GEORGETOWN UNIVERSITY
Department of Chemistry
General Chemistry I
Summer 2025 - In-Person Instruction

General Information for CHEM 1100 and CHEM 1105

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Office Hours: by appointment	Office Hours: by appointment

Course structure: Lecture/Recitation MTWTh 8:10 - 11:25AM
Lecture Quizzes MTW and/or Th 11:00-11:25AM
Laboratory MTWTh 12:10 - 2:45PM

Lab, Chem 1105, is a separate course. Concurrent registration in Chem 1100 and Chem 1105 is required, except with permission from the instructor. The recitation portion of the lab course is used to support the lecture course and attendance to recitation is required for students in CHEM 1100.

Required Items:

1. Chemical Principles The Quest for Insight 8th Edition by Atkins, Jones, and Laverman (e-text is fine and is included with the purchase of Achieve)

2. Online homework through Macmillan Achieve.
The online homework is worth points toward your grade in the course and for success on exams. Achieve works best with the Chrome browser on a laptop or desktop computer.

3. Laboratory Experiments for Chemistry the Central Science; Nelson, Kemp, Stoltzfus and Lufaso, Ninth Custom Edition for Georgetown University. Available only through the GU Bookstore.

4. Scientific calculator. A phone app may not be used as a calculator.

What is this course all about?

CHEM 1100 will emphasize both assigned reading/problem solving from the textbook and lecture material. Worksheets will be provided as supplements to the textbook as added practice. An online homework program will be utilized to give you more practice answering questions and solving problems. It is understood that students will behave with the utmost respect for academic integrity in all aspects of this course.

Objectives: Every material thing around you, on this Earth and throughout the universe is made of atoms. Our main objectives in this course are to:

- Understand atomic structure and how this structure governs the characteristics of atoms as well as how and why atoms combine to form compounds.
- Understand the solid, liquid and gas phases, how they form and why.
- Understand what drives change (why do atoms rearrange to form new substances?)
- Observe connections between experiments, conclusions, and explanations.
- Build analytical problem solving skills.
- Develop strong connections between mathematical problem solving and conceptual meaning.
- Begin the process of your transformation from a container of information to a contributor to human knowledge.

There are three main areas in science that provide the framework for answering questions about our material world: Quantum Mechanics, Thermodynamics and Kinetics. Our goal is to develop your understanding and capabilities in quantum mechanics and thermodynamics and to introduce kinetics.

Examinations: There will be two exams during the summer session and a cumulative final exam. All students are required to take the final exam. The dates for the exams are given on the schedule. There will be **no makeup exams** in this class. If missing an exam is absolutely unavoidable the final exam grade will also count as the missed exam grade. Students who do very poorly on one of their exams, but did not miss an exam, may substitute the final exam grade for the lowest exam grade. Exams will emphasize theory, conceptual understanding and problem solving: there will be multiple choice questions, short answer and problems wherein students are required to show their work.

Quizzes: Quizzes will be given at 11AM as indicated on the schedule. Quizzes are very important in helping you gauge your success with the material, learn to work quickly and efficiently on problems, as well as encouraging good study habits. No quizzes will be given outside of scheduled class times, but the lowest quiz grade will be dropped so one missed quiz is not a problem. Quizzes will be challenging in order to properly prepare you for exams.

Problem Sets (ungraded): *"It is much easier to find something if you seek it"*
Assigned problems from the text are selected to assist your learning and focus your reading. Please attempt the problems before lecture on that topic so you are exposed to what it is you need to know. My lectures are only meaningful to you if there is something in them you wish to know. If you have tried the problems in advance then you have some ideas about what to expect in class: this is what we mean by "come to class prepared to

learn". Do not arrive blank, as if to be written upon; arrive actively curious and hopefully lecture will be enlightening.

A word of caution: Do not be upset if you cannot immediately make sense of a problem, or you do not understand the answer to the problem. If you are struggling to solve a problem, your mind is working and you are learning ways to piece the information together. This is the actual value to you in taking this course; not the facts you assemble, but your method of learning new, complex ideas. If you rely too heavily on looking up answers before you finish trying it yourself, you will gain a false sense of confidence with the material. It is important to struggle a bit with problem solving, to force yourself to find your own way. This doesn't happen immediately, in fact, we will be working on developing this skill all summer long!

Online Homework with Achieve: These assignments will be worth credit toward your grade in the course. This work is meant to be a learning experience with immediate feedback. Your independent work is graded and recorded by the online program. **Online homework is each student's independent work and collaboration is not acceptable.**

Homework due dates are listed in Canvas and on the lecture schedule. Pay attention to due dates and complete assignments on time. Falling behind in a 5-week course severely inhibits chances for success on exams.

