 (Sakurai 5.6)
9	11 Mar	No Classes	Spring Break	14 Mar	No Classes	Spring Break
10	18 Mar	Second Quantization	Merzbacher 21.1-3	21 Mar	Fields and Dynamics	Merzbacher 21.4-6
11	25 Mar	Applications of Many Body Field theory	Merzbacher 22.1-3	28 Mar	Hartree-Fock Method; Quantum Statistics	Merzbacher 22.4,5
12	1 Apr	The Photon Field	Merzbacher 23.1,2	4 Apr	Interactions; Black Body Radiation	Merzbacher 23.3,(5)
13	8 Apr	Electron-Positron Fields	Merzbacher 24.1	11 Apr	The Dirac Equation	Merzbacher 24.2
14	15 Apr	Free Field Solutions	Merzbacher 24.4	18 Apr	Relativistic Invariance and Symmetries	Merzbacher 24.3,5
15	22 Apr	The One-Particle Approximation	Merzbacher 24.6	25 Apr	Pictures and the Nonrelativistic Limit	Merzbacher 24.7,8
16	29 Apr	The Hydrogen Atom	Merzbacher 24.9	2 May	No Classes	