

Inorganic Chemistry Syllabus (Chem 4210/6210)

Spring 2020 – Revised to Reflect On-Line Format Effective March 31, 2020

Prerequisite: Chem 2410

Professor: Dr. K.B. Grant, 423 NSC, (404) 413-5522, kbgrant@gsu.edu

Lecture: TTh 2:15 PM - 3:30 PM, Petit Science Center Room 233

Office Hours: Starting April 2nd, TTh 1:00 PM to 1:40 PM and by appointment.

Texts: "Inorganic Chemistry: **recommended**, "Inorganic Chemistry Fourth Edition" Catherine E. Housecroft and Alan G. Sharpe (2012); **required**, "Descriptive Inorganic Chemistry, Fifth Edition" Geoff Rayner-Canham and Tina Overton (2010).

Effective March 31, 2020, all lectures will be pre-recorded and made available to students immediately in advance of class time in the Inorganic Chemistry Kaltura Course Gallery in iCollege. All exams and quizzes will be administered on-line through iCollege on the dates and at the times indicated in the syllabus. Office hours will be by Zoom <https://zoom.us/>. Please sign up for Zoom now. The date of Exam 2 has been changed. Exam 3 has been eliminated and is replaced with a 100-point take-home writing assignment.

Tentative Lecture Schedule: This schedule is a general guide and **will be modified as needed.**

Date	Chapter	Topic	(Tu = Tuesday)
Jan 14 (Tu)	1 HS; 1 RC-O	atomic structure: Newton's Corpuscular Theory of Light, Bohr model, wave particle duality, Schrodinger's angular and radial distribution functions	
Jan 16	1 HS; 1 RC-O	atomic structure: Dirac equation, relativistic effects, ground state electron configurations, Aufbau and Pauli Exclusion Principles, Hund's Rule	
Jan 21 (Tu)	2 RC-O	nuclear chemistry: shell model of nucleus, magic numbers, radioactive decay	
Jan 23	2 RC-O	nuclear chemistry: fission, fusion, cold fusion	
Jan 28 (Tu)	1 HS; 2 RC-O	periodic trends: classification of elements, effective nuclear charge, atomic radius, ionization energy, electron affinity, Slater's rules	
Jan 30	6 HS; 4 RC-O	metallic bonding, inorganic materials: metal properties, electron sea model of metal bonding	
Feb 4 (Tu)		Quiz 1	
Feb 6	6 HS; 4 RC-O	metallic bonding, inorganic materials: band theory, semiconductors, superconductors	
Feb 11 (Tu)	6 HS; 4 RC-O	metallic bonding, inorganic materials: crystal packing, unit cells, alloys, network covalent	

Feb 13	6 HS; 5 RC-O	compounds, allotropes of carbon, fullerenes, nanoparticles ionic bonding: Arrhenius theory, properties, Coulomb's Law
Feb 18 (Tu)	6 HS; 5 RC-O	ionic bonding: ionic radii, melting points, polarization and covalency, hydrates
Feb 20	6 HS; 5 RC-O	ionic bonding: ionic lattice packing
Feb 25 (Tu)		Exam 1
Feb 27	6 HS; 5 RC-O	ionic bonding: ionic lattice packing, optical properties
Mar 3 (Tu)	6 HS; 6 RC-O	ionic bonding: thermodynamics, Borne-Landé Equation, Born-Haber Cycle
Mar 5	2 HS; 3 RC-O	covalent bonding: Lewis theory, formal charge and resonance
Mar 10 (Tu)	2 & 5 HS; 3 RC-O	covalent bonding: VSEPR theory, valence bond theory, electronegativity
Mar 12	2 HS; 3 RC-O	molecular orbital theory: diatomic and polyatomic molecules, ligand group orbitals, photoelectron spectroscopy
Mar 17 (Tu)		No Class – Spring Break.
Mar 19		No Class – Spring Break.
Mar 24 (Tu)		No Class – School Suspended.
Mar 26		No Class – School Suspended.
Mar 31 (Tu)	19 RC-O	coordination chemistry of d block metals: Werner's Coordination Theory, EPR, isomerism
April 2	7 HS; 19 RC-O	coordination chemistry of d block metals: counting <i>d</i> electrons, metal ion oxidation states, nomenclature
April 7 (Tu)		Exam II, on-line, complete on iCollege from 2:15 PM – 3:30 PM.
April 9	20 HS; 19 RC-O	coordination chemistry of d block metals: thermodynamics, HSAB Theory, chelate effect, 18-e Rule
April 14 (Tu)	20 HS; 19 RC-O	Crystal Field Theory: <i>d</i> orbitals, octahedral crystal fields
April 16	20 HS; 19 RC-O	Crystal Field Theory: back-bonding, color and magnetic properties, Jahn-Teller distortion
April 21 (Tu)	20 HS; 19 RC-O	Crystal Field Theory: tetrahedral and square planar crystal fields
April 23	20 HS; 19 RC-O	d block coordination complexes: absorption spectra, thermodynamics vs. kinetics, molecular orbital theory. 100-point writing assignment due. Send in Word format as an email attachment to kbgrant@gsu.edu by 5:00 PM on April 23rd.
April 30	Final Exam	Cumulative Final, on-line, complete on iCollege from 1:30 PM – 4:00 PM.