Attendance: It is most highly recommended that students attend all class meetings. Students are responsible for making up any missed work in either lecture or recitation on their own. If a student is sick and must miss a lab, please contact Prof. Shahu in order to sign up for the scheduled make up lab.

All lectures, recitations and lab meetings will occur synchronously and in person. It is very important that students diligently keep to the rigorous summer schedule. Note that because we are completing a 15-week semester in just 5 weeks there is very little room to adjust for falling behind.

Laboratory: Students are expected to be prepared in advance for each experiment. See the lab guidelines posted on Canvas for details. The lab is a separate course, CHEM 1105. The lab grade is therefore reported to the registrar separately from the lecture grade. All students registered for CHEM 1100 must also be registered in CHEM 1105 unless they are excused with permission from the instructor.

Grading: Chemistry can be a very difficult body of material to master and the last thing you need is the added pressure of competing with each other for grades. Therefore, the grades will be determined by how the scores fit into a fixed grading system, not how they compare with other scores in the class.

There will be no scaling of grades. Note that an A will represent significant achievement, a very difficult, but certainly not impossible accomplishment.

Assessments

Exam I	20 %
Exam II	20 %
Final exam	30 %
Quizzes	20 %
Online Homework	10 %

Given below are the ranges for final grades in the course.

93.0% and above	A
90.0-92.9	A-
87.0-89.9	B+
83.0-86.9	B
80.0-82.9	B-
77.0-79.9	C+
73.0-76.9	C
70.0-72.9	C-
67.0-69.9	D+
60.0-66.9	D
below 60%	F

Feedback: Please feel free to send me e-mail if you have questions or if you need anything clarified. Obtaining a coherent knowledge of chemistry is one of the first steps toward your goal and I am here to assist.

YOU ARE REMINDED OF THE PLEDGE YOU HAVE MADE UPON ENROLLING AT GU:
In the pursuit of the high ideals and rigorous standards of academic life, I commit myself to respect and uphold the Georgetown University Honor System: To be honest in any academic endeavor, and to conduct myself honorably, as a responsible member of the Georgetown community, as we live and work together.

GOOD LUCK !!! and **ENJOY !!!**

Course Schedule for CHEM 1100 Summer 2025

Date		Topic	Reading
2Jun	Mon	Introduction to CHEM 1100 Structure & Function: Allotropes Atomic Nature of Matter Assignment: Skill Check Worksheets	Course Documents Posted Notes Fundamentals A-C F1-30 A PDF of pp 1-46 of the Fundamentals Section from the 7th edition of the text is posted on Canvas. Pages F1-30 in the 8th edition correspond to F1-28 in the 7th edition. All students need the 8th edition of the text. The pdf is provided for your initial convenience.
3Jun	Tue	**Focus 1: Atoms** Millikan Oil Drop Experiment, Rutherford Gold Foil Experiment, Electromagnetic Radiation Recitation: Qs on skill check worksheets and Fundamentals HW: Units, Unit Analysis, Sig Figs	Topic 1A
4Jun	Wed	Atomic spectra, Photoelectric Effect, Blackbody Radiation, Wave-Particle Duality, HUP Quiz 1 at 11AM – Fundamentals F1-30 Background Reading Module	1A-1B Fundamentals E F41-48
5Jun	Thu	Wave Functions, Particle in a Box Model Hydrogen-like AOs, Quantum Numbers Quiz 2 – Topic 1A – Take home Due no later than 6PM June 8th via submission to Canvas	1B-1D
9Jun	Mon	Catch up and Review Quiz 3 at 11AM – Topic 1B **Achieve HW 1 and 2 due by 11:59PM***	1A-1D

10Jun	Tue	**Exam 1 (1A-1D) 8:10-10:00AM** Electron Configurations 10:30-11:25AM	1A-1D 1E
11Jun	Wed	**Focus 2: Molecules** Ionic vs. Molecular Compounds, Naming Periodic Table, Periodicity Molecules: Covalent Bonding, Lewis Structures	Fundamentals D F31-F38 & Posted Recording 1F-2A 2B-2C
12Jun	Thu	Properties of Bonds Shapes of molecules, VSEPR Theory, Polarity Valence Bond Theory and Hybrid Orbitals	2D & Posted Recording 2E 2F
16Jun	Mon	Molecular Orbital Theory Quiz 4 at 11 AM – Naming and Periodic Trends	2G
17Jun	Tue	**Focus 3: States of Matter** Gases: Physical Properties, Partial Pressures and Stoichiometry. Problem Solving with MO theory Quiz 5 at 11AM – Lattice Energy & Lewis Structures **Achieve HW 3 and 4 due by 11:59PM***	3A-3B & Recorded Lecture Fundamentals F F50-55
18Jun	Wed	Kinetic Molecular Theory and Real Gases Quiz 6 – Molecular Geometry, Hybrid Orbitals, Polarity Take home Due no later than 6PM June 22rd via submission to Canvas	3C, 3E
19Jun	Thu	**Holiday**	

