

# CHE 331, Inorganic Chemistry Lecture, Fall 2009

## COURSE OBJECTIVES

1. To study and discuss atomic and molecular structure, VSEPR theory, hybrid orbital theory, and molecular orbital theory.
2. To introduce concepts concerning the relationship between the structure and properties of solids.
3. To expand the student's understanding of acid-base reactions.
4. To study the principles of group theory, and their application to chemical problems.
5. To study the structure of transition metal complexes.
6. To make the connection between material learned and real-life applications.

## COURSE OUTCOMES

1. The students will demonstrate critical thinking and scientific reasoning skills related to theoretical inorganic chemistry.
2. The students will acquire a detailed knowledge of atomic and molecular structure, modern bonding theories, and the relationships between the structure and properties of solids.
3. The students will master the point group classification of molecules, and the derivation of normal modes of vibration and molecular orbitals by group theoretical methods.
4. The students will strengthen their understanding of Lewis acid-base theory and its relationship to coordination chemistry.
5. The students will be able to relate the concepts they have learned to applications in their respective fields.

## REQUIRED MATERIALS FOR THE COURSE

The following is available on CD from the instructor.

Text: A Symmetry-based Approach to Inorganic Chemistry, and Other Stories, 3rd Ed. Lawrence T. Sein, Jr., 2009.

## MEETING TIMES

Lecture: Monday, Wednesday, and Friday at 8:00 – 8:50 A.M., Oberkotter 1.

Instructor's office: Miller 2

Office Hours: Monday, Wednesday, and Friday 10:00 AM – 11:00 AM, and by appointment

Email: ltsein@cedarcrest.edu

## GRADING SYSTEM

The grade for this course is based on four hour-long exams (65%), and a comprehensive final exam (25%). The remaining 10% of the grade constitutes class participation.

The final letter grade will be awarded according to the following scale:

93 – 100%	A	80 – 82.9%	B-	67 – 69.9%	D+
90 – 92.9%	A-	77 – 79.9%	C+	60 – 66.9%	D
87 – 89.9%	B+	73 – 76.9%	C	Below 60%	F
83 – 86.9%	B	70 – 72.9%	C-		

## POLICIES

### Classroom Attendance

Classroom attendance is **mandatory** in order to perform well in this class.

### Attendance on Quiz and Examination Days

Attendance on exam days is mandatory. There are **NO** make-up exams. Don't even ask. No reason for absence will be accepted, **up to and including death**. If one examination is missed, the score on the final exam will be entered as the score also on the missing examination. A second missed examination will result in the grade of zero for the second examination. There is no extra credit. If I allowed one student the opportunity for extra credit, waves of indignation and accusations of favoritism would result. Therefore, no extra credit is available, so don't ask.

### Obtaining Assistance

Do not hesitate to seek assistance concerning class lectures, homework assignments, or grading. If the student can not make it to the instructor's scheduled office hours, she should make arrangements to meet with the instructor at an alternate time at both the student's and the instructor's convenience.

### Honor Philosophy

"The Cedar Crest College Honor Philosophy states that students should uphold community standards for academic and social behavior in order to preserve a learning environment dedicated to personal and academic excellence. Upholding community standards is a matter of personal integrity and honor. Individuals who accept the honor of membership in the Cedar Crest College community of scholars pledge to accept responsibility for their actions in all academic and social situations and for the effect their actions may have on other members of the College community."

The instructor expects each student to abide by the college's honor code. This honor code applies to all activities associated with this course. The student should realize that the honor code is an important aspect of the educational process at Cedar Crest College.

The following statement concerning Classroom Protocol is supported by Cedar Crest College Faculty and Administration:

"Appropriate classroom behavior is implicit in the Cedar Crest College Honor Code. Such behavior is defined and guided by complete protection for the rights of all students and faculty to a courteous, respectful classroom environment. That environment is free from distractions such as late arrivals, early departures, inappropriate conversations, and any other behaviors that might disrupt instruction and/or compromise students' access to their Cedar Crest College education."

Please be sure to turn off all cell phones and pagers during class times.

### Community Standards for Academic Conduct:

“Academic integrity and ethics remain steadfast, withstanding technological change. Cedar Crest College academic standards therefore apply to all academic work, including but not limited to, handwritten or computer-generated documents, video or audio recordings, and telecommunications.

As a student at Cedar Crest College, each student shall:

- Only submit work which is his/her own.
- Adhere to the rules of acknowledging outside sources, as defined by the instructor, never plagiarizing or misrepresenting intellectual property.
- Neither seek nor receive aid from another student, converse with one another when inappropriate, nor use materials not authorized by the instructor.
- Follow the instructions of the professor in any academic situation or environment, including taking of examinations, laboratory procedures, the preparation of papers, properly and respectfully using College facilities and resources, including library and computing resources to ensure that these resources may be effectively shared by all members of the College community.
- Abide by the Cedar Crest Computer Use Policy.
- If a student perceives a violation of the Academic Standards, he/she will go to their instructor.
- If you are unable to resolve the problem with the instructor, you should go to the chair of the department. If you need further assistance after the consultation with the instructor and the chair, you should see the Provost.”

It is the instructor’s policy to deal with violations of these Standards for Academic Conduct by awarding a grade of **F** for the course for *any* instance of cheating - no ifs, ands, or buts. No warnings will be given other than this.

### Students with Learning Disabilities

The instructor supports the Cedar Crest College policy regarding learning disabilities as follows:

“Students with documented disabilities who may need academic accommodations should discuss these needs with their professors during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center.”

### CHRONOLOGICAL PLAN FOR THE COURSE

The schedule below lists the dates and topics which constitute the lectures pertaining to this course. A summary of the testing schedule and content is provided. The schedule **may be** modified throughout the course, as needed.

#### Lecture Topics Schedule

<u>Date:</u>	<u>Topic</u>	<u>Reading Assignment:</u>
8/24		Introduction
8/26	introduction to symmetry	Chapter 1
8/28	groups	
9/02	matrix operations	Chapter 2
9/04		
9/07	<i>Labor day Holiday – No Class</i>	
9/09	point group assignments	
9/11		

9/14	characters and character tables	
9/16		
9/18	normal modes of vibration	Chapter 3
9/20	<b>TEST #1</b>	
9/22	derivation by projection operator method	
9/25		
9/27		
9/30	Kim method for high-symmetry molecules	
10/02		Chapter 4
10/05	<b>TEST #2</b>	
10/07	Coordination compounds	Chapter 5
10/09		
10/12	<i>Fall Break – No Class</i>	
10/14		
10/16		
10/19	Lewis Dots and Hybridization	Chapter 6
10/21		
10/23		
10/26	Molecular Orbitals	Chapter 7
10/30		
11/02	<b>TEST #3</b>	
11/04		
11/06		
11/09	<i>Last Day to withdraw from class</i>	
11/12		
11/14	CO and Cyanides	Chapter 8
11/16		
11/19	Electronic spectra	Chapter 9
11/23	<b>TEST #4</b>	
11/25	<i>Thanksgiving Break – No Class</i>	
11/27	<i>Thanksgiving Break – No Class</i>	
11/30		
12/02		
12/04	Crystalline solid state	Chapter 10
12/07	Last lecture / review	

### Testing Schedule Summary

<u>2009 Date</u>	<u>Test</u>	<u>Material Included</u>
Mon 09/21	Exam 1	matrix operations, point group assignments
Mon 10/05	Exam 2	derivation of normal modes of vibration
Mon 11/02	Exam 3	derivation of molecular orbitals
Mon 11/23	Exam 4	coordination compounds and spectroscopy
TBA	Final Exam	Comprehensive