

Chemistry 4610 Inorganic Chemistry Spring 2022



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**and by appointment

Course Information

Class: Chem 4610 (CRN 10178 - 3 credit hours)
Meeting Time: Tu/Th 11:00 am – 12:15 pm
Room: TLC 2105

Course Description

The wave nature of electrons is applied to atomic structure and periodic trends. Inter and intramolecular bonding models are used to interpret the chemical and physical properties of various materials, from simplistic diatomic molecules to structurally complex molecular and ionic systems. Thermodynamic principles are used to determine the relative stability of inorganic compounds.

Required Textbook:

Housecroft and Sharpe, *Inorganic Chemistry* 5th ed. Pearson, 2018.

Other Recommended Texts for Further Reading:

Weller, Overton, Rourke, and Armstrong, *Inorganic Chemistry* 7th ed. Oxford University Press, 2018.

Miessler, Fischer, and Tarr, *Inorganic Chemistry* 5th ed. Pearson, 2013.

Learning Outcomes

1. Students will apply models of atomic structure and chemical bonding to explain the physical properties and reactivities of inorganic systems.
2. Students will critically read the chemical literature to understand how the scientific method has been applied to answer research questions in inorganic chemistry.
3. Students will synthesize chemical results and communicate them in their own words to peers.
4. Students will relate principles of inorganic chemistry to modern technological challenges.

Course Assessment

Students' progress towards mastery of the learning outcomes will be tracked and assessed via:

Lecture Attendance [Outcome 1, 2, 4]

Lectures will develop key concepts from fundamental principles and apply them to topics in inorganic chemistry, so **lecture attendance is mandatory**. Arriving to class **more than ten minutes late** will result in you being counted as absent. You will be allowed **two free absences** without a point reduction. Additional absences will result in a point loss *except* in the case of an emergency where **official documentation** can be provided. Powerpoint slides will be made available prior to each lecture to facilitate preparation and note taking. Recording of lectures is permitted.

Homework [Outcome 1, 2, 4]

Homework allows for the reinforcement of key concepts and feedback between student and instructor. Homework assignments will be posted on a weekly basis on CourseDen and will be **due at the beginning of class** as indicated on the schedule. Homework assignments should be handed in in-person and all work must be shown to receive full credit for the assignment.

Literature Review Project [Outcome 2, 3, 4]

As a professional in the sciences, you will be routinely called upon to synthesize the literature of a given topic to create a picture of the current state of the field and the directions it is moving in. To practice this skill, you will analyze a set of related papers published in the past few years by a prominent researcher in the field.

You will write a five-page, double-spaced written review of the chosen set of articles. You should include a brief introduction to the research topic in general, a description of the results of the articles, a discussion of the common themes and findings between your sources, and an outlook on the future directions of the topic. This summary should be clear, concise, and written to introduce a peer to the topic. Remember that good review articles provide *connections* and *perspective*.

Topic Choice (Jan 20) – Five topics relevant to modern inorganic chemistry have been selected by your instructor. For each topic, a prominent researcher in the field has been chosen along with three of their recently published articles. You will choose one of these topics and base your paper around the associated articles. There will be a limit to five students per topic choice.

Article Analysis (Feb 3, Feb 17, March 3 10% each) – You will complete a worksheet for each of your three articles to identify and organize key information.

First Draft (March 31; 20%) - This needs to be a **complete** written draft of your paper following the same guidelines as used for the final draft.

Peer Review (April 14; 10%) – You will use a common rubric to review the first draft of another student that has written on the same topic as you. Your anonymous comments will be returned to the author to help them in their revision.

Final Draft (May 3; 40%) - The final draft will be graded for content, structure, perspective, and incorporation of feedback.

Midterm Exams [Outcome 1]

Three, 75-minute midterm exams will be given that include a mixture of multiple choice, short answer, and worked problems. These will not be comprehensive, so Exam 2 will not cover material tested on Exam 1. **Non-graphing calculators** are permitted, but calculator applications on phones, tablets, laptops, or other electronic devices are *not* permitted.

Final Exam [Outcome 1]

The ACS Inorganic Chemistry Exam will be given as the final exam for this course at the time specified by the UWG Registrar. This comprehensive exam is comprised of 60 multiple choice questions that will need to be completed in 110 minutes. A **non-graphing calculator** is allowed on this exam.

Grading Scale

A	90 – 100
B	80 – 89
C	70 – 79
D	60 – 69
F	0 – 59

Assessment Weighting

Attendance	10 %
Homework	15 %
Lit. Review	15 %
Midterms	15% each; 45 % total
Final Exam	<u>15 %</u>
	100%

Course Policies and Information

Alternative Education Arrangements (AEAs)

Students who fall into one of the [CDC categories](#) for being at higher risk for severe illness due to COVID-19 may request an alternative educational arrangement (AEA). Students must initiate AEA requests and all determinations will be completed by the Office of Accessibility Services (<https://www.westga.edu/student-services/counseling/accessibility-services.php>).

'Curving' Policy

If the average exam grade falls below 75%, exam grades will be adjusted or 'curved' using a linear scale to ensure an average exam grade of 75% and maximum exam grade no higher than 100%.

