CHEM 1212K Syllabus

Principles of Chemistry II, Section HP (4-credits)

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Instructor Information

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General Course Information

Description

Welcome to Principles of Chemistry II! In this course, we will examine:

- The fundamental principles of reaction rates
- Why some chemical reactions go to completion while others go back and forth until they reach an *equilibrium* and how we can manipulate that equilibrium
- The use of chemical reactions to produce electricity and how we can use electricity to force chemical reactions that don't occur on their own to take place
- The chemistry of the transition metals, and the chemistry of hydrogen, oxygen, and carbon.

These are topics that will help you succeed in future chemistry courses and in the many careers that incorporate chemical concepts. The course is designed to promote daily engagement with course materials and to reward mastery of content at the end of the term using a grade improvement plan.

Course Learning Outcomes

Lecture Learning Goals and Outcomes

1. **Apply and analyze** principles of chemical kinetics, temperature effects, and chemical equilibrium to predict reaction rates and extents as well as equilibrium behavior.
2. **Interpret and predict** chemical system responses using Le Châtelier's principle, equilibrium data, and Gibbs free energy relationships in chemical and biological contexts.
3. **Compare and apply** acid–base theories, buffers, and titration methods to characterize inorganic and biological chemical systems.

4. **Integrate and apply** electrochemical concepts, including cell potential, equilibrium, and thermodynamics, to explain energy generation and redox processes.
5. **Explain and predict** structure–property–reactivity relationships in inorganic systems, including coordination compounds, electrophilic and nucleophilic behavior, carbon allotropes, and reactions of hydrides and oxides.

Laboratory Learning Goals and Outcomes

1. **Formulate and investigate** scientific questions in chemistry by **designing and conducting** experiments using appropriate laboratory techniques and safe practices.
2. **Analyze and interpret** experimental data using mathematical, computational, and modeling approaches to **evaluate** results, **identify** sources of error, and **understand** chemical systems.
3. **Apply** chemical theory to **explain** phenomena and **draw** evidence-based **conclusions** supported by scientific reasoning and experimental results.
4. **Integrate** core chemical concepts across lecture and laboratory experiences by **connecting** theoretical principles with experimental observations and real-world applications.
5. **Communicate and collaborate** effectively in a scientific context by **presenting** findings through written reports, oral communication, and laboratory notebooks while **working** responsibly and safely in teams.

Required Course Materials

1. *Interactive General Chemistry 2.0,* Macmillan Learning: This is an interactive e-book that includes access to Achieve, the online homework platform and where you can find answers to half the end-of-chapter problems, as well as iClicker, the mobile polling system. You may purchase an access code via the Barnes and Noble bookstore (it is printed on a card) *or* through the Macmillan Learning link in Canvas. ***The cost should be $40 for one semester access.***
2. *Labflow Complete:* Includes online subscription, lab coat, and safety glasses. Total price is $86.
3. *Laboratory notebook*: You should have a dedicated notebook for recording data and observations during lab demonstrations and simulations. It does not need to make duplicate pages as you write.
4. *Microsoft Office suite*: You will need access to Word, Excel, and PowerPoint for this course. All can be downloaded free of charge for GT students through **OIT**.
5. Access to Canvas is required.

Grading Policy:

A maximum of 1000 points comprise your grade for this course. You will receive one letter grade for the four-credit lecture + laboratory course.

Your final grade will be assigned as a letter grade according to the following scale:

Course Letter Grade	Points Required
A	900—1000
B	800—899
C	700—799
D	600—699
F	less than 600 points ***OR*** less than 135 of the 225 possible laboratory points ***OR*** less than 465 of 775 possible lecture points

Assignments

You grade will be calculated based on:

Assignment	Possible Points
Exam 1	110
Exam 2	110
Exam 3	110
Daily Work[1]	220
Final Exam	225
Laboratory[2]	225
Total	**1000**

1. Daily work consists of online homework, pre-lecture quizzes, in-class problem solving, and learning reflections. See **Description of Graded Components** for additional details.
2. Note that there is a separate laboratory syllabus.

Grade Dispute Policies

Regrade requests must be submitted via a provided link by the deadline announced when scores are posted. A detailed announcement will be posted on Canvas after each exam score is posted.

