LAST UPDATED: March 18, 2026

CHEM 1211K

Georgia Tech | **SEMESTER**

Chemical Principles I

CLASS MEETINGS
Section **C** (4.0 credit hours)
MWF 11 – 11:50 am
CLASSROOM

Welcome to Chemical Principles I! In this course you will learn the fundamental principles of stoichiometry, chemical thermodynamics, and atomic and molecular structure to propel you to success in future chemistry courses and any career touching on chemistry (and there are *many!*). The course is designed to promote daily engagement with the course material and to reward mastery of the material by the final exam via Grade Improvement.

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

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INSTRUCTOR INFORMATION

Course Coordinator
Dr. Michael Evans (mevans@gatech.edu)
Office Hours: Tuesdays and Thursdays, 1 – 2 pm
Location: Clough Commons 584C

Lecture
Dr. Michael Evans (mevans@gatech.edu)
Office Hours: Tuesdays and Thursdays, 1 – 2 pm
Location: Clough Commons 584C

Laboratory
Dr. Deborah Santos (mevans@gatech.edu)
Office Hours: TBD
Location: TBD

Teaching Assistants

Name	Email	Section 1	Section 2
Coming soon!			

Learning Assistants

Name	Email	Section
Coming soon!		

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PLUS Leader

Name	Email	Section
Coming soon!		

Contacting Instructors

Item	Contacts	Information
Lecture content	Ed Discussion Teaching assistants Dr. Evans	Ed Discussion TA Office Hours
Lab content	Ed Discussion Teaching assistants Dr. Evans	Ed Discussion TA Office Hours
Lecture logistics: assignment extensions or missing grades, exam absences, disability accommodations, etc.	Dr. Evans	mevans@gatech.edu
Lab logistics: absences, extensions, etc.	Dr. Evans	mevans@gatech.edu

COURSE OVERVIEW

This course is the first of a two-semester sequence that introduces the foundational concepts of chemistry. General topics covered in lecture include atomic structure, stoichiometry, quantum mechanics, molecular shape, chemical bonding, chemical thermodynamics, and the behavior of gases. Laboratory focuses on fundamental lab skills as well as analytical and synthetic chemistry. The course is designed to develop your experimental skills as you collect and evaluate evidence for the concepts, principles, and theoretical models discussed in lecture.

Pre- and Co-requisites

There are no pre-requisites or co-requisites for this course.

Learning Goals and Outcomes | Lecture

- *Identify* steps in the scientific method.
- *Apply* concepts of measurement and significant figures to laboratory practices and chemical problems.
- *Correlate* position on the periodic table to properties of elements and bonds.
- *Calculate* amounts of chemical species using information from chemical formulas and chemical equations.

- *Correlate* information from balanced chemical equations to the microscopic scale.
- *Explain* atomic structure using the quantum mechanical model of the atom.
- *Explain* periodic trends using theories of electronic structure.
- *Predict* molecular properties and behavior based on molecular structure and bonding theories.
- *Interpret* thermochemical equations and data and *evaluate* energies of systems.
- *Summarize* the behaviors of gases and *explain* them using the kinetic-molecular theory.
- *Correlate* the molecular level process that occur during heating, cooling, and phase changes to the amount of energy removed or added to a system during each process.

Learning Goals and Outcomes | Laboratory

- *Collect* and *interpret* data regarding gaseous and aqueous reactions.
- *Integrate* the concepts of stoichiometry with measurements made in the laboratory.
- *Observe* the physical properties of substances and *relate* them to intermolecular force strength.
- *Apply* concepts related to density and miscibility.
- *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.

IN-CLASS EXPERIENCE

This is a residential course involving in-person class meetings at the times and location listed above. Being physically present will help you learn from us, learning assistants, and your classmates; as such, class meetings will be neither streamed nor recorded. If you are ill, then please do *NOT* attend class. Instead, contact us so that we can discuss the best way for you to stay current with the material while prioritizing your health and that of others.

Our goal is for class meetings to provide opportunities for you to engage with us, with your classmates, and with the material as all these interactions enhance learning. During class, you will be prompted to work with other students and to engage in dialogue with both other students and us about the course material. You also are strongly encouraged to ask questions!