Extra Credit Policy

No extra credit will be accepted for this course

Late Assignment & Make-up Policy

Late assignments will receive a 10% point deduction per day late (e.g. an assignment due at 11:00 am on Tuesday and turned in at 3:00 pm on Wednesday will receive a 20% point deduction). Make-up assignments and exams will only be possible in the case of a documented emergency, and you should contact me within 24 hours if such an emergency arises. Make-up assignments should be completed and turned in within one week of the original deadline unless this is not allowed by the nature of the emergency. Arrangements for make-up exams will be made between myself and the student.

Student Conduct

Students are obligated to abide by conduct guidelines as described in the university catalog. Respect and courtesy of all students while in the classroom is required. The following are also mandatory:

1. Disruptive behavior will result in your expulsion from the room. If disruptive behavior persists you will receive a minimum of a one letter-grade deduction from your overall grade as well as possible additional action depending on the severity of the behavior.
2. All electronic devices must be silenced during lecture. Calls may only be answered in the case of emergencies by stepping out into the hall. Headphones are not permitted to be worn during lecture. **Laptops and tablets are permitted**, but if your use of these devices becomes disruptive their use will be disallowed for the remainder of the semester.

Please feel free to contact me with any questions regarding the above. Following "common sense" behavior should prevent any of the above problems. Failure to adhere to conduct guidelines could result in *dismissal from class, a course grade deduction, as well as further disciplinary action.*

University Policies and Academic Support

Please review the Common Language for all university course syllabi at the address: <https://www.westga.edu/UWGSyllabusPolicies/> . This document contains important information

regarding Academic Support, Online Courses, Honor Code, Email Policy, Credit Hour Policy, and HB 280 (Campus Carry). You should regularly review these statements because they are updated as federal, state, university, and accreditation standards change.

Academic Honesty

Any form of academic dishonesty—including but not limited to cheating or plagiarism—will result in a failing grade on the relevant assignment as well as possible additional action. Please be familiar with the definitions of academic dishonesty and plagiarism as laid out in the Student Handbook, which can be found at the link: <http://www.westga.edu/handbook/>

Disabilities Act / Accessibility for the Course

If you are a student with a disability as defined under the Americans with Disabilities Act and require assistance or support services, please notify me and provide me with a copy of your packet from Student Services. The university will provide you with resources for any audio/visual needs that you may have with the learning management system or course content.

It is critical that you contact UWG Accessibility Services immediately to find out what accommodations are necessary so we can work together to facilitate your success in this class. Please consult the UWG Accessibility Services site <http://www.westga.edu/accessibility> or call (678) 839-6428 for more details regarding accessibility for this course.

Note on Syllabus Modifications

I reserve the right to modify this syllabus at any time during the course of the term, particularly with regards to course schedule. Students will be notified of all syllabus modifications. In a case where a substantial modification is required, I will reissue a revised syllabus.

Tentative Course Schedule

Month	Day	Lecture Topics	Reading	Assignments
Jan	11 Tu	History of Atomic Theory		
	13 Th	Mass Spec/Early Quantum	1.1 - 1.3, 4.5	
	18 Tu	Quantum Theory – Hydrogen	1.4 - 1.6	HW 1
	20 Th	Multielectron Atoms	1.7 - 1.10, 4.12	Topic Choice
	25 Tu	Simple Bonding Theory	2.1, 2.2, 2.4 - 2.8	HW 2
	27 Th	Symmetry & Point Groups	3.1 - 3.5	
Feb	1 Tu	Applications of Symmetry	3.6 - 3.8, 4.6	HW 3
	3 Th	Valence Bond & M.O. Theory	2.3, 2.7, 5.1 - 5.4	Article 1
	8 Tu	M. O. Theory Cntd.		HW 4
	10 Th	Exam 1		
	15 Tu	Structures of Metals	6.1 - 6.7	
	17 Th	Structures of Ionic Solids	6.10 - 6.12, 6.18, 4.11	Article 2
	22 Tu	Band Theory & Conductivity	6.8 - 6.9	HW 5
	24 Th	Ionic Bonding Acid/Base Equilibria	6.13 – 6.15, 7.1-7.7	
March	1 Tu	Coordination and Redox	7.11 – 7.13, 8.1-8.2	HW 6
	3 Th	Redox Contd. Non-aqueous solvents	8.3 – 8.5, 9.1 – 9.4	Article 3
	8 Tu	Coord. Cmpd Structure	2.9, 19.6 – 19.8	HW 7
	10 Th	Coord. Cmpd Bonding Theory	20.1 - 20.5	
	15 Tu	Coord. Cmpd. Bonding Contd.	20.11 - 20.13	HW 8
	17 Th	Exam 2		
	22 Tu	SPRING BREAK - NO CLASS	20.7 - 20.10, 4.9	
	24 Th	SPRING BREAK - NO CLASS		
	29 Tu	LS Coupling and Spectroscopy	20.6 – 20.7	
	31 Th	Spectroscopy Contd. Magnetic Properties	20.8 – 20.10	First Draft
April	5 Tu	Ligand Substitution Kinetics	26.1 - 26.4	HW 9
	7 Th	Charge Transfer Kinetics	26.5	
	12 Tu	Organometallics – Bonding	24.1 – 24.4	HW 10
	14 Th	Organometallics - Reactivity	24.8	Peer Review
	19 Tu	Homogeneous Catalysis	25.1 - 25.6	HW 11
	21 Th	Heterogeneous Catalysis	25.7 - 25.9	
	26 Tu	Bioinorganic Chemistry	29.1 - 29.5	HW 12
	28 Th	Exam 3		
May	3 Tu	<i>Reading Day</i>		Final Draft