23Jun	Mon	Review and discuss topics on Exam 2 Quiz 7 at 11AM – MO Theory **Achieve HW 5 and 6 due by 11:59PM***	1F, 2A-2G, 3A-3B
24Jun	Tue	**Exam 2 (1E-1F, Naming, 2A-2G, 3A-B) 8:10-10:00AM** Intermolecular Forces and Properties of Liquids 10:30-11:25AM	3D,3F
25Jun	Wed	Crystalline Solids, Unit Cells, Calculations	3G
26Jul	Thu	**Focus 4: Thermodynamics** Heat, Work, Calorimetry **Achieve HW 7 due by 11:59PM***	4A-4C
30Jun	Mon	Thermochemistry	4C-4D
1Jul	Tue	Enthalpy and Hess's Law Quiz 8 at 11AM – Solids **Achieve HW 8 and 9 due by 11:59PM***	4D-4E
2Jul	Wed	Review, catch up, practice, prepare for final exam	
3Jul	Thu	**Final Exam 8:15 – 11:15 AM** **Achieve HW 10 due by 11:59PM***	Cumulative

***Achieve HW extension requests can be made via email.**

No makeup quizzes, lowest quiz grade is dropped. Note quiz 2 and 6 submission time is 6PM.

No makeup exams, Final Exam can count in place of a missed exam.

Course Schedule for CHEM 1105-10/11 Summer 2025

Date	Exp #	Topic All Due Dates are for submission on Canvas no later than 11:59 PM ET	Post-Lab Questions
2 Jun		Check-in, Lab Safety, SDS & Tour of the Lab Intro to Experimental Error, Statistics and Graphing Students will purchase goggles from the chemistry stock room at this time.	
3 Jun	Handout	Lab safety quiz (P/F) ALL students must take it and pass it in order to be allowed to continue with the lab course. Lab 1: Calibration of Glassware (Due 6/5)	Complete Worksheet
4 Jun	12 & S19	Lab 2: Atomic spectra (Due 6/9)	5&7 & 1-4
5 Jun	Handout	Lab 3: How Many Waters of Hydration in Epsom Salt? (Due 6/10)	Complete Worksheet
9 Jun		No lab (if you have missed a lab, you must make it up at this time)	
10 Jun		No Lab	
11 Jun	S29	Lab 4: Determining the Concentration of a Solution: Beer's Law (Due 6/16)	1-6
12 Jun	S37	Lab 5: Conjugated Dyes PIB Model (Due 6/17)	1-5
16 Jun	11	Lab 6: Lewis Structures and VSEPR Model (Due 6/18)	1-6
17 Jun	S47	Lab 7: Properties of Gases (Due 6/23)	1-7
18 Jun	13B&S53	Lab 8: Molar Mass of a Vapor (Due 6/24)	1-4 & Gas Law Prob. 1-9
19 Jun		Juneteenth - Holiday	
23 Jun		No lab (if you have missed a lab, you must make it up at this time)	
24 Jun		No Lab	
25 Jun	S61	Lab 10: Structure of Solids (Due 6/30)	Complete Worksheet
26 Jun	S75	Lab 11: Enthalpy of a Chemical Reaction (Due 7/1)	Formal Report
30 Jun	S55	Lab 9: Intermolecular Forces (Due before leaving lab, 6/30)	1-5
1 Jul		Lab/Check out if not enrolled in Chem 1205/1200	
2 Jul		No Lab	
3 Jul		No Lab	

CHEM 1105 General Chemistry Laboratory I
2025 LABORATORY GUIDELINES

BEFORE LAB - Pre Lab Assignment: Due no later than 11:59 PM ET the night before Lab

1. Read the experiment.

2. Complete ***all*** of the pre-lab questions and write an outline of the lab procedure.

3. All answers to the pre-lab questions and an outline of the lab procedure are to be submitted to Canvas by 11:59 PM ET the night before the scheduled lab as pdf files. **Any student that does not submit an outline and answered pre-lab questions will not be allowed to do the lab or schedule a make-up lab, therefore a score of zero is assigned for that lab.**

DURING LAB

1. Please **arrive on time**, at 12:10 PM for each day there is a scheduled lab.

2. **Place all belongings** not necessary for the lab in the lockers before entering the lab. You may secure your belongings with your lab drawer lock.

