

CHEMISTRY OF THE ELEMENTS

CHEM 2131

Spring 2020

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Lectures: Online. Video lectures will be posted on Canvas. Video lectures can be viewed at any time.

Study Session and office hours: I will be available on Zoom on Tuesday's 11:00 to 11:45 AM. Additional help will be available on request.

Text: There is no specific textbook for my class since books are simply for reference. However, the official text for this class is "Chemistry, The Molecular Nature of Matter and Change" by Silberberg. Material covered in this course can be found in textbooks like **General Chemistry, Inorganic Chemistry, and Coordination Chemistry or internet**. *You will be responsible for researching the topics covered in the lectures.*

Course Overview: Chemistry is an experimental science and all the theories and concepts that the students learn in the lectures originated from attempts to explain experimental observations. Chemistry is learned through understanding not memorization. The reason many people find chemistry difficult is because they do not fully understand the fundamental concepts. Chemistry in general is an ever-expanding area of science and is pivotal in developing the logic and reasoning skills that are essential for the understanding reactions in chemistry and biology. This demands a higher level of thinking and the purpose of this course is to provide students with an in-depth knowledge of the principles and applications of chemistry. I do not believe in any gimmicks like clickers or online homework, they simply **do not enhance** student understanding of chemical concepts. Chemistry is about how well you can apply concepts to solve real life problems, not how well you can do exam problems.

Exams will be administered Online:

- a) There will be two one-hour exams and a two-hour final exam. Your final grade for the course will be determined by your performance in **all the three exams**. If your score in the final exam is higher than any of the scores in the one-hour exams, the final exam score will replace the lowest score.
- b) Exams are essay type(written) and time limited. You must complete the exam in one sitting within the allocated time. You can view only one question at a time and the timer will start once you start the exam. Once you submit the answer to a question it will be locked.
- c) **All exams will be comprehensive encompassing lecture materials. The exams are designed to test your ability to apply the concepts covered in the lecture.**

Grading:

The breakdown of the course grades is as follows:

Exam 1	200 points
Exam 2	200 points
Final Exam	200 points
TOTAL	600 points

Power Point Presentations of the lecture topics will be made available under File section of Canvas. The power point presentations are just prelude to the extensive and detail coverage of the topics in the lectures. You need to view the lectures to get a good understanding of the concepts covered. **The exams will cover everything that is covered in the lecture.**

Tentative Schedule of Lecture Topics

Date	Day	Topic
3/30 4/1	M W	Acids and Bases <ul style="list-style-type: none"> Lowry-Bronsted concept, acid-base equilibrium, strengths of acids and bases Lewis theory, HSAB concept, coordinate covalent bond
4/3 4/6 4/8 4/10 4/13 4/15 4/17	F M W F M W F	Introduction to Coordination Chemistry <ul style="list-style-type: none"> Nomenclature, coordination number Ligands and Structure Structure and Isomerism Bonding Theories and Properties
4/20	M	Exam 1 (50 minutes), available from 9:00 AM till 5:00 PM.
4/22 4/24 4/27 4/29 5/1	W F M W F	<ul style="list-style-type: none"> Bonding Theories and Properties <ul style="list-style-type: none"> Crystal Field Theory, spectrochemical series, Crystal Field Splitting Energies, stable and inert. Rates and Mechanisms Applications of Complexes.
5/4 5/6 4/8 5/11 5/13 5/15	M W F M W F	Solid State Chemistry <ul style="list-style-type: none"> Metallic bond and band gap, intermolecular forces Solid State Structures - crystal lattices and unit cells Solid State Structures - closest packing and unit cell dimensions Ionic Bond
5/18	M	Exam 2 (50 minutes), available from 9:00 AM till 5:00 PM.
5/20 5/22 5/25 5/27 5/29	W F M W F	Oxidation and Reduction <ul style="list-style-type: none"> Oxidation Numbers and Redox Reactions Electrochemical cells, Half Reactions and Reduction Potentials Electrode and Cell Potential, Thermodynamics of cells.
6/1 6/3 6/5	M W F	Chemistry and the Environment <ul style="list-style-type: none"> Chemistry of the stratosphere <ul style="list-style-type: none"> Ozone generation and depletion Chemistry of the troposphere <ul style="list-style-type: none"> Greenhouse effect, Photochemical Smog
6/9	Tue	FINAL EXAM (2 hours), available from 9:00 AM till 5:00 PM.