**Relationship to other courses:**
The pre-requisite is CHEM.420. Chemistry Seniors would normally also register for Inorganic Lab (CHEM.425) this quarter. CHEM422 is co- (or pre-)required for CHEM.425.

**Planned Course Content.**

*Background to some experimental methods.*
- Optical spectra; sums & products of representations: spin & symmetry selection rules (simple doublet states); CT transitions.
- Introduction to inorganic electrochemistry: potentiometric measurements, (cyclic) voltammetry.

*Kinetics of substitution at T.M. centres:*
- Lability & inertness. Mechanism: associative, dissociative, interchange; Experimental aspects.
- CFAE and other ligand effects. Solvolysis, anation. Square-planar associative, trans-effect.

*Organometallic and other low oxidation-state compounds:*
- The Eighteen-Electron Rule; Simple carbonyls; MO's for complexes with $\pi$-bonding.
- Complexes with alkenes, 16e rule, alkynes, dienes; allyls, metallacenes, arenes, fluxionality.
- Phosphine complexes, cone angle.
- Nitrosyl complexes; Metal alkyls, metatheses; Oxidative addition.

*Combinatorial Chemistry:*
- Elementary parallel and combinatorial approaches to inorganic synthesis; screen and array concepts.

*Biological examples.*
- Porphyrins as synthetic & natural macrocycles. Oxygen transport: hemocyanin & myoglobin; other small molecule binding by Mb, Hb.

**Text Sources:**
3) Lecture notes will be available.

**Objectives:** Be able to decide whether electronic and vibrational transitions are allowed or forbidden in simple cases. Distinguish amongst various types of electronic transitions in metal complexes. Determine potentials from voltammograms, predict the directions of redox
reactions from \( E^\circ, E_f, E_{1/2} \) data. Be able to correlate symmetry-based MO schemes for molecules with models for synergic \((\sigma, \pi)\) bonding in complexes of unsaturated ligands; use the 18e rule to correlate with molecular stability/reactivity; appreciate the possibilities for, modes for, and consequences of binding of unsaturated acyclic hydrocarbon centres to transition metals; know about binding modes for, and how to correlate structure and composition with 1-electron counting rule formulations for cyclopentadienyl and other \( \pi \)-arene and NO complexes, including a metalloocene MO scheme. Be able: to correlate steric effects for ligands in relationship to their cone angle values; to devise synthetical pathways for organometallic species; to predict the products of oxidative addition reactions. Appreciate the general and specific mechanistic properties of metal complexes with respect to ligand substitution reactions; understand how the various types of experimental results relate to the different mechanistic conclusions; be able to predict whether given metal centres are inert or labile. Appreciate various essential or undesirable rôles of metals in biological chemistry; know modes by which structural differentiation amongst metal-containing active sites is effected and how it steers metalloprotein function.

Other stuff:  Work on the problem sets when I provide them ! Attempt to solve the homework problems as soon as we have covered the material in class. If you do not do the homework, you will find it hard to pass the exams, and virtually impossible to get a good grade. Your grade is based on the (usually three) exams: two midterms (15%, 25%) plus a final exam (60%). If you are not registered in the course, no midterms or quizzes will be graded or returned.

The 10-Minute Rule: If I'm more than ten minutes late, consider the class cancelled. If you are going to be more than ten minutes late for a class, please don't enter without prior arrangement.

Much communication about exams, problem sets, etc., will be by Email. In accord with Drexel's March 2001 rules, I'll try to use your Drexel Email address. As usual, it's your responsibility to make sure that I have a correct and fully functional Email address for you for this quarter.

Make-Up Exams ?
You don't need an excuse to take the make-up exam if you miss a midterm or final. But you must then attend the make-up at the designated time and place or take a zero on it - no excuses. The required final exam will likely be on Monday June 7th. The make-ups will be held shortly thereafter - on the 9th or 10th. Tentative midterm dates are April 27th & May 25th. Graduating Seniors might wish to review the university policies on Final Examinations and Senior Privilege (on page 5 at http://www.drexel.edu/Studentlife/Downloads/03_04Drexel_Handbk_Web.pdf)

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