3. The lab will begin with a **PowerPoint presentation** describing the theory, experiment and calculations. Since students will have already submitted the prelab questions and outlines, this will be a good opportunity for asking questions about the details. Students can also get feedback on prelab questions.

4. **Strictly observe all safety rules**. Goggles must be worn at all times; noncompliance will result in dismissal from the lab. Shorts, sandals (any sort of open toed shoe) and shirts that expose the arms and abdomen may not be worn in the lab. Please dress appropriately before attending the lab. Students without proper clothing will not be allowed in the lab. **Violation of any part of this rule can result in a zero for the lab experiment and a failing grade in the lab course.**

5. **Observe good lab technique**, e.g., do not cross contaminate reagents, use hoods when specified, be aware of flames, keep work area neat, dispose of hazardous wastes in labeled containers provided, etc. Glass waste may only go to glass waste containers. Other trash is not to be disposed of in glass waste containers. **Poor lab technique will result in point deductions from the lab report.**

6. **Reports and worksheets are to be written in ink.** All data must be entered into the data sheet for the experiment**. Do not obliterate errors, draw a single line through your error** and continue on the same report sheet. (i.e., do not erase or scribble out mistakes, do not re-write report sheets, and do not write data on separate sheets of paper)

7. **Clean your lab bench and common work areas before leaving the lab**. There should be no solids in the sink, all gas jets should be turned off and all your equipment should be replaced in your drawer and your drawer locked. All supplies used during the lab must be returned to the work- station bin.

8. **Have your instructor sign and date your report sheet** when you finish. All data collection must be complete before leaving the lab. Work space clean up must be complete to get your instructor's signature.

AFTER LAB

1. Certain questions at the end of each lab are to be completed and turned in with the lab report. **See the lab schedule for these assignments**. (Do not confuse this with completing all the pre-lab questions for your pre-lab assignment.)

2. Submitted reports must have all data and calculations. Answers to the questions, graphs, etc., are to be submitted with the corresponding lab report. Reports must consist of one file with all the required pages. **Each student submits their own lab report even though they worked in pairs.**

3. **A formal lab report is required for the experiment "Enthalpy of a Chemical Reaction"**. The formal report has the format of an American Chemical Society (ACS) journal article consisting of the following sections: Abstract, Introduction, Experimental Method, Results, Discussion, Conclusion and References. Details about the formal lab report format will be posted on Canvas.

Lab reports/post-lab assignments will be submitted on Canvas as a single pdf file. Scan Genius is a useful app for this purpose. Your phone can be used as a scanner to include all handwritten pages with the lab report. Scanning is not necessary for the formal as that will be a typed Word document.

Lab reports/post-lab assignments are due no later than 11:59 PM ET according to the due dates on the syllabus. A 10-point deduction will be assessed if the report/post-lab assignment is a day late. Each subsequent day will result in a 10-point deduction from the lab score. Lab reports/post-lab assignments will not be accepted more than 3 days late.

The lab report grade will depend upon the **accurate presentation of data graphically**. All graphs must be done in Excel. You must, title every graph and all axes must be properly labeled and scaled. If you are unsure how to correctly present your graphical data, please ask! It is all part of your learning process. Read "CHEM 1105 Grading" for important information concerning your evaluation in this course.

Make-up Policy: Make-up will be allowed only in case of sickness (with a physician's note) or truly extenuating circumstances. Contact Prof. Shahu to work out a solution concerning missed labs.

HAVE FUN! We hope it is possible for you to enjoy the online lab environment. We hope to make it collaborative, conversational and illustrative of techniques. Think about what the experiment is designed to prove and observe closely how the data was collected in the video. Ask questions!

Summary of Grading Criteria
in General Chemistry Laboratory I 2025

100% of the grade in Gen Chem Lab is based on lab work

The goal for the assessment of students in the General Chemistry Lab is to maintain an environment that is both fair and academically challenging. As the first lab course taken by science majors, Chem 1105 plays an important role in exposing students to the experimental nature of chemistry. While you do not get to do independent research, you do get to try many of the experimental techniques utilized by researchers throughout academia and industry. This course is a "practical" course in the sense that it is about *doing* experiments, not just *knowing about* experiments.