Taking notes is an essential academic skill that does not come naturally to some. To facilitate the development of this skill, we provide what we refer to as *skeletal* lecture notes. These are PowerPoint slides that will be posted to Canvas that have a framework

of information. We will complete the slides in class. This means that you don't have to write *all* the course notes during class; however, we do expect you to follow along by taking notes on the skeletal frameworks during class. You do not need to focus on writing down everything verbatim; indeed, part of the skill development is learning to paraphrase and condense key information! We encourage you to compare notes with classmates regularly to ensure you have recorded all key points.

Flipvember. Following the third exam, beginning with class 11.F on **DATE** and continuing through the end of the term, the course will shift to a flipped format. Reading and taking notes on lecture videos before class will become required; in class, we will work through structured problems on slides or worksheets. The aims of Flipvember are to help you build skill in learning independently and to help the Learning Assistants and me observe and provide feedback on your problem solving and critical thinking skills. These skills will be critical in Chemical Principles II (CHEM 1212K).

COURSE REQUIREMENTS AND GRADING

Daily Work* ..... 250 pts.
Laboratory† ..... 225 pts.
Exam 1 ..... 100 pts.
Exam 2 ..... 100 pts.
Exam 3 ..... 100 pts.
Final Exam ..... 225 pts.

* Daily work consists of online homework, in-class questions, preparation quizzes, and learning reflections. See below for additional details.

† 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.

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DESCRIPTIONS OF GRADED COMPONENTS

Midterm Exams

Midterm examinations will be held on the following dates in **CLASSROOM** from **11 – 11:50 am**: **DATE 1**, **DATE 2**, **and DATE 3**. The exams will include *both* a portion administered on Canvas (requiring LockDown Browser) and paper-based free-response questions, and will take place in the scheduled class period and location. Bring your laptop computer to the room, connect to the Internet, and access Canvas prior to the official start time. Smartphones, tablets, and headphones *are not permitted* for use during exams. Approximately one week before the first exam is administered, we will perform a "test run" during class to identify any issues with connectivity or access.

When the Canvas portion of the exam opens, you will receive a unique subset of 15 – 20 questions from a question bank. Possible question types are multiple choice, multiple answer, fill in the blank, numeric entry, and dropdown menus. Only one attempt is permitted and responses should be submitted when you have completed the exam (however, responses will submit automatically at the end of the exam period). Although exams will be graded immediately, exam scores will only be released after instructors have had an opportunity to review them and free-response questions have been graded in Gradescope.

One 8.5" × 11" crib sheet will be permitted for use on each of the three midterm exams. Only one side of the crib sheet may be used and ***all content must be hand written. No photocopied material is permitted***. The inclusion of photocopied or printed material on a crib sheet is a violation of the academic integrity policy of the course. Exams will otherwise be closed book, closed note, and closed Internet.

Use of a scientific or graphing calculator without Internet connectivity is permitted (and strongly encouraged!).

Final Exam

The final exam will be held in **CLASSROOM** from **TIME** on **DATE 4**. The exam will be administered on Canvas and will *not* include free-response questions. You will receive a unique set of 50 – 55 questions from a question bank.

Four single-sided crib sheets may be used for the final exam; the policies above for midterm crib sheets also apply for the final exam. Use of a scientific or graphing calculator without Internet connectivity is permitted (and strongly encouraged!).

Grade Improvement Plan

The final exam will include four sections, with the first three sections representing material from exams 1 – 3. 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 midterm

exam, that score will replace the original score. For example, if a student earns 75 points on exam 1 and 95% on section 1 of the final exam, 95 points will be used in the calculation of the exam 1 score. It is possible for all three original exam scores to be replaced. ***You must have attempted the original individual exam or have an excused absence communicated to the course instructor 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. These 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, we offer you about 10% more points of opportunity than are required for full credit. As outlined below, there are 277 points available; of these, you need 250 for full credit. This means that individual due date extensions and make-up assignments will be available only for those with excused absences, Institute-approved absences, or ODS accommodations. Each of these circumstances should be discussed with us as soon as you know of an issue.

Though you need only 250, we encourage you to work through as many of the assignments as possible to facilitate success in the course.

