

CHEM 462/633: Inorganic Chemistry

Fall 2012 SYLLABUS

T/Th 9:35-10:50 am, CHAN 2121

INSTRUCTOR: Professor Janet Bluemel—Reed McDonald building (RMD), room 323 (via 321)
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Homepage Bluemel: <http://www.chem.tamu.edu/rgroup/bluemel/>

OFFICE HOURS: T/Th 11:00 am-12:00 pm, or by appointment

TEACHING ASSISTANT: Kyle Cluff—RMD, room 428 or 401 (both via room 428)
PHONE: 979-862-7826 | E-MAIL: Kyle.cluff@chem.tamu.edu

ASSISTANT: Jennifer Belcik—RMD, 1-5 pm, room 321
PHONE: 979-845-3786 | E-MAIL: jbelcik@tamu.edu

TEXTBOOKS/COURSE MATERIAL:

All material required for the course will be provided in the form of hardcopies, lecture scripts, or electronic files. Any one of the following books may be used for additional reading.

- [1] Inorganic Chemistry. Catherine E. Housecroft and Alan G. Sharpe. Prentice Hall, 2nd Edition.
ISBN: 0130399132
- [2] Inorganic Chemistry. D. F. Shriver, P. W. Atkins, and C. H. Langford. Oxford Univ. Press, 4th Edition.
ISBN: 9780716723981
- [3] Chemistry of the Elements. N. N. Greenwood and A. Earnshaw. Pergamon Press, 2nd Edition.
ISBN: 0-7506-3365-4 (paperback)
- [4] Advanced Inorganic Chemistry. F. Albert Cotton, Carlos A. Murillo, and Manfred Bochmann. John Wiley & Sons, Inc., 6th Edition. ISBN: 0471199575

COURSE GRADING:

Exam I (Oct. 11, 2012, CHAN 2121)	25 %
Exam II (Nov. 15, 2012, CHAN 2121)	25 %
Final Exam (Friday, December 7, 2012, from 12:30-2:30 pm, CHAN 2121)	50 %

COURSE DESCRIPTION and LEARNING GOALS:

My aim is to provide a comprehensive and contemporary presentation of the diverse and fascinating discipline of inorganic chemistry. Inorganic chemistry deals with the properties of all the elements in the periodic table. These elements range from highly reactive metals to noble metals, such as gold. The nonmetals include solids, liquids and gases. Therefore, a special emphasis is placed on spectroscopic techniques in this course, because only modern methods allow the thorough investigation of the diverse characteristics of inorganic molecules and materials. The purity of materials, dynamic effects, crystallographic features, and surface adsorption phenomena, for example, all play an important role in modern Inorganic Chemistry and this course will enable the students to fully understand the underlying principles. Achievements in recent research, as well as industrial aspects of inorganic chemistry and spectroscopy will be included. Examples taken from recent publications and seminar talks presented by visitors during the semester will be discussed.

COURSE OUTLINE:

I. Characterization of Inorganic Compounds and Materials

- Elemental Analysis, Melting and Boiling Points
- NMR and EPR of Liquids and Solids
- IR, Raman, and UV-VIS
- Photoelectron and Atomic Absorption Spectroscopy
- Mößbauer Spectroscopy
- X-Ray Powder and Single Crystal Diffraction

II. Coordination Chemistry and Organometallic Chemistry

- Ligands
- Constitution and Geometry
- Reactions of Coordination Compounds

III. The Chemistry of the Transition Metals

- A. The d-Block Metals and their Complexes
 - Trends in Chemical Properties
 - Crystal- and Ligand-Field Theory and Electronic Spectra
- B. d-Metal Organometallic Chemistry
 - Ligands and their Bonding
 - Compounds and Reactions
- C. f-Block Metals and their Chemistry
 - Lanthanoid Chemistry
 - Actinoid Chemistry

IV. Solid-State and Materials Chemistry in Academia and Industry

- Oxide Glasses and Pigments
- Layered Materials and Intercalation
- Metal Organic Frameworks (MOFs)
- Fullerides, Graphene, and Nanorods

V. Introduction to Catalysis

- A. Homogeneous Catalysts
 - Basic Principles
 - Examples of the most Important Catalytic Reactions
- B. Heterogeneous Catalysts
- C. Hybrid Catalysts
 - Solid/Liquid Systems
 - Liquid/Liquid Biphasic Systems

The Americans with Disabilities Act (ADA) is a federal antidiscrimination 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 the Department of Student Life, Services for Students with Disabilities in Cain Hall, Rm. B118, or call 845-1637.

"An Aggie does not lie, cheat or steal, or tolerate those who do."