The lab work is assessed based on:

1. Student preparedness for experiments……..10%
2. Technique, skill and safety in the labs……..10%
3. Experiments without formal lab reports……60%
4. Experiment with formal lab report…….……20%

1. **Preparedness** is evaluated based on the submission of an **outline of the lab procedure** and **completed pre-lab questions**. There is a deduction on your lab report of 10 points if the outline of the lab is not done. Sometimes, certain pre-lab questions are graded.

2. **Experimental technique** during the lab is very important and we hope to see your skills improve throughout the semester. Poor technique will be penalized, especially the contamination of reagents, improper disposal of wastes and not cleaning up. It is very important that all equipment and glassware are handled correctly, cleaned and put away appropriately when the lab is finished. Lab benches must be wiped down at the end of each lab. Sinks must be cleared of solids. All **safety regulations must be followed consistently**. Wastes must be disposed of properly. General instructions are given at the beginning of the semester and specific instructions are given at the beginning of each lab. If you have any questions, please ask.

3. The **criteria for grading each lab report will be determined after you have done the lab**. Each lab is different, so points are assigned to emphasize different aspects of the lab. Each lab emphasizes different skills, e.g., problem solving, graphing, unknown determination, etc. Some labs have extensive calculations and problems to solve, so most of the credit is associated with doing these problems correctly.

4. If you have a **question about the grading of the lab report, write an email to the TA and the Professor within 24 hours of the posting of the grade**. The **whole lab report** will then be **regraded**. No regrades will be accepted after this period.

Data must be written into the report sheet in ink. Original data must be submitted with every report. Do not rewrite lab data. Do not erase your work as you proceed with the lab.

The lab report grade also depends upon the accurate presentation of data graphically. **All graphs must be presented in Excel.** You must title every graph and all axes must be properly labeled and scaled. An Excel tutorial is posted on Canvas for additional assistance.

Students working as a pair in the lab share data because they acquire the data together. This is perfectly reasonable. **All other data sharing is dishonest**. If you believe your results are in error, you are encouraged to write an explanatory note to show your understanding of the situation and possible sources of error.

Regardless of how the points are allocated in a particular lab, it is expected that for every lab experiment you will do your best to get the best results. This means being prepared and working carefully while you are in the lab. **Academic honesty is expected at all times.** To a chemist, this means no fabrication of data, no exchange of data, and no changing of data. Students working as a pair in the lab share data because they acquire the data together. This is perfectly reasonable. All other data sharing is dishonest. You are held to a high standard to get good results, but there is not always a penalty for poor results. At times, credit will be deducted if there is a very large error in your reported outcome for an unknown determination.

Some examples of dishonest behavior to be rigorously avoided: changing data in lab reports, copying data from another student's lab report, not contributing to the group on team projects, printing several copies of the same graph, introduction or conclusion and sharing amongst the group, allowing your partner to analyze all the data, having one group do half the lab while another group does the other half and then sharing the results. These are actions that I would not expect of any student. Plan well and be organized so you do not fall into unethical behavior in an attempt to keep up with your course work.

Academic Honesty: ALL STUDENTS ARE EXPECTED TO EXERCISE HONESTY IN THEIR WORK. YOU ARE REMINDED OF THE PLEDGE YOU HAVE MADE:
In the pursuit of the high ideals and rigorous standards of academic life, I commit myself to respect and uphold the Georgetown University Honor System: To be honest in any academic endeavor, and to conduct myself honorably, as a responsible member of the Georgetown community, as we live and work together.

Policy on Artificial Intelligence: The current official policy of the Georgetown Honor Council is that students using AI-generated text and representing it as their own work constitutes a violation of academic integrity. In line with this policy, any usage of AI in the context of this course shall be disclosed, the sources shall be properly cited, the accuracy of AI-generated outputs shall be verified, and their potential biases shall be checked. Non-disclosure of using AI to help complete your assignments will be treated as a case of plagiarism and referred to the Honor Council. While AI tools may be used to generate ideas/topics for your assignments, formulate structure for your written work, and even help you find existing research on the topic, the writing and revising must be your own. Verbatim use of AI-generated outputs, even properly disclosed and cited, will also be treated as a case of plagiarism and referred to the Honor Council.

Given below are the **ranges for the final grades** in the course. If your average is in this range, you will get at least the letter grade indicated.

93% and above	A
90-92.9	A-
87-89.9	B+
83-86.9	B
80-82.9	B-
77-79.9	C+
73-76.9	C
70-72.9	C-
67-69.9	D+
60-66.9	D
below 60%	F