

Topics in Inorganic Chemistry

CHMD39H3

Syllabus

The major goal of this course is to serve as a review of important concepts in (inorganic) chemistry and introduce new material on the borderlines of the discipline. This year the course will focus on **unusual stuff** – the advanced aspects of synthetic and structural inorganic chemistry. The ‘unusual’ aspects cover: elements (the chemistry and properties of artificial elements), oxidation states (extremes from thermodynamic stability), structures (deviations from expected and common) and ligands (various types of designer ligands and ligands with unusual atoms). Some of the topics covered are:

1. **NEW material:** Understanding published crystallographic data (crystallography vs. molecular structure; reading the data tables, using Cambridge Crystallographic Data Centre database – new material)
2. Synthesis and applications of “usual” metal complexes:

This part will cover:

- a. Oxidation states of d-block elements (a review from CHMC31Y3 material – expected knowledge)
 - b. Geometries of coordination compounds (a review of CHMC31Y3 material – expected knowledge)
 - c. Bonding in coordination compounds (a review of CHMC31Y3 and more advanced cases)
 - d. What is ‘unusual’? (mostly new material)
 - e. Concept of “starting material” in inorganic chemistry synthesis (mostly new material)
3. Structural analysis: NMR, IR and UV-Vis spectroscopies in more detail (as much as we can include in the discussion and as needed to understand the material)

The topics will include:

- a. More advanced topics in NMR techniques
- b. Detailed IR analysis

- c. UV-Vis spectroscopy of non-octahedral complexes
- d. Relating all structural and analytical data to identify most likely structure of a compound.

This is a broad list of topics, but each lecture is going to discuss more specific cases taken from the literature (new and old). The strict list of topics covered lecture by lecture will not be provided in order to maintain the flexibility of the course and allow for free discussion.

For each topic there will be a very short handout available on the blackboard outlining the required readings, suggested readings, lecture goals and questions that go beyond the material covered. As you could expect, this course does not have a textbook (although your CHMB31/C31 textbook is still useful as a background source). Most of the readings are available on-line. The relevant lecture notes from CHMB31 and CHMC31 will be re-posted on CHMD39 site (just in case you 'lost' them...). Other listed readings you will have to locate through the UofT library catalogue. You are encouraged to research beyond the provided lists.

Note: Only the lectures with new material (for example, the second lecture on crystallography) will have PowerPoint presentation, others will be more seminar- and discussion-based, and focused on the readings.

Really important stuff:

For you to be able to participate, follow and meet the requirements of this course, it is absolutely essential for you to prepare in advance – read the materials provided on the blackboard well ahead of the lecture, and write down the questions you have.

Evaluation components:

Preparation for the class and participation: 15%

Assignments: 25%

Short presentation based on assignments: 20%

Final exam: 40%

Preparation/participation: One of the overall goals of this course is to make you review, question and re-think the material covered in earlier courses (starting from high school science classes). This prior knowledge is expected and fundamental for understanding of the in-class material. This part of evaluation will look at your ability to ask questions and navigate through old and new and make relevant connections through discussions. Of course, to be able to do this, it is essential to prepare for the class!

Assignments: During our first lecture, you will be given the assignment and detailed instructions. The assignment is scaffolded in several steps and each step will have its due date. In short, each one of you will be assigned complex compounds and your task will be to research their synthesis, structural properties, write-up your research and then present it in class.

Short presentation. The presentations will be scheduled in class at the end of the course. The presentation schedule will be posted at least one week before the presentations start.

Final exam. Our final exam will be scheduled outside regular class hours. You will be given one full paper or two related communications which you have to read and answer the exam questions based on the paper(s).

Office hours and contact info

My office is located in the new environmental sciences and chemistry building (behind the Instructional Center), 5th floor, room EV564. The office hours schedule will be posted on the Blackboard portal (under 'Contact') prior to the start of the semester. If you would like to see me outside the office hours (for any reason), please e-mail me and we'll schedule the time. You can pay me a visit before the semester starts and before announcement of the regular office hours.

I can also be reached via e-mail: ahadzovic@utsc.utoronto.ca.

Academic Integrity

Academic integrity is one of the cornerstones of the University of Toronto. It is critically important both to maintain our community which honors the values of honesty, trust, respect, fairness and responsibility. It also protects you, the student within our community as well as the value of the degree towards which you are all working so diligently. Detailed information about how to act

with academic integrity, the Code of Behavior on Academic Matters, and the processes by which allegations of academic misconduct are resolved can be found online: <http://www.artsci.utoronto.ca/osai/students> and

http://www.utsoc.utoronto.ca/~vpdean/academic_integrity.html

Section B of the University of Toronto's Code of Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>) lists actions that are considered academic offences. Some of the most common offences are:

- To use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks, i.e. to commit **plagiarism**.
- To include **false, misleading** or **concocted** citations in their work.
- To obtain **unauthorized** assistance on any assignment.
- To provide **unauthorized** assistance to another student. *This includes showing another student completed work.*
- To submit their own work for credit in **more than one course** without the permission of the instructor.
- To **falsify** or **alter** any documentation required by the University. This includes, but is not limited to, doctor's notes.
- To use or possess an unauthorized aid in any test or exam.

There are other offences covered under the Code, but these are by far the most common. Please respect these rules and the values which they protect. Offences against academic integrity will be dealt with according to the procedures outlined in the Code of Behavior on Academic Matters.

GOOD LUCK AND SEE YOU SOON!!

AH