

**CHM 4412: PHYSICAL CHEMISTRY II**  
**QUANTUM MECHANICS AND SPECTROSCOPY**

THE CLASS COVERS MATERIAL TO LEARN ABOUT FUNDAMENTAL PHYSICAL PROPERTIES WHICH ARE THE BASE FOR UNDERSTANDING CHEMICAL AND PHYSICAL BEHAVIOR OF MATTER AS WELL AS FUNDAMENTAL CONCEPTS OF SPECTROSCOPY.

- INSTRUCTOR:** Professor Valeria Kleiman. 311B CLB (Chemistry Laboratory Building), e-mail: [kleiman@chem.ufl.edu](mailto:kleiman@chem.ufl.edu), phone: 392-4656
- Teaching Assistant: Ebo Ewusi-Annan [ewusi-annan@chem.ufl.edu](mailto:ewusi-annan@chem.ufl.edu)
- CLASS SCHEDULE:** Spring Semester 2012: January 9<sup>th</sup> – May 4<sup>th</sup>.  
T, R Period 2-3 (8:30 – 10:25 am) @ LEIGH 207
- OFFICE HOURS:** Prof Kleiman: M, 3<sup>th</sup> P (9:35-10:25 am) and R 8<sup>th</sup> P (3:00-3:50pm) CLB 313.  
At any other time, send e-mail for an appointment.  
T.A.: W, 11:00 am -12:00 F, 11:00 am - 12:00 noon and 3:00 pm - 4:00pm CLB 311/313
- PREREQUISITS:** This class makes extensive use of mathematics (integration, differentiation, matrix algebra, graphing) If you are not up to speed in your math skills, you should work on that in the first week of the semester. The first Appendix in the book covers the math topics most needed for this class. Be sure you feel comfortable with these concepts so you can concentrate on the physical chemistry. You can ask question to the TA or the instructor at any point thorough the semester. MAC 2313 is a prerequisite, CHM4411 is not.
- TEXTBOOK:** "QUANTUM CHEMISTRY & SPECTROSCOPY" 2E by Thomas Engel Ed. Prentice Hall.  
The material we cover is available on any Quantum Chemistry textbook (Atkins, Levine, Raff, McQuarrie) for undergraduate level students.
- ATTENDANCE:** Attendance to lectures and office hours is expected. In many instances (and as time allows), the 2-period class will combine a traditional lecture with discussion of problems. Reading the material BEFORE lecture time is paramount to keep up with the fast pace of the course. In addition to the 4 hrs class a week, ~8/week of reading, homework and general study are required.
- COURSE WEB SITE:** We have a course workspace in SAKAI (<http://lss.at.ufl.edu/>). The site will have copies of the syllabus, homework assignments, quizzes, and exams. It will also serve as a communication tool between the instructor and you. If you are register for the course, you are automatically registered in Sakai.
- HOMEWORK:** Homework due date is posted on the class calendar. Late homework (if it is turned in on the same day, but after deadline) will have a **20% deduction on the grade**. The day after, the solutions will be posted, and no more homework will be accepted for grading. Each

homework problem has to show the **full derivation**, using SI units. **No points will be given for a final result without justification.**

**EXAMS AND QUIZZES** Throughout the semester, there will be two types of quizzes. During some of the lectures classes there will be 10 min. quizzes covering material from previous lectures and reading material for the current lecture. In addition, there will be quizzes administered through SAKAI. At the end, the two lowest quiz scores may be dropped. There will be 3 progress exams. Conflicts with these exams dates (travel to conferences, visiting graduate schools) must be resolved with the instructor no later than 5 days prior to the exam date. Emergency situations (sickness, death in the family, etc) have to be communicated to the instructor within 48 hrs of the exam and will be considered at the discretion of the instructor.

There will be no make-up exams.

**COURSE GRADING:** The grade will be determined by homework (15%), Quizzes (10%), progress tests (45%), a final exam (20%) and in-class participation (10%). If after the last progress test your grade is above 80% you'll be given the opportunity to skip the final exam (details to be explained in class).

*Cheating on an exam will result in a grade of zero for that case. If any homework or quiz assignment is suspect, a grade of zero will also be given for that assignment.*

**HONOR CODE:** The student honor code can be found at <http://www.registrar.ufl.edu/catalog/policies/students.html>  
The students, instructor and TAs are honor bound to comply with the Honors Pledge: ***We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.***

**STUDENTS WITH DISABILITIES:**

Students requiring special accommodations need to register at the Dean of Student Offices and bring the documentation to the instructor.

Counseling services are available at <http://www.counsel.ufl.edu/> or call (352)-392-1575 during regular service hours (8am-5pm). For other hours or weekends call the Alachua County Crisis Center (264-6789). Students may also call the clinician on-call at Student Mental Health for phone callback and consultation at (352)-392-1171.

**CLASS SCHEDULE:**

This is a tentative schedule for the course. If changes are made, they will be announced via Sakai.

<b>Dates</b>	<b>Topic</b>	<b>Book Reading</b>
Jan 10-12	Introduction to Quantum Theory	Chapter 1,2
Jan 17-19	Postulates, Free particle, 1D box	Chapters 3, 4
Jan 24-26	Real World Applications, Operators Theory	Chapter 5, 6
Jan 31- Feb 2	Operators, Harmonic Oscillator	Chapter 7
Feb 7-9	Angular Momentum	7
Tuesday, Feb 14 EXAM 1 includes Chapters 1-6, 7.5		
Feb 16	Diatomic Molecules	Chapter 8
Feb 21-23	H Atom, Many e-	Chapter 9, 10
Feb 28-Mar 1	Many e-, Atomic Spectroscopy	Chapter 10,11
Mar 4-10 SPRING BREAK		
Mar 13-15	Chemical bonding	Chapter 12, 13
Mar 20-22	Polyatomic molecules	Chapter 14
Tuesday, Mar 27 EXAM 2 includes Chapters 8-14		
Mar 29	Electronic Spectra	Chapter 15
Apr 3-5	Magnetic Resonance Spectra	Chapter 18
Apr 10-12	Molecular Symmetry	Chapter 17
Apr 17-19		
Tuesday, April 24 EXAM 3 includes Chapters 15 and 17-18		
Tuesday, May 3 (10:00 am to 12:00pm) Comprehensive Final		