Assignment	Count	Points per Assignment	Total Points for Assignment Type
Preparation Quizzes	38	1.5	57
Homework (Macmillan Achieve)	13	10	130
In-class Questions (iClicker)	36	2	72
Goal Setting and Reflection Surveys (Macmillan Achieve)	4	4	16
Exam Trial Run	1	2	2

- *Preparation Quizzes.* These are brief assignments designed to help keep you engaged with the readings. Assignments will be posted and submitted on Canvas via Quizzes. Preparation Quizzes are due and close at 11:59 pm on their corresponding class days.
- *Homework (Macmillan Achieve).* Homework assignments are structured for interleaved practice, with questions that review previous topics interspersed with questions focused on more recent topics. Homeworks are due weekly on

Thursdays except for exam weeks. There are 13 homework assignments with due dates across the semester; see the schedule below for details.

- *In-class Questions.* Each class meeting will include a series of questions or problems worked during class with interactive polling facilitated by iClicker, which is included with your Macmillan Achieve purchase. Each class meeting is worth 2 points regardless of the number of questions asked; correct responses on half or more of these questions earn 2 points, at least one earns 1 point, and none earns 0 points.
- *Goal Setting and Reflection Surveys.* At the start of the semester and after each exam, a goal setting and reflection assignment will be posted in Macmillan Achieve. These assignments will be graded for completion and are designed to help you consider your goals for CHEM 1211K, your approach to learning in the course, and your motivations and metacognition.
- *Exam Trial Run.* Before the first midterm exam, a trial quiz requiring LockDown Browser will be posted. Successful completion of this quiz is worth 2 points toward your Daily Work total.

To make the most of the course structure we have developed, it is important to consider your mindset toward Daily Work assignments. It is easy to consider these as just items to be crossed off a to-do list, and there are many shortcuts and hacks students can use to complete them quickly and with high scores. However, that "efficiency" often is counter-productive in the long-term. We encourage you to view these assignments as they were designed—as tools to aid your mastery of the material. We encourage you to approach each question as an opportunity to test your understanding. The best way to do this is to try each question using only materials you'd have on an exam. It's okay if you can't work them all this way, and if you are stuck then you certainly should refer to your lecture materials or textbook. However, giving each question a solid 30 – 60 seconds of consideration before you refer to other resources will help forge mental connections as well as the skill of starting to work a problem even when you are unsure of the exact route you should take (the latter is a skill that will serve you well in life!).

Laboratory

Laboratory assignments will include pre-labs, notebook pages, post-labs, certified reagent operations, and other miscellaneous assignments. *You must pass the laboratory component of the course to pass the course as a whole.* Although you will work with a lab partner and a small degree of collaboration is acceptable, all laboratory work should be completed and submitted individually. Please consult the lab syllabus for more details.

REQUIRED MATERIALS AND WEBSITES

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). Purchase access to the textbook and homework by clicking the Register for Achieve link here or in the Textbook and Homework module on Canvas.

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.

Websites

- *Canvas.* All course materials and announcements will be posted on the CHEM 1211K Canvas sites. Make sure to check them *daily!* Note that there are separate sites for the Lecture and Laboratory components of the course.
- *Ed Discussion.* Use Ed Discussion as an opportunity to ask and *answer* questions about anything related to CHEM 1211K. Keep in mind that teaching others is a great way to develop a deeper understanding of the concepts of the course. Please observe general guidelines for civility as you post questions and responses. We intend the site to help build community and we are determined to make it a safe and inclusive space for all students.
- *Macmillan Achieve.* This site contains homework problems that contribute to your Daily Work score. It can be accessed directly via the lecture Canvas site.

EXPECTATIONS AND GUIDELINES

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. 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.

Accommodations for Student with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404) 894-2563 or http://disabilityservices.gatech.edu/ as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please inform Dr. Evans ***within the first week of the course or as soon as possible after registering with ODS.***

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.

Extensions, Late Assignments, and Missed Exams
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 submissions for homework, GSR surveys, iClicker questions, and other Daily Work assignments are not accepted. Laboratory assignments are not generally accepted late without the use of one or more tokens. (See the lab syllabus for details.)

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 utilize 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, 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.

