CHEMISTRY 4365 Inorganic Chemistry
UTEP SPRING SEMESTER 2006
GENERAL ANNOUNCEMENTS & SYLLABUS

Instructor: **Dr. Juan C. Noveron**
Location: Classroom Building 304, MWF 9:30 – 10:20 AM.
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1. Curriculum: Chemistry 4365 Inorganic Chemistry covers the fundamental principles of structure and reactivity of inorganic chemicals. The following topics will be covered:

1.Basic concepts of Inorganic Chemistry.
2. Nuclear properties
3. An introduction to molecular symmetry
4. Bonding in polyatomic molecules
5. Structures and energetics of metallic and ionic solids
6. Acids, bases and ions in aqueous solution
7. Reduction and oxidation
8. Non-aqueous media
9. Hydrogen
10. Group 1: the alkali metals
11. The group 2 metals
12. The group 13 elements
13. The group 14 elements
14. The group 15 elements
15. The group 16 elements
16. The group 17 elements
17. The group 18 elements
18. Organometallic compounds of *s*- and *p*-block elements
19. *d*-Block chemistry: general considerations
20. *d*-Block chemistry: coordination complexes
21. *d*-Block metal chemistry: the first row metals
22. *d*-Block metal chemistry: the second and third row metals
23. Organometallic compounds of *d*-block elements
24. The *f*-block metals: lanthanoids and actinoids
25. *d*-Block metal complexes: reaction mechanisms
26. Homogeneous and heterogeneous catalysis
27. Some aspects of solid state chemistry
28. The trace metals of life

2. Textbook: *Inorganic Chemistry*, Catherine Housecroft; 2nd Edition, Prentice Hall, 2004.

3. Grades: Letter grades will be assigned on the basis of your total number of points earned for the semester. The following activities will be used to evaluate performance:

(a) *Exams*: Three one-hour exams will be administered and only the top two scores will be credited. Each exam will carry a maximum of 100 pts.

(b) *Oral Presentation*: Each student will prepare a class presentation of 20 min. that discusses one article from the inorganic chemistry literature. The selected article requires the instructor approval. The maximum number of points for the presentation are 50 pts.

(c) *Literature Report*: Each student will submit a written report about a topic article from the literature. The maximum number of points for the report are 50 pts.

(d) *Homework*: Text-book based homework will be assigned weekly and collected before each exam. In-class exercises such as quizzes may be credited as homework.

(e) *Attendance and Notebook*: Attendance information will be collected in each class period. The maximum number of points for attendance and notebook is 50 pts.

(f) *Final Exam*: A comprehensive final examination at the end of the semester will be administered. The final exam is mandatory and has a maximum number of points of 200 pts.

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4. Tentative Schedule:

Week	Chapter	Week	Chapter
8/27	**1, 2**	10/8	**21**
9/4	**2, 3**	10/15	**22**
9/10	**6**	10/22	**23**
9/17	**7**	10/29	**25, Exam II**
9/24	**8, Exam I**	11/5	**28**
10/1	**10, 11**	11/12	**27**

Week	Chapter
11/19	Student Presentations
11/26	Student Presentations
12/3	**Review, Exam III**
12/12	**Final Exam 10 A.M.**

5. *Inorganic Chemistry* is structured in four sections:

I Basic concepts – ***Chapter 1*** forms a review base for fundamental principles.

II Physical inorganic chemistry – ***Chapters 2-8*** cover:

- nuclear properties, including an introduction to the routine use of NMR spectroscopy with nuclei having $I \geq 1/2$;
- an introduction to molecular symmetry, group theory and vibrational modes of simple molecules;
- bonding in polyatomic molecules, using VB and MO theories;
- structures and energetics of metallic and ionic solids, including packing of spheres, basics of band theory and semiconductors, a survey of common structure types, Born-Haber cycles, Born-Landé equation and related formulae, applications of lattice energies, Frenkel and Schottky defects;
- acids, bases and ions in aqueous solution, including sparingly soluble salts, common ion effect, stability constants;
- reduction and oxidation with detailed discussion of *E*o values and thermodynamic relationships, Nernst equation, dependence of *E* on factors such as pH and complex formation, potential diagrams and Frost-Ebsworth diagrams, Ellingham diagrams;

III ***Chapters 9-24*** – Descriptive chemistry of the elements and principles of coordination chemistry. The treatment of the chemistry of inorganic elements is organized in a fairly traditional manner, with chapters covering:

- Hydrogen
- Group 1: the alkali metals
- The group 2 metals
- The group 13 elements
- The group 14 elements
- The group 15 elements
- The group 16 elements
- The group 17 elements
- The group 18 elements
- Organometallic compounds of *s*- and *p*-block elements
- *d*-Block chemistry: general considerations
- *d*-Block chemistry: coordination complexes
- *d*-Block metal chemistry: the first row metals
- *d*-Block metal chemistry: the second and third row metals
- Organometallic compounds of *d*-block elements
- The *f*-block metals: lanthanoids and actinoids

IV ***Chapters 25-28*** consist of four special topics, each designed to form the basis of a teaching module:

- *d*-Block metal complexes: reaction mechanisms;
- Homogeneous and heterogeneous catalysis which includes details of selected industrial processes;
- The trace metals of life which covers metal storage and transport, dealing with O_2, biological redox processes, and Nature's Lewis acids.