Principles of Chemistry II

Last Updated: Tue, 12/16/2025

Course prefix: CHEM

Course number: 1212K

Section: HP

CRN (you may add up to five):
30608

Instructor First Name: Carrie

Instructor Last Name: Shepler

Semester: Spring

Academic year: 2026

Course description:

This course is the second of a two-semester sequence that introduces the foundational concepts of chemistry. General topics covered in lecture include chemical kinetics, chemical equilibrium, acids and bases, buffers and titrations, electrochemistry, coordination chemistry, and fundamental principles of main-group chemistry. Laboratory focuses on fundamental lab skills as well as analytical and synthetic chemistry. The laboratory component is designed to develop your experimental skills as you collect and evaluate evidence for the concepts, principles, and theoretical models discussed in lecture.

Course learning outcomes:

Learning Goals and Outcomes | Lecture

- *Apply* relations between concentration, time, and rate to predict the time course of a chemical reaction.
- *Apply and analyze* kinetic data to infer a mechanism of a chemical reaction.
- *Interpret* equilibrium data for reactions in gaseous and aqueous phases.
- *Compare and contrast* the three theories of acids and bases and apply them to inorganic and biological systems.
- *Describe and apply* redox reactions in the interconversion of chemical and electrical energy.
- *Integrate* the concepts of chemical equilibrium, Gibbs free energy, and cell potential in an electrochemical context.
- *Explain* the properties of inorganic compounds by applying tenets of bonding theories (valence bond theory and molecular orbital theory).
- *Describe and analyze* the structures of coordination complexes.

- *Describe and predict* the reactivity of inorganic compounds using the Lewis acid-base model.
- *Predict and explain* the colors and magnetic properties of transition metal coordination compounds using crystal field theory.

Learning Goals and Outcomes | Laboratory

- *Collect* and *interpret* data from gaseous and aqueous reactions.
- *Integrate* the concepts of stoichiometry with measurements made in the laboratory.
- *Measure* the equilibrium properties of chemical and electrochemical systems and *infer* theoretical results from raw data.
- *Identify* the hazards and risks associated with a chemistry laboratory experiment.
- *Recognize* the value of maintaining a laboratory notebook and *apply* sound note-taking practices.
- *Develop* skills in written and oral scientific communication.

Required course materials:

Textbook

- *Interactive General Chemistry* by Macmillan Learning. This is an interactive e-book included with access to the online homework platform Macmillan Achieve (see below). A purchase of Achieve includes access to the textbook, online homework platform, and iClicker for in-class questions.

Additional Materials

- *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.
- *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.
- *Labflow.* Labflow will serve as a learning management system for the laboratory and include protocols, pre-labs, post-lab assignments, and other lab resources.

Grading policy:

Daily Work*..... 220 pts.
Laboratory†..... 225 pts.
Exam 1..... 110 pts.
Exam 2..... 110 pts.
Exam 3..... 110 pts.
Final Exam..... 225 pts.

* Daily work consists of online homework, in-class problem sets, preparation quizzes, and goal setting and reflection surveys.
† Students earning below 60% in the laboratory component of the course (less than 135 of 225 points) will receive a grade of F and will be required to repeat both the lecture and the laboratory components. See the lab syllabus for laboratory requirements.

Letter grades will be assigned using the following ranges. To encourage mastery of concepts and skills the course will not be curved.

A..... 1000 – 900 pts.
B..... 899 – 800 pts.
C..... 799 – 700 pts.
D..... 699 – 600 pts.
F..... 599 – 0 pts.

Students earning below 60% in the lecture component of the course (less than 465 of 775 points) will receive a grade of F and will be required to repeat both the lecture and the laboratory components.

Attendance policy:

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

Rules and Regulations Section IV
Student Absence Regulations

Due to the structure of Daily Work, late homework submissions and in-class work are not accepted except in the case of long-term excused absences discussed in advance with the course coordinator. Lab assignments are penalized at 10% of the total assignment value for each day they are late following the precise due time.

Academic honesty/integrity statement:

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. For information on Georgia Tech's Academic Honor Code, please visit this page or this page.

Any student suspected of cheating or plagiarizing 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 a violation.

If at any time throughout the semester you have a question involving academic integrity or the Honor Code, please do not hesitate to reach out to your instructor or a First-year Chemistry faculty member.

Collaboration and Group Work

You are 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.

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. See Student-Faculty Expectations in the Catalog for an articulation of some basic expectation 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, we encourage you to remain committed to the ideals of Georgia Tech while in this class.

We expect students to arrive prepared for class, to participate in class activities and discussions, and to use office hours for additional help when needed.

In return, students should expect instructors to arrive prepared for class, to engage them in activities and discussions that further their understanding of course material, and to be available during office hours.

Students should expect to spend, on average, 6 – 8 hours per week outside of the classroom and laboratory to excel in this course. This includes time spent reading the textbook and watching lecture videos, taking and reviewing notes, working problems, and writing laboratory reports. To succeed in this course, students *must* develop a pattern of preparing for class, attending class, and then reviewing after each class period.

Core IMPACTS statement(s) (if applicable):

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 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