Inorganic Chemistry II (Chem 4220/6220)

Preliminary Syllabus

Prerequisite: Chem 4210/6210 with a grade of B- or higher

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

Days and Time: Tuesdays and Thursdays, 2:15 PM to 3:45 PM, Langdale Hall Room 425

Office Hours: TBA

Course Format: Blended. All exams and quizzed will be given on-line through iCollege. As a result, class will not meet in person on Sept 15, Oct 6, Nov 10, Dec 3, and on the day of the final exam. All lectures from Aug 25 to Sept 10 and on Sept 17 will be given in person in Langdale Hall Room 425. **On Sept 17, the proposed format will be evaluated in class and a decision will be made on the portion of future class lectures to be given on-line and in person.**

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

Texts: "Descriptive Inorganic Chemistry, **Fifth Edition**" Geoff Rayner-Canham and Tina Overton (2010), **a free pdf of this textbook is on-line**; "Inorganic Chemistry **Fifth Edition**" Catherine E. Housecroft and Alan G. Sharpe (2018).

Assigned Seats: On the first day of in-person class, each student will be assigned a permanent seat. Instructors will then create a seating chart. Students should sit in their assigned seats for each in-person class session. If a student becomes ill, the seating chart will help identify those who may have been in close contact.

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

Date	Chapter	Topic (Tu = Tuesday)
Aug 25 (Tu)	**RC-O Ch 9**	**periodic trends:** Effective nuclear charge, atomic radius, ionization energy, electron affinity, bond triangle, group trends. **in person**
Aug 27	**RC-O Ch 9**	**periodic trends:** Second and third period bonding trends, n n+10 rule, diagonal rule, actinoid and lanthanoid relationships. **in person**
Sept 1 (Tu)	**RC-O Ch 7**, HS Ch 7	**acid base behavior**: Arrhenius Theory, solvents, Brϕnsted-Lowry acids and bases. **in person**
Sept 3	**RC-O Ch 7**, HS Ch 7	**acid base behavior**: Binary and polyprotic acids, oxyacids, metal ion acidity, anion basicity, Lux Flood-Theory. **in person**
Sept 8 (Tu)	**RC-O Ch 7**, HS Ch 7	**acid base behavior**: Lewis Theory, HSAB Theory
Sept 10	**RC-O Ch 8**, H Ch 8	**oxidation and reduction:** Oxidation number rules, balancing redox reactions. **in person**
Sept 15 (Tu)		**Quiz 1 on iCollege, asynchronous**

Sept 17	**RC-O Ch 8**, H Ch 8	**oxidation and reduction:** Cell potentials, Gibbs Free Energy, Nernst Equation. **in person**
Sept 22 (Tu)	**RC-O Ch 8**, H Ch 8	**oxidation and reduction:** Latimer and Frost diagrams, redox potentials in metal complexes. **TBA**
Sept 24	**RC-O Ch 19**, HS Ch 20	**review of coordination chemistry:** *d* orbitals, counting *d* electrons, oxidation states, labile vs. inert metal ion centers, the chelate effect. **TBA**
Sept 29 (Tu)	**RC-O Ch 19**, HS Ch 20	**review of coordination chemistry:** Crystal field theory, high spin and low spin complexes. **TBA**
Oct 1	**HS Ch 26**	**d-block metal coordination chemistry:** Substitution reactions in square planar and octahedral complexes. **TBA**
Oct 6 (Tu)		**Exam 1 on iCollege, asynchronous**
Oct 8	**HS Ch 26**	**d-block metal coordination chemistry:** Inner sphere and outer sphere electron transfer reactions, photochemistry. **TBA**
Oct 13 (Tu)	**RC-O Ch 23,** HS Ch 24-25	**organometallic chemistry of d-block elements:** Historical overview, properties, 18-electron rule, nomenclature. **TBA**
Oct 15	**RC-O Ch 23,** HS Ch 24-25	**organometallic chemistry of d-block elements:** Metallocenes, oxides, ligand substitutions, oxidative addition and reductive elimination reactions. **TBA**
Oct 20 (Tu)	**RC-O Ch 23,** HS Ch 24-25	**organometallic chemistry of d-block elements:** Beta-hydride elimination, alpha and beta abstractions, carbonyl compounds. **TBA**
Oct 22	**RC-O Ch 23,** HS Ch 24-25	**organometallic chemistry of d-block elements:** Catalysis: Ziegler-Natta catalyst, catalyst, Monsanto Process, zeolites. **TBA**
Oct 27 (Tu)	**HS Ch 27**	**f-block metals:** Oxidation states, lanthanoid contraction, spectroscopic and magnetic properties, bonding, coordination and organometallic complexes. **TBA**
Oct 29	**supplementary reading**	**green chemistry:** Film, "The Plastic Ocean". **TBA**
Nov 3 (Tu)	**supplementary reading**	**green chemistry:** The 12 principles of green chemistry, greenhouse effect & metathesis reactions, green diesel, rare earth recycling, biodegradable plastic. **TBA**
Nov 5	**HS Ch 28**	**nanotechnology:** The chemical and physical properties of nanoparticles, catalysis. **TBA**
Nov 10 (Tu)		**Exam II on iCollege, asynchronous**
Nov 12	**HS Ch 29**	**bioinorganic chemistry**: Metal ions and ligands in biological systems, magnetotactic bacteria, metal ion transport by siderophores and proteins, organisms that sequester V(III). **TBA**
Nov 17 (Tu)	**HS Ch 29**	**bioinorganic chemistry**: Structural roles of metal ions, metalloenzymes, dioxygen transport proteins, electron transfer proteins. **TBA**
Nov 19	**HS Ch 29**	**bioinorganic chemistry**: Metals in medicine. **TBA**

