

Instructor

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Lecture

MWF 12:00 PM – 12:50 PM, Rowell 115

Office Hours

TR 11:00 AM – 12:00 PM, Discovery W112

Exams

F Sep. 28, 12:00 PM, Rowell 115
F Nov. 2, 12:00 PM, Rowell 115
M Dec. 10, 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. Main Group Chemistry
- VI. Transition Metal Bonding
- VII. Ground State Magnetism
- VIII. Electronic Excited States

Unit #3 – Transition Metal Chemistry

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

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 28** and **November 2**. Exam #3 is scheduled for **December 10** 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. 27	Proper Rotations (4.1)	Improper Rotations (4.1)	Point Groups (4.2)
Sep. 3	Labor Day No Class	Character Tables (4.3) PS #1 Due	Molecular Vibrations (4.4)
Sep. 10	IR and Raman Spectra (4.4)	Atomic Theory (2.2) PS #2 Due	Homonuclear Diatomics (5.2)
Sep. 17	Heteronuclear Diatomics (5.3)	Main Group σ Bonding (5.4) PS #3 Due	Main Group π Bonding (5.4)
Sep. 24	Delocalized σ Bonding (8.5)	Lewis Acid-Base (6.4) PS #4 Due	Exam #1 12:00 PM
Oct. 1	Frustrated Lewis Pairs (6.4)	Hard-Soft Acid-Base (6.6)	Fall Recess No Class
Oct. 8	Fall Recess No Class	Metal σ Bonding (10.3) PS #5 Due	Metal π Bonding (10.3)
Oct. 15	Angular Overlap Model (10.4)	Spin States (10.3-10.4) PS #6 Due	EPR Spectra (10.1)
Oct. 22	Jahn-Teller Effect (10.5)	Excited States (11.2) PS #7 Due	UV/Vis Spectra (11.3)
Oct. 29	Tanabe-Sugano (11.3)	Coordination Complexes (13.3) PS #8 Due	Exam #2 12:00 PM
Nov. 5	O_h Substitution (12.1-12.5)	D_{4h} Substitution (12.6-12.7)	Oxidation-Reduction (8.1) PS #9 Due
Nov. 12	Inner Sphere ET (12.8)	Outer Sphere ET (12.8)	Oxidative Addition (14.1) PS #10 Due
Nov. 19	Thanksgiving Recess No Class	Thanksgiving Recess No Class	Thanksgiving Recess No Class
Nov. 26	Insertion/Elimination (14.2)	Catalysis (14.3)	Bioinorganic Acid-Base PS #11 Due
Dec. 3	Bioinorganic ET	Bioorganometallics	Course Evaluations PS #12 Due
Dec. 10	Exam #3 10:30 AM		

The instructor reserves the right to change everything, with notice