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SCHEDULE OF TOPICS

Week of	Monday	Wednesday	Friday
1	Course Introduction	2.A Atoms and the Periodic Table I	2.B Atoms and the Periodic Table II
2	3.A Compounds and the Mole I	3.B Compounds and the Mole II	3.C Compounds and the Mole III
3	**No Class – Labor Day**	4.A Chemical Reactions and Aqueous Solutions I	4.B Chemical Reactions and Aqueous Solutions II
4	4.C Chemical Reactions and Aqueous Solutions III	5.A Stoichiometry I	5.B Stoichiometry II
5	5.C Stoichiometry III	**Exam 1 (2.A – 5.B)**	6.A Thermochemistry I
6	6.B Thermochemistry II	6.C Thermochemistry III	18.A Chemical Thermodynamics I
7	18.B Chemical Thermodynamics II	7.A Gases I	7.B Gases II
8	**No Class – Fall Break**	8.A Quantum Model of the Atom I	8.B Quantum Model of the Atom II
9	8.C Quantum Model of the Atom III	8.D Quantum Model of the Atom IV	**Exam 2 (5.C – 8.C)**
10	8.E Quantum Model of the Atom V	9.A Periodicity and Ionic Bonding I	9.B Periodicity and Ionic Bonding II
11	10.A Covalent Bonding I	10.B Covalent Bonding II	10.C Covalent Bonding III
12	11.A Molecular Shape and Bonding Theories I	11.B Molecular Shape and Bonding Theories II	11.C Molecular Shape and Bonding Theories III
13	11.D Molecular Shape and Bonding Theories V	**Exam 3 (8.D – 11.C)**	11.E Molecular Shape and Bonding Theories VI
14	11.F Molecular Shape and Bonding Theories VII	12.A Liquids and Solids I	12.B Liquids and Solids II
15	12.C Liquids and Solids III	**No Class – Thanksgiving**	
16	13 Solutions	**No Class – Reading Day**	**No Class – Final Exams**

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SCHEDULE OF HOMEWORK ASSIGNMENTS

Week	Due Date
1 – 2	
3	
4	
6	
7	
8	
10	
11	
12	
14	
15	
16.1	
16.2	

Four submissions will be allowed for each problem in the homework sets; you will receive 100% credit for a correct response on all four submissions *except for multiple-choice problems*. Homework is due at 8:00 pm on the date indicated.

1. Each homework assignment is worth 10 points.
2. Each homework set will be available in Achieve 10 – 14 days before it is due.

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RESOURCES FOR STUDENT SUPPORT

- Academic Success and Advising https://www.success.gatech.edu/
  - 1-on-1 Tutoring (Knack): https://www.success.gatech.edu/tutoring/1-to-1-tutoring/
  - Peer-Led Undergraduate Study (PLUS): https://www.success.gatech.edu/tutoring/plus/
  - Drop-In Tutoring: https://www.success.gatech.edu/tutoring/drop-in-tutoring/
  - Learning Assistant Program: https://www.success.gatech.edu/tutoring/learning-assistant-program/
  - Studypalooza: https://www.success.gatech.edu/tutoring/studypalooza/
- Advising and Transition https://www.success.gatech.edu/advising/
  - Academic major advising https://advising.gatech.edu/find-your-advisor
  - Exploratory advising https://advising.gatech.edu/exploratory-advising
  - Academic coaching https://advising.gatech.edu/academic-coaching
- Office of Student Achievement
- Communication Center (http://www.communicationcenter.gatech.edu)
  - Individualized help with writing and multimedia projects
- Mathematics Resources
  - College Algebra Open Course: https://gatech.instructure.com/enroll/MGFMYG
  - Precalculus Open Course: https://gatech.instructure.com/enroll/YAFYFG
- Personal Support
  - The Office of Student Life: https://studentlife.gatech.edu/; 404-894-6367; Smithgall Student Services Building, 2nd floor
  - You also may request assistance at https://studentlife.gatech.edu/request-assistance
  - Center for Mental Healthcare and Resources https://mentalhealth.gatech.edu; 404-894-2575 or 404-894-3498
  - Students' Temporary Assistance and Resources (STAR): https://studentlife.gatech.edu/content/star-services
  - Can assist with interview clothing, food, and housing needs.
  - Stamps Health Services: https://health.gatech.edu; 404-894-1420
  - Primary care, pharmacy, women's health, psychiatry, immunization and allergy, health promotion, and nutrition
  - OMED: Educational Services: http://www.omed.gatech.edu
  - Belonging and Student Support: https://belonging.gatech.edu/studentsupport
  - Veteran's Resource Center: http://veterans.gatech.edu; 404-385-2067
  - Georgia Tech Police: 404-894-2500