CHM2050:

HONORS GENERAL CHEMISTRY 1 FOR MAJORS

FALL 2025 | 3.00 CREDITS | CLASS NUMBER: 18409 & 18410

GENERAL INFORMATION

INSTRUCTOR

Name: Alberto Perez
Office Building/Number: LEI 240F
Phone: 392 5400
Email: perez@chem.ufl.edu
Office Hours: held in **LEI308,** Wednesday Period 4 (10:40-11:30), Thursday Period 6 (12:50-1:40)

TEACHING ASSISTANTS

Teaching Assistant(s):
Name: Imesh. imesh.ranaweera@ufl.edu - **Office Hours:** TBA
Name: Binod. bl.perera@ufl.edu - **Office Hours:** TBA

Undergraduate Teaching Assistant(s):
- **Office Hours:** TBA
Nicole Pfefferkorn, npfefferkorn@ufl.edu

Ella Lawrence, ellalawrence@ufl.edu

Omar Alhallaq, omaralhallaq@ufl.edu

Kara Wegrzynek, wegrzynekk@ufl.edu

Medina Sanwari, medina.sanwari@ufl.edu

Elise King, eliseking@ufl.edu

Katie Natour, k.natour@ufl.edu

Siya Patel, siyapatel@ufl.edu

Carmen Karsonovich, ckarsonovich@ufl.edu

Raquel Rodriguez-Flores, rrodriguezflores@ufl.edu

Ahmad, Adam, ahmad.ad@ufl.edu

COURSE DESCRIPTION

First semester of the CHM 2050/2045L and CHM 2051/2046L sequence. Stoichiometry, atomic and molecular structure, the states of matter, reaction rates and equilibria.

PREREQUISITES/COURSE FEES/CREDITS

Prerequisites: CHM 1025 with a minimum grade of C or a passing score on Chem placement plus no attempt of CHM 1025 w/grade. Corequisites: CHM 2045L. No course fees. 3 credits.

COURSE INFORMATION

COURSE MATERIALS

'**Chemistry: Atoms First**' 2e by OpenStax. The text is required and will be used for lecture preparation and practice problems (see course schedule). It is freely available here: https://openstax.org/details/books/chemistry-atoms-first-2e.

Or: **Chemistry: The Molecular Nature Of Matter And Change** by Martin Sillberberg. Currently in the 10th edition, but any edition would work.

Calculator: You must have your own scientific calculator. Calculators may be used on homework and exams but may not be shared. You may not use graphing calculators or any calculators that are capable of wire–less communication on exams. Simple inexpensive scientific calculators such as the TI-30 series or the Casio fx-260 are acceptable and sufficient for any problem encountered on exams.

COURSE OBJECTIVES

The course will provide instruction in the basic concepts, theories, and fundamental terms of chemistry. At the very core of chemistry is the concept of the atom, its structure, and bonding interactions with other atoms. Understanding the atom provides a conceptual foundation for the many aspects of 'macroscopic' chemistry. Major scientific developments will be reviewed and their impacts on society, science, and the environment examined. Focus will be placed on the relevant processes that govern biological and physical systems.

One of the goals of this course is to help you develop collaborative skills by working in groups to interpret and analyze class material. This will not only deepen your understanding of challenging concepts but also give you an opportunity to connect with peers who may be pursuing the Chemistry major or Honors track. Many students in this course are curious about research, so one of our key activities will involve interviewing graduate students. These conversations will offer valuable insights into what research in chemistry looks like, how general chemistry concepts apply, and what paths are available to you as you advance in your academic career.

STUDENT LEARNING OUTCOMES

With what they learn students will be able to: (1) formulate empirically testable hypotheses relevant to the study of physical and life processes; (2) use logical reasoning skills through scientific criticism and argument; and (3) apply techniques of discovery and critical thinking to predict and evaluate outcomes of experiments.

Upon successful completion of CHM2050 each student will:

• Have a working knowledge of the basic concepts, theories, and fundamental terms of chemistry and understand the relevant processes that govern chemical systems.

• Grasp the major scientific developments that have led to the current state–of–the–art in the field.

• Be able to assess impacts chemistry has on society, science, and the environment.

• Be familiar with and capable of using the scientific method when discussing scientific facts as they relate to chemistry.

• Know how to formulate empirically testable hypotheses derived from the study of physical and chemical processes.

• Use logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to predict and evaluate outcomes of experiments.

