Brooklyn College
Inorganic Chemistry (Chem 4760)

Textbook: (Available at Brooklyn College Bookstore)
Inorganic Chemistry, Gary L Miessler and Donald Tarr, 5th Ed, Pearson – Prentice Hall (2013)
Solutions Manual for Inorganic Chemistry (Miessler & Tarr) - Inorganic/organic molecular models

Other recommended books:
-*Inorganic Chemistry*, Catherine E. Housecroft and Alan G. Sharpe, 4th Ed., Pearson – Prentice Hall (2012)
-*Shriver and Atkins Inorganic Chemistry*, 5th Ed., by Atkins Overton, Rourke, Weller, Armstrong, and Hagerman; Freeman (2010) – *Note: 6th Edition will be available in January 2014*
-Molecular Symmetry and Group Theory by Alan Vincent, Wiley, 2nd Ed. (2001)

Laboratory Component: No textbook required. Your instructor will provide the necessary handouts with background information and instructions for each experiment

Grading: The final grade will be determined as follows: 4 tests, 20% each; 7 Lab reports, 20%

No make-up tests will be given except in documented cases of medical emergency.

Reading
•This is an **advanced course** and students are expected to do a lot of work on their own. Lectures may not cover all the contents in the textbook as listed below, but you will be expected to know the assigned material. Questions and discussion during the lectures are strongly encouraged. If you have difficulties, make use of office hours.

•A lot of material will be covered in this course. Keep up-to-date. Read appropriate sections in the textbook before the lectures.

Typical lecture schedule

Unit 1 (Lectures 1-2)
- *Chapters 1-3.* Introduction to inorganic chemistry. Revision of basic concepts of atomic theory, periodic trends, and simple bonding theories.

Unit 2 (Lectures 3-6)
- *Chapter 4.* Symmetry and group theory. Applications to vibrational spectroscopy.

Unit 3 (Lectures 7-12)
- *Chapter 5.* Molecular orbitals: general principles. Homonuclear diatomic molecules. Heteronuclear diatomic molecules. Larger molecules.
- *Chapter 6. Sections 6.2 and 6.3*. Frontier orbitals and acid-base behavior. Hydrogen bonding. Hard-soft acid-base interactions.

Unit 4 (Lectures 13-17)
- *Chapters 9-11*. Coordination chemistry. Nomenclature, isomerism, coordination numbers and geometries. Electronic structure. Ligand field theory. Electronic spectra. Reactions and mechanisms.

Unit 5 (Lectures 18-20)
- *Chapter 7.* The crystalline solid state. Simple structures. Thermodynamics of ionic crystal formation. Superconductivity. Defects. *Chapter 7, Section 7.3.* Molecular orbitals and band structure of solids. Diodes, the photovoltaic effect and light-emitting diodes. Quantum dots.

Unit 6 (Lectures 21-25)
- *Chapters 13*. Elements of organometallic chemistry and catalysis.
- *Chapter 15*. Bioinorganic and environmental chemistry.

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Laboratory Component

Typical Schedule of Experiments

Week	Experiment
1	Check-in and general discussion.
2	**Expt. 1 (part 1)**: Solid state chemistry: synthesis of a zeolite
3	**Expt. 1** (**part 2**): Synthesis of a zeolite (cont.)
4	**Expt. 2**: Synthesis of $PdCl_2(NCPh)_2$. FTIR spectroscopy and group theory analysis
5	**Expt. 3**: Exercises in VSEPR/MO theory (computational lab)
6	**Expt. 4 (Part 1)**: Synthesis of *cis*-diamminedichloroplatinum(II) (cisplatin)
7	**Expt. 4 (Part 2)**: Interaction of cisplatin with DNA (thermal denaturation method)
8	**Expt. 5**: Magnetic susceptibility measurements: Evan's magnetic balance and NMR method.
9	**Expt. 6**: Electronic spectra of transition metal ions in solution. Use of Tanabe-Sugano diagrams
10	**Expt. 7 (part 1)**: Synthesis and FTIR spectrum of $RuHCl(CO)(PPh_3)_3$
11	**Expt. 7 (part 2)**: Synthesis and FTIR spectrum of $[RuH(CO)(NCCH_3)_2(PPh_3)_2]PF_6$
12	**Expt. 7 (part 3)**: ^{1}H and ^{31}P NMR spectra of $RuHCl(CO)(PPh_3)_3$ and $[RuH(CO)(NCCH_3)_2(PPh_3)_2]PF_6$
13	**Expt. 7 (part 4)**: Catalytic hydrogenation of benzaldehyde by use of $[RuH(CO)(NCCH_3)_2(PPh_3)_2]PF_6$. Gas uptake measurements and calculation of turnover frequency.
14	Check-out