

Instructor

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Lecture

MWF 12:00 PM – 12:50 PM, Innovation E430

Office Hours

MW 1:00 PM – 2:00 PM, Innovation E340

Exams

M Sep. 30, 12:00 PM, Innovation E430
F Nov. 1, 12:00 PM, Innovation E430
T Dec. 10, 1:30 PM, Innovation E430

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. Acid-Base Chemistry

Unit #2 – Structure and Bonding of Inorganic Compounds

- V. Coordination Complexes
- VI. Ligand Field Theory
- VII. Angular Overlap Model
- VIII. Electronic Spectroscopy

Unit #3 – Transition Metal Chemistry

- IX. Coordination Chemistry
- X. Organometallic Complexes
- 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 only your 10 best problem set grades will count towards your final grade.

Exams

Three exams are scheduled for Chem 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 30** and **November 1**. Exam #3 is scheduled for **December 10** at 1:30 PM.

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. 26	Course Introduction	Proper Rotations (4.1)	Improper Rotations (4.1)
Sep. 2	Labor Day No Class	Point Groups (4.2)	Group Theory (4.3) PS #1 Due
Sep. 9	Molecular Motions (4.4)	IR and Raman Spectra (4.4)	Molecular Orbitals (5.1) PS #2 Due
Sep. 16	Diatomics (5.2-5.3)	Polyatomics (5.4)	Brønsted-Lowry (6.1-6.3) PS #3 Due
Sep. 23	Lewis Acid-Base (6.4-6.5)	Hard-Soft Acid-Base (6.6)	Nomenclature (9.1-9.2) PS #4 Due
Sep. 30	Exam #1 12:00 PM	Isomerism (9.3)	Coordination Complexes (9.4)
Oct. 7	Magnetism (10.1-10.2) PS #5 Due	Metal σ Bonding (10.3)	Metal π Bonding (10.3)
Oct. 14	Fall Recess No Class	Angular Overlap (10.4) PS #6 Due	Spin States (10.4)
Oct. 21	Jahn-Teller Effect (10.5)	Excited States (11.1-11.2) PS #7 Due	Selection Rules (11.3)
Oct. 28	Tanabe-Sugano (11.3)	O_h Substitution (12.1-12.5) PS #8 Due	Exam #2 12:00 PM
Nov. 4	D_{4h} Substitution (12.6-12.7)	Oxidation-Reduction (12.8)	18 Electron Rule (13.1-13.3) PS #9 Due
Nov. 11	Organometallic Ligands (13.4)	OM Complexes (13.5-13.6)	Oxidative Addition (14.1) PS #10 Due
Nov. 18	Insertion/Elimination (14.2)	Catalysis (14.3)	Metal Tetrapyrroles (16.1) PS #11 Due
Nov. 25	Thanksgiving Recess No Class	Thanksgiving Recess No Class	Thanksgiving Recess No Class
Dec. 2	Metalloproteins (16.2-16.3)	Iron-Sulfur Cluster (16.4)	Course Evaluations PS #12 Due

The instructor reserves the right to change everything, with notice