

COLLEGE OF CHEMISTRY COURSE GUIDE (../INDEX.HTML)

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CHEM 201 - FUNDAMENTAL CONCEPTS IN INORGANIC CHEMISTRY (1 UNIT)

COURSE OVERVIEW

SUMMARY

This course is the first part of a three part series (Chem 201/250A/251A) that first year graduate students must take as a review of some of the basic concepts underpinning inorganic chemistry (notably with an omission of chemical applications of group theory, which is covered in Chem 250A). Undergrads may take this course with instructor permission (email the professor), and several usually choose to do so each year.

PREREQUISITES

CHEM 104A (chem104a.html) and CHEM 104B (chem104b.html)

You need consent of the instructor to take the class.

TOPICS COVERED

- Atomic Orbitals and Properties, Relativistic Effects, Periodic Trends
- Ionic Solids, Simple Bonding Schemes, Valence Bond Theory
- Molecular Orbital Theory (Diatomic and AH_n molecules), Photoelectron Spectra, Walsh Diagrams, Isolobal Analogy
- Octahedral ML_6 Complexes, π -bonding, Electronic absorption spectra
- Jahn-Teller Effect, Other ML_n complexes, Crystal Field Theory
- Stability constants, Acid-base reactions (HSAB), Chelate effect

- Lability, Basic chemical kinetics, Ligand substitution reactions and mechanisms
- Stereochemical Rigidity (Fluxionality and linkage isomerism), Electron Transfer Reactions (Inner- and Outer-Sphere)

WORKLOAD

COURSEWORK

- 4 Problem Sets (30%)
- Final Exam (70%)

TIME COMMITMENT

3 hours of lecture per week. Problem sets are lengthy and may take 5-6 hours each.

CHOOSING THE COURSE

WHEN TO TAKE

The class is predominantly taken by first-year graduate students with some junior and senior undergraduates. You should take Chem 104A and 104B before taking this class. However, this class offers a good review of the material covered in both Chem 104A and Chem 104B, so don't worry if you're not completely solid on everything covered in those classes.

WHAT NEXT?

- CHEM 108 – Inorganic Chemistry Lab ([chem108.html](#))
- CHEM 250A – Molecular Symmetry and Chemical Applications of Group Theory ([chem250a.html](#))
- CHEM 251A – Coordination Chemistry I ([chem251a.html](#))
- Chem 251B – Coordination Chemistry II (occasionally offered)

ADDITIONAL COMMENTS AND TIPS

The recommended textbooks for this course are DeKock and Grey's *Chemical Structure and Bonding*, and Cotton and Wilkinson's *Advanced Inorganic Chemistry*. You shouldn't need either to complete the problem sets. DeKock and Grey is an okay textbook, but I wouldn't trust the later chapters (especially the last one). Annoyingly, it is not available as a PDF from online sources. Cotton and Wilkinson is more of a reference textbook, and has much more detail than is necessary to understand the material.

Personally, I've found that the textbooks I used in Chem 104A/B (Miessler & Tarr, Shriver & Atkins, and Housecroft & Sharpe) were more useful as references. And I would highly recommend finding a PDF or hard copy of Albright, Burdett and Whangbo's *Orbital Interactions in Chemistry* – this has examples of almost every molecular orbital diagram you'll ever need to complete the problem sets in it, and Prof. Long frequently references it in lecture. The 1st edition may honestly be better than the 2nd, because the 1st edition is shorter and more straightforward.

When reviewing for the final exam, consult lecture notes, problem sets, then assigned readings, in that order. Material covered in lecture will be emphasized, although generally speaking the final exam is easier than the problem sets.

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COLLEGE OF CHEMISTRY PEER SERVICES

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