CHEM 362
Descriptive Inorganic Chemistry
Spring 2016 ✧ MWF 10:20 - 11:10 AM ✧ 255 Chemistry

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TEACHING ASSISTANT:
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WEBPAGE: http://www.chem.tamu.edu/rgroup/marcetta/chem362

TEXT: "*Inorganic Chemistry*", 5th Edition, Miessler, Fischer & Tarr, Prentice Hall (ISBN-10: 0321811054 | ISBN-13: 9780321811059)

REVIEWS: SUNDAY'S AT 5-6 P.M. RM. 255

REFERENCES:
- Wikipedia
- WebElements: http://www.webelements.com/
- *Instant Notes – Inorganic Chemistry*, Second Edition by P.A. Cox
- *Inorganic Chemistry* by Shriver, et al., 5th or 6th editions
- *Inorganic Chemistry, 4th Ed* by Miessler and Tarr
- *MIT open courseware: MIT Course No. 5.111 Principles of Chemical Science*
- *Youtube: Periodic Table of Videos http://www.periodicvideos.com/index.htm*

COURSE GRADING:		SCHEDULE
HOUR EXAM 1	15%	FEBRUARY 17
HOUR EXAM 2	15%	MARCH 30
HOUR EXAM 3	15%	APRIL 20
FINAL EXAM	**25%**	**MAY 9**

PROJECTS 5 + 10= 15%
QUIZZES: 15%

POSTER DAY 1	**APRIL 11**
POSTER DAY 2	**APRIL 13**

PREREQUISITE(S): Chem 103,104 or equivalent; at least one semester of Organic Chemistry is advised.

COURSE DESCRIPTION: Introduction to inorganic chemistry with a focus on fundamentals of atomic/molecular structure and descriptive inorganic chemistry (on understanding the properties of the elements and how they are combined in inorganic compounds), structure/geometries of small molecules, bonding theories both in inorganic molecules and in the solid state. Survey of main group and transition metal chemistry; overview of roles of transition metals in organometallic chemistry and bioinorganic chemistry, as time permits.

CELL PHONES, TABLETS AND OTHER ELECTRONIC DEVICES: Use of cell phones and other electronic devices in class is strictly limited to course-related activities (e.g., taking notes). Students violating this policy will be required to leave immediately. If you have an emergency, please be courteous and step outside, so as not to disrupt the class.

COURSE OBJECTIVES: At the end of the course success will be judged by the student's ability to:

- Explain the position of elements in the Periodic Table and the relation of the elements' physical and chemical properties based on electronic structure.
- Predict the formulation of main group inorganic molecules, their electronic structure, and their geometry. Predict properties based on structure and reactive centers.
- Account for extended structures, both ionic and molecular interactions between molecules.
- Be familiar with first row transition metals, their coordination complexes and a few applications to bioinorganic and catalytic chemistry.

ADA STATEMENT: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit http://disability.tamu.edu.

AGGIE HONOR CODE: "An Aggie does not lie, cheat, or steal or tolerate those who do."
Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/

POSTER PRESENTATION

The poster assignment sheet, and guidelines, will be given to you on a separate document. You should plan to prepare your poster in power point, and later place the individual slides (there should be around 9 – 12 of them) together into an overall poster. We will offer you several poster templates to follow. The following website was given by Dr. Mawk who has the analytical chemistry students also prepare a poster as a course project.

Ten Simple Rules for a Good Poster Presentation by T. C. Erren and P. E. Bourne.

http://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.0030102

Project: Poster Presentation and Peer Evaluation
You will be offered your choice of topics for a poster presentation on one of two class days. Mull these over and return with a ranked list of 3. If you know whom you would prefer as a team member, make such a suggestion and we will try to accommodate your choice. If you do not designate a team, then we will merely assign according to overlap of preferences of topics.

Students will work in a team of three to prepare the poster and the presentations are scheduled as shown on page 1. Your poster/presentation will be evaluated by your peers. The evaluation sheet will ask for assessment on **Content** (what is the scope – did you find interesting elements to include? Do you use chemical principles to explain observations you choose to include in your presentation?) **Clarity and Organization** (Did you clearly express the goal of your presentation? Do you go from sub-topic to sub-topic easily?) **Ability to answer questions** (inclusion of all members of your team in the presentation.)

The Peer Evaluation Team: The members of the class who are not presenting will prepare for the poster presentations by reading about the topic and deriving expectations and questions. They will write out three questions to be turned in on three different evaluation sheets. They will themselves be "graded" on the quality of those questions, and the description of the responses.

CLASS SYLLABUS AND EXPECTATIONS:

Section 1. Mostly Fundamentals of (Inorganic) Chemistry

The first part of this material you have seen in high school chemistry/physics and in your first year of University Chemistry. Some I will not discuss in class so as not to bore you and I encourage you to review/read on your own. This short "review" will assure you have the following information securely in your mind and at your disposal. If you are lost, please ask for help. We can schedule reviews that specifically address the needed material. Specifically you should be familiar/know the subjects outlined below regarding atomic structure and bonding. The odd quiz here and there will keep you on your toes. The scheduled examinations will separate the men from the boys and the women from the girls and identify those who might one day wear a lab jacket with pride. I cannot stress enough that if you read the chapter in advance and check on Wiki or elsewhere (MIT open courseware, Chemical Science 5.111 before the lecture, you will be ahead of the game!

The Periodic Table

- Memorize the names, symbols, and atomic numbers of the first 36 elements.
- Components of the Periodic Table
    - Blocks: s-block, p-block, d-block, f-block
    - Groups: alkali, alkaline-earth, chalcogens, halogens, noble gases
    - Lanthanoids and Actanoids

Electron Configuration: Orbitals; Quantum Numbers: n, l, m_l, m_s
Outershell/Valence Shell

Magnetism: Paramagnetic, Diamagnetic, Ferro-magnetism

Nuclear Charge; Effective Nuclear Charge, ***and how it affects*** => Periodic Properties: Atomic Radii, Ionization Enthalpies, Electron Affinities, Electronegativities; ***and how these atomic properties control*** =>

Structure and Bonding in Molecules: Octet Rule, Lewis Dot-Structures
Formal Charge and Oxidation States
Valence Shell Electron Pair Repulsion (VSEPR) Approach to predicting geometries
Molecular Orbital Theory: Diatomic Molecules and Larger

CHEMICAL SYMMETRY AND GROUP THEORY-- Definitions

• Configuration	• Symmetry Operation
• Equivalent Configuration	• Symmetry Element
• Identical Configuration	

Symmetry Operations Required for Specifying Molecular Symmetry

• Identity Operation	• Inversion Operation
• Reflection Operation	• Improper Rotation Operation
• Proper Rotation Operation	

Sets of Symmetry Operations and Point Groups-A special quiz will assure your mastery of this section.

Section 2. Acids and Bases and Salts and Structures in the Solid State. General Trends in main Group element Chemistry. Coordination Chemistry as a subset of Acid/Base interactions.

Section 3. Electronic structure as related to properties of transition metal complexes. Overview of T. M. organometallic /catalytic reactions. Thumbnail sketch of Bioinorganic Chemistry.