1-2014

PHSX 462.01: Quantum Mechanics II

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PHSX 462: Quantum Mechanics II Spring 2014

PROFESSOR:	Dr. Alex Bulmahn
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LECTURE:	MWF 12:10-1:00 pm, Charles H. Clapp Building 231
OFFICE HOURS:	M 1:00-2:30, T 11-12, W 10:30-11:30, *and by appointment*
TEXTBOOK:	*Introduction to Quantum Mechanics, 2nd Edition*
	David J. Griffiths
PREREQUISITE:	PSHX 461

Overview: This course will cover advanced topics in quantum mechanics, introducing approximation methods needed to analyze real systems. Topics include non-degenerate, degenerate, and time-dependent perturbation theory, multi-particle systems, interactions of light with matter, and scattering theory.

Learning Objectives: Upon completion of this course you should have gained an understanding of:

- the formalism of time independent perturbation theory and how it applies to physical situations such as the hydrogen atom.
- the formalism of time dependent perturbation theory and how it applies to physical situations such as the interaction of light with atoms.
- multi-particle systems such as atoms and solids.
- the usefulness of the variational principle as an approximation method.
- scattering processes.

Grading: Your grade for the course will be based on weekly homework assignments, two in-class midterm exams, and a final exam. **Homework is due at the end of the day on the due date and late homework will be penalized 20% per day late (not including weekends and holidays). Make up exams will only be given in extreme circumstances.** The grading for the course will be broken down as follows:

Homework:	30%
Midterm Exams:	40 % (20% each)
Final Exam:	30%

This course can only be taken with the traditional grading option. The letter grades in this course will be based on a curve, giving you the grade that you earn. The curve will be

determined by the performance of the class as a whole, but I do not have a set number of A's, B's, etc. predetermined. *Note: the last day to add or drop the course via Cyberbear is February 14th. The last day to drop the course without the Dean's signature is April 7th.*

Academic Honesty: All students must practice academic honesty. Academic misconduct is subject to penalty by the course instructor and/or disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://life.umt.edu/vpsa/student_conduct.php.

Students with Disabilities: Whenever possible, and in accordance with civil rights laws, The University of Montana will attempt to provide reasonable modifications to students with disabilities who request and require them. Please feel free to setup a time with me to discuss any modifications that may be necessary for this course. For more information, visit the Disability Services for Students website at http://life.umt.edu/dss/.

Schedule:

Week	Dates	Topic	Reading
1	1/27—1/28	Non-degenerate Perturbation Theory	6.1
2	2/3—7	Degenerate Perturbation Theory	6.2
3	2/10—14	Applications of Degenerate Perturbation Theory, The Stark Effect	6.2
4	2/17—21	Review of Addition of Angular Momentum , The Real Hydrogen Atom	4.4.3, 6.3
5	2/24—28	Zeeman Effect, Hyperfine Splitting	6.4, 6.5
6	3/3—7	Two-particle Systems	5.1 **Midterm Exam #1**
7	3/10—14	Atoms	5.2
8	3/17—21	Solids	5.3
9	3/24—28	Variational Principle and Helium	7.1, 7.2
10	3/31—4/4	SPRING BREAK—NO CLASS	Relax and Recharge
11	4/7—11	Time Dependent Perturbation Theory	9.1
12	4/14—18	Emission and Absorption	9.2 **Midterm Exam #2**
13	4/21—25	Spontaneous Emission, Lasers	9.3
14	4/28—5/2	Scattering, Partial Wave Analysis	11.1, 11.2
15	5/5—9	Phase Shifts, the Born Approximation	11.3, 11.4
16	5/12—16	Finals Week **Final Exam, Tuesday 5/13 10:10-12:10**	