

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. As such the content is broad and varied. This year the course theme is "On Hydrogen,"—everything that we do and talk about will contain hydrogen and its chemistry in one form or another. The topic will include:

1. Hydrogen and history of chemistry (including accounts of science in general)
2. Hydrogen and the birth of elements (a more detailed look at the first steps of nucleosynthesis and radioactivity in general)
3. Hydrogen and astrochemistry (including a glimpse at the Schrödinger equation)
4. Hydrogen and electronic structure (yet another glimpse at the Schrödinger equation)
5. Hydrogen and industry (a detailed look at the production of syn gas and intro to chemical industry)
6. Hydrogen and molecular orbital theory (going beyond the basics)
7. Hydrogen and molecular structure (a brief look at X-ray crystallography)
8. Hydrogen and hydrogen bond (what on Earth is hydrogen bond?)
9. Hydrogen and NMR (more on proton NMR in inorganic chemistry)
10. (Di)hydrogen vs. (di)hydride complexes of transition metals (a more in-depth look)

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. Those books/articles that are listed as readings but are not available on-line are placed on a short-term loan for CHMD39 in UTSC library. Otherwise, little material will be provided in terms of lecture notes in this course. You are encouraged to research beyond the provided lists.

The list might look like a slapdash collection of topics that your instructor dreamt up during a delirium, but as you will see each topic leans on the one before (more-or-less). Thus, if we do not cover all material during one lecture, we can easily move the 'leftovers' to next week or discussion board on blackboard. It will also demonstrate what is expected from you in the evaluations.

Evaluation components:

Assignments: 2 x 10%

Paper (on selected topic): 20%

Short presentation (on above paper): 20%

Discussions: 10%

Final exam: 30%

The assignments. For each of two assignments you will have to write a short summary (or 'review') of three or more assigned articles/book parts (those will be given in the assignment). The length of summary depends on the number of assigned articles and topic and will be communicated to you in the assignment. On top of this—I consider everything to be a fair game (calculations, reactivity, etc.) at this level and in this course type.

Paper/short presentation. The list of potential paper and presentation topics will be available on the blackboard. You can pick a topic from the list or you can come up with your own topic as long as it deals with hydrogen and inorganic chemistry; make sure, however, to check with me if the topic is

acceptable! Each topic on the list contains an outline of what is required and what to focus on as guidelines. Your paper should be concise, about 7-8 pages in length with 5-7 sources used (as current as possible!). You will have a 10 minute presentation followed by Q&A. 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.

Discussions. 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.

Final exam. Our final exam will be cumulative and scheduled outside regular class hours. The exam questions will be integrative, i.e. would cover more than one topic listed above, because (again) you have to show the ability to relate two or more complex concepts in one coherent answer. Keep in mind that you are not supposed to be experts in all the topics above; rather you have to be able to comfortably navigate through material that could usually be found in different courses. A good hint: look at the questions at the end of lecture hand-outs; some of them 'might' appear on the final.

GOOD LUCK AND SEE YOU SOON!!

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