

Chem 750: Introduction to Quantum Mechanics. Fall, 2017

Professor: Carey K. Johnson, B039 Malott
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Office hours: drop in or by appointment

Class time: TR 9:30 – 10:45. 2001 Malott

Text: Peter Atkins and Ronald Friedman, Molecular Quantum Mechanics, 5th ed (Oxford)

Catalog description: An introduction to the basic principles of quantum theory relevant to atomic and molecular systems. Topics include operators and operator algebra, matrix theory, eigenvalue problems, postulates of quantum mechanics, the Schrödinger equation, angular momentum, electronic structure, molecular vibrations, approximation methods, group theory, and the foundations of spectroscopy. Prerequisite: Two semesters of physical chemistry.

Grading:	Problem Sets	100 - 150 (about)
	Quizzes	50 - 100
	Midterm Exams	200
	Final	150 pts (about)
	<u>Short papers/reports</u>	<u>about 50 pts</u>
	Total	about 700 pts

Solid, consistent effort will be awarded a B grade. Consistently excellent work will be awarded an A grade. (The +/- grading scale will be used.)

Problem sets: Working problems is the most essential component in learning the concepts and mathematical tools of quantum mechanics. Problem sets (10 – 20 points each) will be assigned roughly weekly. Although you are encouraged to discuss problems with other students, what you hand in should be your own work unless the problem set is explicitly assigned as group work.

Exams: Midterm exams (about Sept. 28 and Nov. 21) and Final (7:30 – 10:00 am, Friday, Dec. 15). Midterms may be partly take-home.

Accommodation: The Academic Achievement and Access Center (AAAC) coordinates academic accommodations and services for all eligible KU students with disabilities. If you have a disability for which you wish to request accommodations and have not contacted the AAAC, please do so as soon as possible. They are located in 22 Strong Hall and can be reached at 785-864-4064 (V/TTY). Information about their services can be found at <http://www.access.ku.edu>. Please contact me privately in regard to your needs in this course.

Policies on course conflicts with religious observances:

Please see: <http://policy.ku.edu/governance/USRR#art1sect4> and <http://policy.ku.edu/governance/USRR#art2sect1>

Academic Misconduct: Students should review the university policy on Academic conduct at: <http://policy.ku.edu/governance/USRR#art2sect6>. Academic misconduct includes presenting work of someone else as your own, giving or receiving of unauthorized aid on examinations, knowingly misrepresenting the source of any academic work, plagiarizing another's work. Any incident of academic misconduct in this course will result in a zero for the assignment in question and will be prosecuted

according to the procedures outlined in the KU Student Handbook (<http://www.studenthandbook.ku.edu>).

Some good references (these books will be placed on reserve at Anschutz Science Library):

F. Albert Cotton, *Chemical Applications of Group Theory*, 3rd ed. QD461 .C65 1990

Richard Feynman, *Lectures on Physics, Vol. III*. QC23 .F47

David J. Griffiths, *Introduction to Quantum Mechanics*, 2nd ed. QC174.12 .G75 2005

Ira Levine, *Quantum Chemistry*, 5th ed. QD462 .L48 2000

Frank Pilar, *Elementary Quantum Chemistry*, 2nd ed. QD462 .P55 1990

Mark Ratner and George Schatz, *Introduction to Quantum Mechanics in Chemistry*. QD462 .R38 2001

David S. Schonland, *Molecular Symmetry*. QD461 .S455

Approximate Schedule

Topic	Chapter	Approximate Dates
Development of Quantum Mechanics	0, 1, 2	Aug. 22, 24
Foundations and Simple One-Dimensional Systems	1, 2	Aug. 29, 31, Sept. 5, 7
Angular Momentum and the H Atom	3	Sept. 12, 14, 19
More Angular Momentum	4	Sept. 21, 26
Midterm Exam		about Sept 28
Group Theory	5	Oct. 3, 5, 10, 12
Perturbation and Variation Theory	6.1–6.6	Oct. 17, 19, 24
Many-Electron Atoms	7	Oct. 26, 31
Molecular Electronic States	8	Nov. 2, 7, 9
Electronic Structure Calculations	9	Nov. 14, 16
Midterm Exam		about Nov. 21
Interaction of Matter and Radiation	6.7–6.18	Nov. 28, 30
Spectroscopic Transitions	11	Dec. 5, 7
Final Exam		Dec. 15, 7:30 – 10:00 am