Instructor

Prof. Matt Liptak
Discovery W112
(802) 656 – 0161
matthew.liptak@uvm.edu

Lecture

MWF 12:00 – 12:50, Rowell 115

Office Hours

TF 2:00 – 3:00, Discovery W112

Exams

F Sep. 29, 12:00 PM, Rowell 115
F Nov. 3, 12:00 PM, Rowell 115
M Dec. 11, 10:30 AM, Rowell 115

Course Description

Chem 231 will cover the fundamentals of inorganic chemistry within the frameworks of molecular symmetry and molecular orbital theory. All areas of inorganic structure, bonding, and reactivity will be covered, with an emphasis on transition metal complexes.

Textbook

Miessler, G.L. and Tarr, D.A. *Inorganic Chemistry*, 5th Ed., Prentice Hall, 2013

Web Content

Lecture notes, problem sets, and problem set answer keys will be available through Blackboard (bb.uvm.edu). These materials are available for all current, UVM-affiliated, students, but they may not be shared off-campus without permission of the instructor.

Course Goals

Upon completion of Chem 231, it is anticipated that you will:

1. Understand the relationship between molecular symmetry and bonding.
2. Appreciate the use of molecular orbital theory as a *general* approach that can explain the chemical properties of inorganic and organic molecules.
3. Recognize why transition metal complexes can have structures and properties unique from those of main group compounds.

Academic Honesty

As UVM students, you are expected to conduct yourself in accordance with the Code of Academic Integrity: http://www.uvm.edu/policies/student/acadintegrity.pdf

Accommodations

All exam accommodations must be requested via e-mail at least two weeks prior to the scheduled exam time in order to receive consideration.

Course Outline

Unit #1 – Fundamentals of Inorganic Chemistry

I. Molecular Symmetry
II. Vibrational Spectroscopy
III. Molecular Orbital Theory
IV. Main Group Bonding

Unit #2 – Structure and Bonding of Inorganic Compounds

V. Acid-Base Chemistry
VI. Solid State Chemistry
VII. Transition Metal Bonding
VIII. Ligand Field Theory

Unit #3 – Spectroscopy and Reactivity of Coordination Complexes

IX. Electronic Spectroscopy
X. Coordination Chemistry
XI. Organometallic Chemistry
XII. Bioinorganic Chemistry

Problem Sets

Problem sets will be handed out approximately once a week throughout the course of the semester. These problem sets are intended to solidify your understanding of the major course concepts and challenge you to think critically using your new-found knowledge. Please follow a "no writing utensil" rule when discussing these assignments with your classmates. Problem sets are due at the ***beginning*** of class. Late Problem sets will not be accepted, but the two lowest scores will be dropped.

Exams

Three exams are scheduled for Chemistry 231, which will cover units 1 – 3 separately. In other words, the exams will not be cumulative. Exams #1 and #2 are scheduled for 12 PM on **September 29** and **November 3**. Exam #3 will use our final exam time: **December 11** at 10:30 AM.

Grading

Your grade will be based upon problem sets (25%) and three exams (25% each). I strive to be as accurate as possible when grading problem sets and exams, but will occasionally make a mistake. You may request a complete regrade of an assignment, plus a clear explanation for any lost points, at any point prior to administration of the final exam.

***Tentative* Course Schedule**

	Monday	**Wednesday**	**Friday**
Aug. 28	Course Overview	Proper Rotations (4.1)	Improper Rotations (4.1)
Sep. 4	***Labor Day*** ***No Class***	Point Groups (4.2)	Character Tables (4.3) ***PS #1 Due***
Sep. 11	Molecular Vibrations (4.4)	IR and Raman Spectra (4.4)	Molecular Orbitals (5.1) ***PS #2 Due***
Sep. 18	Homonuclear Diatomics (5.2)	Heteronuclear Diatomics (5.3)	Main Group σ Bonding (5.4) ***PS #3 Due***
Sep. 25	Main Group π Bonding (5.4)	Walsh Diagrams ***PS #4 Due***	***Exam #1*** ***12:00 PM***
Oct. 2	Lewis Acid-Base (6.4)	Intermolecular Forces (6.5)	Hard-Soft Acid-Base (6.6)
Oct. 9	***Fall Recess*** ***No Class***	Solid State Structure (7.1) ***PS #5 Due***	Lattice Energy (7.2)
Oct. 16	Band Structure (7.3)	Coordination Complexes (9.3) ***PS #6 Due***	Metal σ Bonding (10.3)
Oct. 23	Metal π Bonding (10.3)	Ligand Field Splitting (10.3) ***PS #7 Due***	Angular Overlap Model (10.4)
Oct. 30	Jahn-Teller Effect (10.5)	UV/Vis Abs Spectra (11.1) ***PS #8 Due***	***Exam #2*** ***12:00 PM***
Nov. 6	Electronic States (11.2)	Ligand Field Transitions (11.3)	O_h Substitution (12.1-12.5) ***PS #9 Due***
Nov. 13	D_{4h} Substitution (12.6-12.7)	Oxidation-Reduction (12.8)	Oxidative Addition (14.1) ***PS #10 Due***
Nov. 20	***Thanksgiving Recess*** ***No Class***	***Thanksgiving Recess*** ***No Class***	***Thanksgiving Recess*** ***No Class***
Nov. 27	Insertion/Elimination (14.2)	Catalysis (14.3)	Tetrapyrroles (16.1) ***PS #11 Due***
Dec. 4	Metalloproteins (16.2)	Nitrogen Fixation (16.3)	Course Summary ***PS #12 Due***
Dec. 11	***Exam #3*** ***10:30 AM***		

The instructor reserves the right to change everything, with notice