Missing scores related to lecture must be addressed email to the instructor within one week of the due date or the date that scores are posted to Canvas.

Please refer to the laboratory syllabus for information regarding requests of regrades of lab assignments.

Description of Graded Components

Exams

Three exams will be given during the semester on the dates listed in the lecture schedule. Exams will be administered ***on Canvas via the Quizzes feature*** and consist of questions that may be in any of the following formats: multiple choice, multiple answer, numeric entry, fill in the blank or fill in multiple blanks, matching, and free-response questions for which you may be asked to draw a diagram or molecule, interpret a graph, write a chemical reaction, or provide a short answer to a conceptual question. There will be two of the free response questions for each 20-question midterm exam.

Exam content will be outlined via a Canvas announcement a week prior to each exam.

Exams will be held from 8:00 – 9:00am on the dates that will be posted to Canvas on the first day of class. These exams will be administered using Canvas quizzes and on paper (free response questions), so you will need to bring a fully functional laptop to class on exam days in addition to writing utensils. It is your responsibility to ensure that your laptop is charged, that your battery is sufficient (or you have a power cord), and that your computer can connect to the Wi-Fi and to Canvas.

We will utilize Lockdown Browser on exams so that you will not be able to access websites outside of Canvas. We will *not* use HonorLock, and you will NOT be recorded during exams. It is your responsibility to ensure that you have a device on which Lockdown Browser functions prior to each exam.

You are permitted the use of a "crib sheet" during exams. A crib sheet is a single 8.5" x 11" piece of paper on which you may write anything you like on one side. The overall surface area of the crib sheet may not be expanded via the use of Post-It™ notes, etc. and all crib sheet information must be in your own handwriting. No typed, scanned, or electronically copied information is permitted. You may print out material written on an electronic tablet provided that you can demonstrate your ability to write in the same size using a pen and paper. Crib sheets may be retained for use on the final examination, or new crib sheets may be generated for that purpose.

Final Exam

A two hour and fifty-minute, final exam will be given at the time determined for this course by standard Georgia Tech procedures. The complete schedule of final exams may be found at this site, typically by the first day of classes.

The final exam will be delivered in a similar format as midterm exams using Canvas quizzes. ***The final exam will be delivered in person via Canvas, and requests to change the time or date of the final exam will be accommodated only in instances in which a student has three final exams on the same calendar day with the CHEM 1212K final exam being the middle exam (per Institute guidelines).*** Students in this situation should contact the

instructor by **November 19th** to arrange an alternate time to take the exam. The final exam will NOT include free response questions; otherwise, the format will be like midterm exams.

Grade Improvement Plan

The final exam will be composed of four sections with the first three sections representing material from exams 1 – 3, respectively. The remaining section will cover material after exam 3. If you earn a higher score on a given section than you did on the corresponding exam, that percentage will replace the original score. For example, if a student earns a 75% on exam 1 and a 95% on section 1 of the final exam, the 95% will be used in the grade calculation. It is possible for all three original exam scores to be replaced with the Grade Improvement Plan. ***You must have attempted the original individual exam or have an excused absence communicated to the course instructors to be eligible for the Grade Improvement Plan.***

Daily Work

Daily work consists of work that is designed to be completed regularly (daily) to help you stay on track with course material.

Assignment Type	Number of Assignments	Points Per Assignment	Total Points Available from Assignment Type
Macmillan Achieve (Online homework)	12	Variable	114
Preparation Quizzes	25	4	100
In-Class Assignments	25	5	125
Surveys and Learning Reflections	3	5	15
TOTAL POINTS POSSIBLE: 354			

- Achieve homework*:* There are 10 assignments with a variable number of questions each of which is worth 1 point. Each assignment has a due date at 11:59pm on dates listed at the end of the syllabus. You have ***four*** attempts per question and are NOT penalized for using hints.
- Preparation Quizzes*:* These are low-stakes, low cognitive load questions designed to help you focus on specific features of pre-lecture videos or textbook content. You have ***three*** attempts at each quiz). Preparation quizzes are due at the beginning of each class period. Correct answers will be viewable at the end of the week of the due date. ***Late submissions will receive no credit. Do NOT use any remaining attempts for practice after the due date. This will result in a late penalty such that you will receive no credit for the assignment.***
- In-Class Work*:* Problem solving will be a huge focus of a portion of each class period. Points associated with work done in class can be earned using the *iClicker* platform that comes with

your ebook access. You will receive ½ credit for each question that you answer in any way. You will receive full credit for each correct answer. You are encouraged to work with classmates, and learning assistants will be available if you have questions.