Nov 24 (Tu)		**No Class – Thanksgiving Break.**
Nov 26		**No Class – Thanksgiving Break.**
Dec 1 (Tu)	**supplementary reading**	**metal ions in oxidative stress:** Free radical chemistry, reactive oxygen species, Fenton chemistry, the balance between antioxidants and prooxidants in biological systems. **TBA**
Dec 3		**Exam III on iCollege, asynchronous**
Date Pending	**Final Exam**	**Cumulative**, Please open the following link for updates. https://registrar.gsu.edu/registration/semester-calendars-exam-schedules/ **on iCollege, asynchronous**

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, in-class homework quizzes (30 points), and attendance (20 points). **Different exams and homework problems will be administered to undergraduate and graduate students. Some graduate student homework problems will require the students to perform literature searches to obtain insights and/or solutions from the current scientific literature.**

Projected breakdown of points:

Exam I	100
Exam II	100
Exam III	100
Quiz	50
Attendance	20
Homework	30
Final Exam	100
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

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 Honest. **Students are expected to be familiar with and to comply with this policy**. Here is a link to the Policy: https://deanofstudents.gsu.edu/student-conductpolicy-on-academic-honesty/. 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.

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, October 13th 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 Monday, October 12th.

COVID-19 Information:

Face Coverings:

Georgia State University and the University System of Georgia have mandated a face covering policy. Students are required to wear an appropriate face covering while inside campus facilities (classrooms, hallways, elevators, labs and in all other public spaces) because six feet of social distancing may not always be possible. Face coverings will be worn in addition to and not as a substitute for social distancing. Face coverings aren't required in one's own dorm room or suite, when alone in an enclosed office or study room, or in campus outdoor settings where social distancing requirements are met.

Anyone not using a face covering when required will be asked to wear one or leave the area. Repeated refusal to comply with the requirement may result in discipline through the applicable conduct code for students. Reasonable accommodations may be made for those who are unable to wear a face covering for documented health reasons. To request an accommodation, start with the Access & Accommodations Center Welcome Form found at How to Connect. https://access.gsu.edu/how-to-connect/how-to-register/

How to Get Tested for COVID-19:

Any enrolled student who is experiencing symptoms consistent with COVID-19 should call their health provider or make an appointment at the Student Health Clinic at 404-413-1930 or at through the Student Patient Portal at www.gsu.medicatconnect.com. If you are experiencing an emergency, please call 404-413-3333 (on-campus) or 911 (off-campus). For students or employees without symptoms of COVID-19 but who would like to be tested, please call your health provider or use GSU's list of local testing sites, some of which offer free tests. https://ahead.gsu.edu/covid-19-resources/

Student Illness:

If a student develops a fever, cough or shortness of breath they should stay at home, not go to class or work, and stay away from other people. If a student becomes sick or is required to quarantine during the semester, they should notify their instructor as soon as possible. The student will work with the instructor to develop a plan to complete the necessary course content, activities, and assessments in order to meet the course student learning outcomes. **When an instructor is notified that a student has tested positive for COVID-19, the instructor is required by University Policy to notify the Dean of Students at 404-413-1515 and direct the student to the Georgia State Ahead website for additional information.**