Advanced Inorganic Chemistry

(Fall 2020)

CHEM 3313/710 (TF 12:15 PM-1:30PM)

Instructor: Prof. Guoxiang (Emma) Hu, Guoxiang.hu@qc.cuny.edu

Office hours: Fri, 3:00-5:00 pm in Blackboard Collaborate

Course description: This course will discuss periodic trends across the entire periodic table in the category of acid-base chemistry, coordination (complex-ion) chemistry, precipitation chemistry, and oxidation-reduction chemistry. Principles that help explain these trends in chemical reactivity will also be discussed. Symmetry and molecular orbital theory will be introduced after you have developed an understanding of fundamental trends across the periodic table, which allows molecular orbital theory to be more broadly applied in subsequent chapters. This course is not only to chemistry students, but also to other professionals in other fields of science in which inorganic chemistry has become important. There is no physical chemistry prerequisite, but a background in General Chemistry, and enrollment in a Foundations of Organic Chemistry course are assumed.

Students who participate in this class with their camera on or use a profile image are agreeing to have their video or image recorded solely for the purpose of creating a record for students enrolled in the class to refer to, including those enrolled students who are unable to attend live. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who unmute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live.


Other suggested references: Inorganic Chemistry by Catherine Housecroft; Inorganic Chemistry by Mark Weller, Tina Overton, Jonathan Rourke, and Fraser Armstrong
**Attendance:** You are required to attend class and arrive on time. Excessive absences and tardiness will affect your grade.

**Homework:** Homework will be given in class and on BlackBoard/Teams. Homework are usually due in one week and at the beginning of the class. Late homework, for example homework turned in at the end of the class, will not be accepted. *Examinations may be based on the homework!*

**Examinations:** You will have one mid-term and one final examination. Make-ups are discouraged. Mid-term exam will cover the material for Chapter 1-6, with 16% from each chapter. Final exam will be comprehensive with 15% from Chapter 1-6, and 85% from Chapter 7-12 (with 14% from each chapter).

**Grading and evaluation:**

The grade is a 10 point grade scale with minimal minus grades:

- A+ (96%-100%), A (90%-95%)
- B+ (86%-89%), B (80%-85%)
- C+ (76%-79%), C (70%-75%), C-(66%-69%)
- D (50%-65%), F (below 50%)

The evaluation is based on:

- Participation (5%) + Homework (12x5%=60%) + Mid-term (15%) + Final (20%)

**Academic honesty:** Plagiarism or any other form of cheating is not tolerated. The student perpetrating such an act will receive zero for the assignment in question and a warning and/or referral to the Chairman and/or the Dean, along with other possible penalties, including automatic failure of the course.

**Topics and tentative course schedule** (roughly one chapter/week):

- Chapter 1 (09/01-09/04): Periodic Trends in Fundamental Properties of Atoms and Simple Ions
- Chapter 2 (09/08-09/11): Monatomic Ions and Their Acid–Base Reactivity
- Chapter 3 (09/15-09/22): Polyatomic Ions: Their Structures and Acid–Base Properties
- Chapter 4 (09/25-10/02): Ionic Compounds in the Solid State, in Minerals, and in Solution
- Chapter 5 (10/06-10/09): Trends in Coordination Equilibria
- Chapter 6 (10/13-10/16): Principles of Oxidation–Reduction Reactivity
- **10/20: Mid-term**
- Chapter 7 (10/27-10/30): Introduction to Transition Metal Complexes
Chapter 8 (11/03-11/06): Oxides and Silicates as Materials

Chapter 9 (11/10-11/13): The Underlying Reasons for Periodic Trends

Chapter 10 (11/17-11/24): Symmetry

Chapter 11(12/01-12/04): Molecular Orbital Theory: A Bridge Between Foundational and Advanced Inorganic Chemistry

Chapter 12(12/08-12/1111/16): The Elements as Molecules and Materials

12/15: Final