- Surveys*:* Three survey assignments will be posted on Canvas. These assignments will be graded for completion and are designed to provide feedback to me during the course. Each survey is worth 5 daily work points.

Daily work assignments are designed to aid your understanding of material and should be viewed as part of your study and learning process rather than tasks simply to be completed. To emphasize this philosophy, I am offering you about 60% more points of opportunity than are required for full credit.

Because these assignments are designed to enhance your understanding of the material as we cover it and I am offering so many more points than needed for full credit, individual due date extensions and make-up assignments will be available only for those with excused absences, institute approved absences, or disabilities accommodations. Each of these circumstances should be discussed with me soon as you know of an issue.

Though you need only 220 points, I encourage you to engage in as many of the assignments as possible to facilitate your success in the course. To encourage this, I will employ a ***Token System*** based on the number of daily work points earned by certain dates in the course. If you earn a token prior to each exam, then you will have the opportunity to earn up to full credit back on one exam question. You may also earn the opportunity to attempt bonus questions on the final exam. Details regarding the token system will be posted to Canvas on the first day of class.

Laboratory

You **must** pass Laboratory to pass the **overall course**. Teaching assistants will have the responsibility for establishing laboratory grades. Students are graded on pre-lab quizzes, formal lab reports, summary reports, report accuracy, lab technique and safety and two laboratory quizzes/practicums. **A grade of 135 points or more in the lab is considered passing.** If you fail CHEM 1212K lab, then you must retake the entire lecture and lab. Your teaching assistant may specify that students work in pairs for certain experiments. Whether this is the case or not, *all post-lab assignments must be prepared independently by each student*. Please see the lab syllabus for more details.

Attendance and/or Participation

The only components of CHEM 1212K with required attendance are laboratories and exams. Participation in lecture is *strongly* encouraged, and by not attending you forfeit the opportunity to earn daily work points. However, the daily work system is designed to facilitate missed days when they are needed by offering more points than required for full credit.

Comprehensive guidelines regarding class attendance and excused absences can be found in the Georgia Tech catalog. Please read through the class attendance policy.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

This is a Core IMPACTS course that is part of the STEM area

Core IMPACTS refers to the core curriculum, which provides students with essential knowledge in foundational academic areas. This course will help students master course content, and support students' broad academic and career goals.

This course should direct students toward a broad Orienting Question:

- How do I ask scientific questions or use data, mathematics, or technology to understand the universe?

Completion of this course should enable students to meet the following Learning Outcome:

- Students will use the scientific method and laboratory procedures or mathematical and computational methods to analyze data, solve problems, and explain natural phenomena.

Course content, activities and exercises in this course should help students develop the following Career-Ready Competencies:

- Inquiry and Analysis
- Problem-Solving
- Teamwork

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. I want to ensure that your specific needs are met, and I will send you an email outlining my typical approach to certain accommodations in the first week or two of the course. Your response to that email is important to ensuring we are in good communication throughout the semester.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

In the first-year chemistry program, we expect students to arrive prepared for class, to participate in class activities and discussions, and to utilize office hours for additional help when needed.

In return, you should expect me to arrive prepared for class, to engage you in activities and discussions that further your understanding of course material, and to be available during office hours.

Pre- &/or Co-Requisites

Students must have completed CHEM 1211K or CHEM 1310 with a D or better to enroll in CHEM 1212K.

Students entering the class are expected to have a chemistry background that includes topics listed below. ***It is completely okay if you are rusty***, and the key is to make sure you spend a little time brushing up so that new material won't be overwhelming. Some review resources will be provided in Canvas.

1. Appropriate use of significant figures (for addition/subtraction, multiplication/division, and $\log_{10}$)
2. Stoichiometric calculations (grams to moles, molarity, limiting and excess reagents)
3. Polyatomic ions (names, formulas, and charges; a table of common ions will be provided)
4. Net ionic equations and spectator ions (solubility rules for ionic compounds in water are required for this)
5. Gibbs free energy of reaction (what it represents, how to calculate it using enthalpy, entropy, and temperature)
6. Lewis structures (drawing for inorganic compounds and simple organic compounds such as CH_4 or acetic acid)
7. Ground state electron configuration of elements in the first five rows of the periodic table.