GRADED WORK

GRADED COURSE COMPONENTS

Exams (80%): Three during-term exams will be given (see schedule above). These exams will be conducted during class periods. Exam duration will be 115 minutes. The final exam is cumulative and worth 20% of your grade, the same as a during-term exam. It will have a duration of 120 minutes and take place in ROOM TBA during the time the registrar has set for the final exam in this course (Final Exam: 12/08/2025 @ 3:00 PM - 5:00 PM). Students who have reached the desired grade level for the course may opt-out of the final exam.

For exams you must use a non-graphing non-programmable scientific calculator with log, ln, root, and exponent (scientific notation) functions. Be sure to also bring pen or pencils and bring your UF ID card. Remember your section number and team element. In this course you are permitted to use a letter-sized sheet of paper with your own hand-written notes on front and back in all exams. No other notes, papers, cell phones, or other electronic devices can be in view during exams.

Homework and Peer Grading (10%): You will be assigned 10 homeworks, each equal to 1% of your grade, for a total of 10% of your grade. Graded HW is assigned weekly except during weeks of during-term exams. Weekly graded homework assignments involve conceptual and numerical problems that require the student to apply the learned concepts to specific examples in different areas of experimental and theoretical chemistry including physical and life processes. Homework problems may also include reading material, typically a topically related original research article requiring the student to summarize and comment in their own words. HW assignments will be given over the course of the semester. They will normally be published on Canvas by Tuesday afternoon and are due on Wednesday morning of the following week by 10:00am, submitted on Canvas.

Late HW policy: HW is late if it is not delivered by the deadline! Each day late will incur a 20% deduction of the total points value. Do your HW! By doing HW problems you will collect essential points toward your course grade and will be better prepared to deal with problems on exams. HW problems come from many different sources, including the instructor's own personal list of problems. Since these will be the hardest problems you will encounter in CHM2050, you may form study groups with other students to work on them. However, simply copying someone else's work is plagiarism and will be treated as such! You need to understand how to solve these problems. One way to test your understanding is to explain the solution for a problem to someone else.

After HW is collected on canvas, we will liberate the grading key for that homework, and assign a random HW from one other student in the class. You will grade with the key. We have found this to be a good way of: 1) seeing how I would solve the problem by going over the key, 2) pay attention to trying to understand how presentation helps understand what you have done – If your peers cannot understand what you did why, neither can we. This will help you improve how you present HW and exams through your adventures at UF.

Participation Grade - iclicker (5%): Our class will use the iclicker tool for in-class and graded for participation.

Research Connections Project (5%):

Objective:

To deepen your appreciation for how general chemistry concepts are applied in real research environments and to expose you to the diverse types of research conducted across scientific disciplines at UF.

What You Will Do:

1. Group Interviews: You will be assigned to a group (~10 students per group). Each group will identify and interview three graduate students or research undergrads from three different research labs across campus. Each group will explore:

    -What is the focus of the research?

    -How do general chemistry concepts show up in their research? Be specific.

    -What has the grad student learned through research that surprised or inspired them?

    -What might be good skills to acquire/things to be aware of if interested in undergraduate research?

2. Group Post (Due by November 15th – earlier is better): Your group will create a short write-up (~500 words) summarizing your findings and insights, to be posted on discussion forum in Canvas.

3. Discussion Engagement (By December 1st): Each student must make at least 5 meaningful comments or questions across posts from other groups. Comments must demonstrate reflection and critical thinking about research environments, interest areas, or connections to course content.

4. Exam Question: One question regarding interviews you have done might come up in the last midterm or final.

Extra Credit Opportunity (one per student):
Protein Visualization in VR (Replaces one HW or adds 40 points to HW total)

Explore a real-world molecular system using **Nanome in VR**! For this extra credit, you'll choose a **protein of interest involved in disease** from the Protein Data Bank. The protein must be **interacting with either a partner protein or a small-molecule inhibitor**.

What You'll Do:

1. **Schedule a VR session** with a TA to use the Nanome VR headsets.
2. **Load your chosen protein complex** into Nanome.
3. **Explore the structure** using different molecular representations (e.g., cartoon, surface, sticks).
4. **Identify and describe key molecular interactions** (e.g., hydrogen bonds, hydrophobic pockets, salt bridges).
5. **Connect what you observe to course concepts**—this could include structure-function relationships, intermolecular forces, or active site geometry.
6. **Record an interactive VR presentation** in Nanome. Imagine explaining the protein and its interactions to someone unfamiliar with it. Highlight:
    - The **protein's biological role**

- Its **relevance to disease**
- The **interactions** it forms with its binding partner

Grading will be based on the VR presentation. We will check for accuracy, efficient communication, and quality.

