

Inorganic Chemistry (Chem 4210/6210)

Spring 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: TBA

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).

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

<u>Date</u>	<u>Chapter</u>	<u>Topic</u>	(Tu = Tuesday)
Jan 14 (Tu)	1 HS; 1 RC-O	<u>atomic structure:</u> 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	<u>atomic structure:</u> Dirac equation, relativistic effects, ground state electron configurations, Aufbau and Pauli Exclusion Principles, Hund's Rule	
Jan 21 (Tu)	2 RC-O	<u>nuclear chemistry:</u> shell model of nucleus, magic numbers, radioactive decay	
Jan 23	2 RC-O	<u>nuclear chemistry:</u> fission, fusion, cold fusion	
Jan 28 (Tu)	1 HS; 2 RC-O	<u>periodic trends:</u> classification of elements, effective nuclear charge, atomic radius, ionization energy, electron affinity, Slater's rules	
Jan 30	6 HS; 4 RC-O	<u>metallic bonding, inorganic materials:</u> metal properties, electron sea model of metal bonding, band theory, semiconductors	
Feb 4 (Tu)		Quiz 1	
Feb 6	6 HS; 4 RC-O	<u>metallic bonding, inorganic materials:</u> superconductors, crystal packing, unit cells, alloys, network covalent compounds, allotropes of carbon, fullerenes, nanoparticles	
Feb 11 (Tu)	6 HS; 5 RC-O	<u>ionic bonding:</u> Arrhenius theory, properties, Coulomb's Law, ionic radii, melting points, polarization and covalency, hydrates	
Feb 13	6 HS; 5 RC-O	<u>ionic bonding:</u> ionic lattice packing, optical properties	

Date	Chapter	Topic	(Tu = Tuesday)
Feb 18 (Tu)	6 HS; 6 RC-O	ionic bonding: thermodynamics, Born-Landé Equation, Born-Haber Cycle	
Feb 20	2 HS; 3 RC-O	covalent bonding: Lewis theory, formal charge and resonance	
Feb 25 (Tu)		Exam 1	
Feb 27	2 & 5 HS; 3 RC-O	covalent bonding: VSEPR theory, valence bond theory, electronegativity	
Mar 3 (Tu)	2 HS; 3 RC-O	molecular orbital theory: diatomic and polyatomic molecules, ligand group orbitals, photoelectron spectroscopy	
Mar 5	3 HS; 3 RC-O	molecular symmetry: symmetry operations	
Mar 10 (Tu)	3 HS; 3 RC-O	molecular symmetry: point groups, vibrational spectroscopy	
Mar 12	7 & 19 HS; 19 RC-O	coordination chemistry of d block metals: Werner's Coordination Theory, EPR, isomerism	
Mar 17 (Tu)		No Class – Spring Break.	
Mar 19		No Class – Spring Break.	
Mar 24 (Tu)	19 RC-O	coordination chemistry of d block metals: counting <i>d</i> electrons, metal ion oxidation states, nomenclature	
Mar 26	7 HS; 19 RC-O	coordination chemistry of d block metals: thermodynamics, HSAB Theory, chelate effect, 18-e Rule	
Mar 31 (Tu)		Exam II	
April 2	20 HS; 19 RC-O	Crystal Field Theory: <i>d</i> orbitals, octahedral crystal fields	
April 7 (Tu)	20 HS; 19 RC-O	Crystal Field Theory: back-bonding, color and magnetic properties, Jahn-Teller distortion	
April 9	20 HS; 19 RC-O	Crystal Field Theory: tetrahedral and square planar crystal fields	
April 14 (Tu)	20 HS; 19 RC-O	d block coordination complexes: absorption and emission spectra, magnetic properties, thermodynamics vs. kinetics, CN & geometry	
April 16	20 HS; 19 RC-O	molecular orbital theory of coordination complexes: EPR, π donor vs. π acceptor ligands, crystal field theory interpretation,	
April 21 (Tu)	Class notes	Overview of Inorganic Chemistry II (Chem 4220/6220)	
April 23		Exam III	
April 30	Final Exam	Cumulative, 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. Students are required to bring their notes. Walk-ins may not always be accepted.

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.

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.

Projected breakdown of points:	Exam I	100
	Exam II	100
	Exam III	100
	Quiz	50
	Attendance	25
	Homework	25
	Final Exam	100
	Total:	500 points

Projected grade cut-offs:	A plus	96%
	A	90%
	A minus	88%
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	B plus	85%
	B	75%
	B minus	73%
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	C plus	70%
	C	65%
C minus	63%	
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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

Evaluations: Student evaluations of the Instructor can be performed using the GoSOLAR/PAWS online evaluation system. Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completion of the course, please take time to fill out the online course evaluation.

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.