Extra Credit Opportunities

Because the structure of daily work, the token system, and the grade improvement plan already are in place, no extra credit opportunities will be available.

Collaboration, Group Work, and Use of Generative AI

You are strongly encouraged to work with classmates on in-class problem solving and to study with others outside of class. Collaboration on homework assignments is acceptable, and you should keep in mind that the effort you put into these assignments will be reflected in what you gain from them. Discussion of the material in laboratory assignments is appropriate; however, all work submitted in reports must be prepared independently.

The online homework platform incorporates an AI tutor, and you are encouraged to make use of this after you've attempted the problem on your own or if you get stuck. Like *any* AI platform, the AI tutor in Achieve is imperfect. Do not use all four attempts at a question if your interpretation of what the AI tutor tells you does not lead to the right answer. Instead, drop by office hours or post on Ed Discussion for help.

The use of platforms such as ChatGPT to arrive at answers to pre-lecture quiz, in-class assignment, or homework questions is discouraged. While AI may help you arrive at an answer faster, using it defeats the purpose of completing the assignments using your own knowledge or collaborating with others (which is to gain understanding of the underlying concepts). I would much rather you ask a learning assistant or me during class, post on Ed Discussion, or come by office hours for help as I think this is more beneficial in the long-term. If you do choose to use AI for these assignments, then you are strongly encouraged to spend time analyzing the answer and ensuring that A) it is the correct answer; B) you understand *why* it is the correct answer.

Redemption of tokens will require you to complete an assignment. Again, I think it is most beneficial to complete this on your own. *If you choose to utilize AI assistance, then you must include the conversation in your assignment* and *provide reflection on it*. Additional details will be provided in the assignments on Canvas.

The use of AI platforms or the accessing of any website other than the Canvas quiz page for exams is strictly prohibited during exams.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

Comprehensive guidelines regarding class attendance and excused absences can be found in the Georgia Tech catalog. Please read through the class attendance policy and the excused absence policy in their entirety.

If you need to miss class or an assignment deadline due to a religious observation, then please contact me via email in advance of the absence so we can make appropriate plans.

Application of guidelines to CHEM 1212K:

Daily work*:* Because the daily work structure offers so many more points than are needed for full credit, there are no individual extensions on homework assignments, preparation quizzes, or in-class activities unless you have an institute approved absence, experience a lengthy illness, or have other extenuating personal circumstances. In the latter two cases, please contact me and, without providing details, we can discuss the situation and determine the best course of action.

Exams*:* Contact me via email as soon as you are able if you are ill prior to or miss an examination. Please do NOT provide documentation to me.

Laboratory: Please follow the instructions provided in the laboratory syllabus regarding missed lab sessions.

Inclement Weather and Digital Learning Days

In the case of inclement weather, I will post videos of the content to be covered. I will not lecture on this material but will be available via Microsoft Teams (look for a Canvas announcement with a link) to clarify or answer questions. I'll also be available via Ed Discussion.

Campus Resources for Students

Undergraduate Student Academic Success Resources:

A list of resources for undergraduate students' academic success and information about advising can be found on the Academic Success & Advising website.

Academic Success and Advising (a unit in the Office of Undergraduate Education & Student Success) provides free support for your courses. Students can attend scheduled supplemental review (PLUS) sessions, stop by Drop-In Tutoring, or schedule a one-on-one appointment through Knack. To explore what options work best for you, please visit us online at success.gatech.edu/tutoring, email us at tutoring@gatech.edu, or come see us at Clough Undergraduate Learning Commons, Suite 283.

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being.

Taking care of yourself should be a top priority. It is important for you as a person first and as a student second. I encourage you to utilize good sleep practices, eat nutritious foods and incorporate treats, move your body, and practice good hand washing techniques.

We all have lives outside of Georgia Tech, and sometimes that gets in the way of work and studies. ***Please ask for help or just let someone on campus know when life gets messy. There are <u>many</u> resources and <u>lots</u> of folks on campus who want to help.*** You can find great information about well-being on the Student Engagement and Well-Being webpage.