Chemistry 104A **Inorganic Chemistry** **Fall 2019**

Instructor: Don Tilley (tdtilley@berkeley.edu), 591 Tan Hall
Office Hours: Tues 5-6 pm

GSI Office Hours: Amélie Nicolay (anicolay@berkeley.edu), Wed 2-3 pm (1 Lewis)
Josh Tsang (joshua.tsang@berkeley.edu), Thurs 12-1 pm (1 Lewis)

Lecture: Tuesday, Thursday 9:30-11:00 am, 390 Hearst Mining

Discussion Section: Mon 7-9 pm, 9 Lewis Hall (not held Sept 2)
The discussion section should provide a valuable additional resource for this course. In the discussion section, the GSIs will reemphasize and expand on material covered during lecture, entertain questions and work through "example" problems.

Texts: "Inorganic Chemistry" 5th ed., Miessler & Tarr (MT)
"Chemical Structure and Bonding" 2nd ed., DeKock and Gray (DG)
"Molecular Symmetry and Group Theory" 2nd ed., Vincent (V); *recommended*

Important: The course material, and what you will be responsible for on the exams, will be defined in lecture and based mainly on the class notes. Therefore, attendance in class is a key to success! The paperback book by Vincent is a valuable tool for learning about symmetry and group theory in chemistry. I will refer to sections of the book during the course. In addition, part of the course (in particular MO theory) will be based on material in the book by DeKock and Gray.

Grading	***Date***	***Points***
Midterm 1	*In class*, Tuesday, Oct 1	25%
Midterm 2	*In class*, Tuesday, Nov 5	25%
Problem Sets	*throughout semester*	10%
Final Exam (exam group 7)	Tuesday, Dec 17, 3–6 pm	40%

Final Grades

Your final grade for this class will be determined ***exclusively*** by the four criteria listed above (exams, problem sets, and final exam). ***Under no circumstances will alternative grading schemes be used in individual cases.***

Special note, especially to those graduating this academic year:
****All grades are final, and not open to negotiation after they have been determined****

Examinations

Exams will cover material emphasized in the lectures, the required reading, and the problem sets. The midterms will be given in place of the regular lecture in class. No makeup exams will be given. If you have a legitimate reason (with documentation) to miss an exam, you may be excused from the exam and in this case your final grade will be based on your *prorated* other scores. Please mark the exam dates on your calendar immediately. If you know in advance of any reason that may cause you to miss any examination, you must see Prof. Tilley immediately.

Note: ***Dishonesty and cheating will not be tolerated. Evidence of cheating on an exam will result in a grade of zero for that exam, and further disciplinary action by the University.***

Regrade Policy

The GSI will hand back midterm exams after lecture periods and also during office hours. Requests for regrades will only be considered if they are in the form of a written statement on a sheet of paper attached to the original, unaltered exam. No requests will be considered if they are handed in more than two weeks after the exam.

Problem Sets

You are strongly encouraged to work through the problem sets, as this will test your understanding of the course material, and exam questions may be similar to the material covered in the problem sets. The GSIs will collect your answers at the end of the lecture the week after the assignment is given. They will grade two of the problems in each set, chosen randomly, and your cumulative score on these problems will determine 10% of your final grade. Each problem set will be graded on the basis of 10 points, with 2 points awarded for "completeness". Also, if you are on a grade borderline, regularly completed problem sets will be taken into account in determining whether or not your grade should be higher.

Course Website

To access solutions to problem sets, go to: https://bcourses.berkeley.edu/courses/1484881 and find the site for our class. At this site, class notes and viewgraphs will also be posted. Please download the appropriate class notes and viewgraphs before coming to lecture.

Approximate Chemistry 104A Syllabus, Fall 2019

Week	Topic	Reading
1-2	**Introduction and atomic structure** The Hydrogen Atom Many-Electron Atoms Atomic parameters, periodic trends	MT, Chaps 1,2 DG, Chap 1
3-4	**Covalent bonding** Lewis structures valence bond theory VSEPR molecular orbital theory	MT, Chap 3
5-6	**Symmetry and group theory** Symmetry operations, point groups Representations, character tables	MT, Chap 4 Vincent
Oct 1	****Midterm 1****	
7-8	**MO Theory** diatomics polyatomics Walsh diagrams, Bent's rule	MT, Chap 5; DG, Chaps 2-5
9	**Acid-base chemistry** Brønsted acids, oxyacids and acid strength Lewis acid-base theory Hard and soft acids and bases (HSAB Theory)	MT, Chap 6
10-11	**Ionic bonding and the solid state** Crystal lattices (close-packing model) Ionic solids, Born-Haber cycles Band theory, defects, semiconductors	MT, Chap 7
Nov 5	****Midterm 2****	
11-15	**Descriptive chemistry of the main group elements** Hydrogen Alkali, alkaline earth metals Main group organometallics Group 14 chemistry Pnictogen and chalcogen groups Halogens, noble gases Trends in properties, relativistic effects	MT, Chap 8
Dec 17	**Final Exam, Dec 17, 3 - 6 pm**	

Reserve Books:

1. Shriver, Overton, Rourke, Weller, Armstrong, Inorganic Chemistry, 4th Ed.
2. Cotton, Wilkinson, Gaus, “Basic Inorganic Chemistry” 3rd Ed.
3. Huheey, Keiter, and Keiter, "Inorganic Chemistry", 4th Ed.
4. Douglas, McDaniel, Alexander, "Concepts and Models of Inorganic Chemistry", 3rd Ed.
5. Cotton and Wilkinson, "Advanced Inorganic Chemistry", 6th Ed.
6. Greenwood and Earnshaw, "Chemistry of the Elements"
7. Wulfsberg, "Foundations of Inorganic Chemistry"