iCollege: Please access iCollege for on-line course materials. For technical support, please contact the IS&T Help Center at: help@gsu.edu, 404-413-HELP (4357), www.gsu.edu/help.

Office Hours: The Instructor will be available to meet with Students during scheduled office hours. Additional office hours will be arranged by appointment.

Academic Honesty: The Department of Chemistry follows Georgia State University's Policy on Academic Honesty. **Students are expected to be familiar with and to comply with this policy.** Here is a link to the Policy: <https://codeofconduct.gsu.edu/>. All tests taken must represent your individual, unaided efforts. The following are examples of academic dishonesty: (i) to use an unauthorized homework key to complete a graded homework assignment; (ii) to sign an attendance sheet for a Student that is absent from class; (iii) to receive or offer information during an examination; (iv) to use unauthorized supplementary materials during tests; (v) to commit plagiarism on examinations and graded homework assignments (*i.e.*, the act of presenting an individual's written work as one's own, without acknowledgment of the individual). Incidents related to academic honesty will be referred to the Chemistry Department Chair for appropriate action.

Writing Assignment (100 points): Students should write a paper on Crystal Field Theory that thoroughly explains all of the topics in the on-line class notes (octahedral, tetrahedral, and square planar crystal fields, factors that affect the magnitude of $10 Dq$, determining the magnitude of $10 Dq$, etc.). Chem 6210 students should include three additional Crystal Field topics from the scientific literature. The paper should include introduction and conclusion sections, references, and figures. ACS format should be followed at all times. Please run the paper through Grammarly prior to submission to correct spelling and grammatical errors and to eliminate passages of text that have been inadvertently paraphrased or plagiarized from the literature. <https://technology.gsu.edu/technology-services/it-services/training-and-learning-resources/grammarly/> Plagiarizing text from any published or unpublished source will result in a grade of zero for the assignment. Students are asked to submit the paper to the instructor as an email attachment in Microsoft Word format by 5:00 PM on April 23rd.

Grading: The grading scheme will be based on 500 points and will consist of three 100 point in-class exams, a 50 point in-class quiz, a cumulative final, homework quizzes (25 points), and attendance.

<u>Projected breakdown of points:</u>	Exam I	100
	Exam II	100
	Paper	100
	Quiz	50
	Attendance	25
	Homework	25
	<u>Final Exam</u>	<u>100</u>
	Total:	500 points

Projected grade cut-offs: A plus 96%

A	90%
A minus	88%

B plus	85%
B	75%
B minus	73%

C plus	70%
C	65%
C minus	63%

D	55%
F	less than 55%

Notes on Plus/Minus Grading: All Instructors have the option to award grades on a plus/minus scale. As per Departmental or College policy, Instructors decide on the criteria for the awarding of plus and minus grades. The following quality points are used to calculate GPAs.

A+:	4.30
A:	4.00
A-:	3.70
B+:	3.30
B:	3.00
B-:	2.70
C+:	2.30
C:	2.00
C-:	1.70
D:	1.00
F:	0.00
WF:	0.00

Student Accommodations: Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed accommodation plan and are responsible for providing a copy of that plan to Instructors of all classes in which an accommodation is sought.

Miscellaneous: Tuesday March 3rd is the last day to withdraw from a class and receive a "W". Please note that any Student who enrolled in the course **without having completed** the required course prerequisite could be withdrawn from the course on this date **if your class average is a C or lower**. Any Students falling into this category should make arrangements to meet with the course Instructor on or before Tuesday March 3rd.