Advanced Inorganic Chemistry

CHEM 531 Spring 2014


Calculator: For quizzes and examinations the use of calculators and periodic tables is permitted

Topics to be covered

<table>
<thead>
<tr>
<th>Approximative Dates</th>
<th>Topics Covered</th>
<th>Approx. Text Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan.13, 15, 17</td>
<td>The internal structure of the atom, atomic orbitals &amp; periodic trends</td>
<td>Chapter 1, handouts</td>
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<td>Jan. 22, 24, 27</td>
<td>Covalent bonding and geometry, VB theory</td>
<td>Chapter 2, handouts</td>
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<td>Jan. 29, 31, Feb.3</td>
<td>MO theory, Structure and Bond Properties, Group theory and representations</td>
<td>Chapters 2, 6, handouts</td>
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<td>Feb. 7, 10, 12</td>
<td>Group theory applications in vibrational spectroscopy</td>
<td>Chapter 6 and handouts</td>
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<tr>
<td>Feb. 14, 17, 19</td>
<td>Group theory applied to chemical bonding and molecular orbitals</td>
<td>Chapter 6 and handouts</td>
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<tr>
<td>Feb. 21, 24, 26</td>
<td>The structures of simple solids, defects &amp; nonstoichiometry</td>
<td>Chapter 3, handouts</td>
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<td>Feb. 28, March 3</td>
<td>Ionic bonding and thermodynamics</td>
<td>Chapter 3, handouts</td>
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<tr>
<td>March 5,7</td>
<td>Acid base chemistry, solvation</td>
<td>Chapter 4, Chapter 5, 23</td>
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<td>March 17, 19, 21</td>
<td>Redox processes, oxidation states of the d-block elements, chemical reactivity</td>
<td>Chapter 4, 5, 23</td>
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<tr>
<td>March 26, 28, 31</td>
<td>Coordination chemistry, isomerism, thermodynamics of complex formation, electronic structure, magnetic properties</td>
<td>Chapter 7, Chapter 20, handouts</td>
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<tr>
<td>April 2,4, 7</td>
<td>d-Metal Organometallic chemistry</td>
<td>Chapter 22, handouts</td>
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<td>April 9, 11, 14, 16</td>
<td>Periodic trends</td>
<td>Chapter 9, 19, handouts</td>
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<tr>
<td>April 18, 21, 23</td>
<td>Nanomaterials, nanosciences and nanotechnology</td>
<td>Chapter 24, handouts</td>
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<tr>
<td>April 25, 27, 29</td>
<td>Physical techniques in inorganic chemistry &amp; chemical analysis</td>
<td>Chapter 8, handouts</td>
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*Wednesday February 5th: First in-class Exam (Chapters 1, 2, 6)*

*March 8-16, No classes for the Spring Recess*

*Monday March 24th: Second in-class Exam (Chapters 3, 4, 5, 6, 23)*

**Cumulative Final Exam (Exam Date/Time to be announced by the Registrar’s Office)**

Required purchases:


Recommended textbooks and educational materials:


Recommended Review Journals

1. Science (Published by the American Association for the Advancement of Science) Q1.S354; (Free internet access from campus: http://www.sciencemag.org/).
2. Nature (Macmillan Publishers Ltd) (Free internet access from campus)
3. Chemical Reviews (Published by the American Chemical Society); (Free internet access from campus: http://pubs.acs.org/journals/).
4. Accounts of Chemical Research (Published by the American Chemical Society) (Free internet access from campus: http://pubs.acs.org/journals/).
5. Chemical and Engineering News (Published by the American Chemical Society); (Free internet access from campus: http://pubs.acs.org/journals/). (Generally short articles, but good for ideas).
6. Scientific American (Scientific American, Inc.) (Light reading, very general; covers all of science).

Recommended Primary Journals from the American Chemical Society (Free internet access from campus computers (http://pubs.acs.org/journals/):

1. Journal of the American Chemical
2. Inorganic Chemistry
3. Organometallics

STUDENT LEARNING OBJECTIVES: Students who complete this course will have the opportunity to explore in detail the bonding and structure-properties relationship of a variety of elements and inorganic compounds. This will allow them to deepen their fundamental understanding of the chemical reactions that inorganic compounds undergo, as well as to refine the current theoretical concepts and theories used to explain the physical and chemical properties of various compounds.

LEARNING RESOURCES: (1) Course web site on Blackboard (will be used as a discussion forum and place where you will find copies of the syllabus, handouts, homework assignments and solutions, relevant examples and multimedia material pertinent to the course content, exam schedules and other important class information).

CLASS ATTENDANCE: According to the CMU policies and regulations, attendance of courses is mandatory. Attendance will be taken at the beginning of each class period. Chronic tardiness will be penalized.

CLASSROOM ETIQUETTE: To maintain a respectful learning environment, please turn off cell phones and/or laptops and disconnect all internet access. Because of the room arrangement and capacity, please be on time to class and refrain from leaving the room during class, if possible. Talking and other distracting behavior is not permitted during class. Asking questions and participating in class activities are encouraged.
DISABILITIES: Students who qualify for services will receive the academic modifications for which they are legally entitled. It is the responsibility of the student to register with the Office of Disability Services (250 Foust Hall; Tel.: 989-774-3018) each semester and follow their procedures for obtaining assistance. All information and documentation of disability is confidential.

ACADEMIC MISCONDUCT: I call to your attention that any material submitted in this course must represent your own work. Apparent violations of this standard will be referred to the University Committee of Academic Misconduct as required by the CMU Faculty Rules. Any work copied from a book or journal or another student without reference will be considered plagiarized and no credit will be given for the work it is part of. Extensive paraphrasing will receive the same treatment. Please remember this when you are writing reports and answering problem sets! Although consultation between students in solving problems is encouraged, identical problem sets with single authors will be considered plagiarized and will be given no credit. If you worked with others, give them credit. Any cheating on exams (copying from each other or from materials brought in, substitute examinees, changing answers after tests have been returned, stealing tests, etc.) will result in a grade of F for the course. Without honesty, there is no science - there can be no compromises at any stage.

STUDENT RESPONSIBILITY: Each student receives this information about Chemistry 531 in the first lecture sections. It is your responsibility to read this material and be familiar with the course content and grading. You are also responsible for any announcements concerning course procedures which are made in class, whether you are present or not! (If you are absent, you are expected to get notes, announcements, etc. from another student in the class.)

PROBLEM SETS are worth a total of 10 points each. Fifty points can be awarded for attendance and participation in class activities at the discretion of the instructor. Points will be deducted for students who arrive late or who fail to participate. Problem sets are to be worked out individually without assistance from others. Make-ups are not given.

MID-QUARTER EXAMS: These exams are given only at the times announced before the exam. Makeup exams will be given only in the last week of regularly scheduled classes for special circumstances* (documented) or a preapproved university conflict. A sign-up sheet for the make-up exams will be available in the last week of April. Exams are a scheduled part of this course and attendance is required (exam location is the same as the lecture). Students with University conflicts should consult the instructor. Computer answer sheets from exams will not be returned.

*No make-up exams will be given except with written official verification of the following: serious illness or injury, death of an immediate family member. In such cases Dr. Caruntu should be contacted before the exam.

FINAL EXAM: The final exam must be taken at the University scheduled time. CMU ID cards will be collected at the final exam. Final exams will not be returned. Bring your approved calculator to ALL exams.

OFFICE HOURS: Office hours are tentatively scheduled for Tuesdays and Thursdays from 2:00 PM-3:30 PM.

GRADING: There will be two exams during the term plus a cumulative final. These tests will evaluate your understanding and recollection of the chemistry included in your textbook. All questions on exams will require you to write, draw, outline or otherwise tell me what you understand about inorganic chemistry. All exams are closed book and notes are not permitted. Your performance in the course will be evaluated on the basis of total points earned. Course grades will be determined from exam grades, quizzes, and attendance. The distribution of points is as follows:
10 independent problem sets (10 Pts. Each) ............. 100 Pts.
Midterm Exam 1 ................................................. 100 Pts.
Midterm Exam 2 .................................................. 100 Pts.
Final Exam .......................................................... 150 Pts.
Literature Survey/Term paper ........................... 50 Pts.
TOTAL ................................................................. 500 Pts

LETTER GRADES WILL BE ASSIGNED AS FOLLOWING:

450 points and over = A
Between 375 points and 450 points = B
Between 325 points and 375 points = C
Between 275 and 325 points = D
Below 275 points = F