GRADING SCALE

Letter Grade	Number Grade
A	**100-90**
A-	**89.9-86**
B+	**85.9-83.0**
B	**82.9-80.0**
B-	**79.9-77.0**
C+	**76.9-73.0**
C	**73.0-69.0**
D+	**68.9-66.0**
D	**66.4-62.5**
D-	**62.9-60.0**
E	**59.9-0**

See the UF Catalog's "Grades and Grading Policies" for information on how UF assigns grade points.
Note: A minimum grade of B is required to earn Academic points towards your Honors Completion Requirements. (Exception: Honors Quest I and II sections require a C). Once you have earned your final grade in this course, please upload the course information and final grade from your Unofficial Transcript into your Honors Canvas Cohort: Honors Completion module to earn Honors Milestone / Completion credit.

COURSE POLICIES

EXAM POLICIES

University examination and reading day policies can be found at: https://catalog.ufl.edu/UGRD/academic-regulations/examination-policies-reading-days/.

Exam Absences: Will be handled in accordance with official UF academic regulations. For more information, see https://catalog.ufl.edu/UGRD/academic-regulations/. See below for further clarification for two different types of situations.

(1) Conflicts with other events: Acceptable reasons to miss a scheduled exam include religious holidays, military obligations, special curricular requirements (e.g., attending professional conferences), or participation in official UF-sanctioned activities such as athletic competitions, etc. For more information on such absences see the official

UF Policy at https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/#absencestext. If you must be absent for an exam due to a documented and approved conflict known in advance, you must e- mail your instructor (perez@chem.ufl.edu) the documentation at least one week prior to the scheduled exam date and an early conflict exam will be scheduled for you.

(2) Missing an exam due to an emergency or sudden illness: If you are absent for an exam due to an unpredicted documented medical reason or family emergency, you must contact the instructor as soon as possible, and you may be asked to have your excuse verified by the Dean of Students Office (DSO). Your instructor will follow UF academic regulations in evaluating the notification and/or documentation received by you or by the DSO on your behalf. Once your instructor is satisfied with the validity of your exam absence a make-up exam will be scheduled after a reasonable amount of time, i.e., before the end of the semester. If your documentation is deemed insufficient to excuse your absence you will receive a zero on the missed exam.

Exam Grade Disputes: Any and all exam grade disputes must be brought to the instructor's attention before the last day of the semester.

Average/Replace Policy: To alleviate the stress of potential issues that do not fall under officially sanctioned absences, we have incorporated an "average/replace" policy (the lowest of the three progress exams will be replaced by the average of the three progress exams). The "average/replace" policy will help minimize the impact of a single poor performance.

Tip for Exam Preparation: While studying for your exams, prepare your note sheet with important information, equations, concepts, anything that you might need and don't want to memorize for your exams.

HOMEWORK

Homework (HW): HW assignments will be given over the course of the semester. They will normally be published on Canvas by Tuesday afternoon and are due on Wednesday morning of the following week by 10:00am, submitted on Canvas. We will make the answers and rubric available and you will be randomly assigned someone else's HW for peer grading, to be submitted by Thursday at 10am. The goal is for you to catch the presentation issues that might improve your own homework, as well as process the answers of the HW.

Late HW policy: HW is late if it is not delivered by the deadline! Missed homework **without an excused absence** is penalized with each day late incurring a 20% deduction of the total points value. Do your HW! By doing HW problems you will collect essential points toward your course grade and will be better prepared to deal with problems on exams. HW problems come from many different sources, including the instructor's own personal list of problems. Since these will be the hardest problems you will encounter in CHM2050, you may form study groups with other students to work on them. However, simply copying someone else's work is plagiarism and will be treated as such! You need to understand how to solve these problems. One way to test your understanding is to explain the solution for a problem to someone else.

PARTICIPATION GRADE – ICLICKER AND PEER GRADING

In-class iclicker activities will allow a few points towards the final grade.

CANVAS

Access your Canvas e-learning account by clicking on the 'Log-In to E-Learning' link on the web site, http://lss.at.ufl.edu/ where you will have to supply your Gatorlink credentials to log in. Please, do this at your

earliest convenience and make yourself familiar. Canvas will be primarily used by TAs and the instructor to communicate with the class. Please make sure to monitor the announcements on a regular basis. If you experience technical problems when using Canvas, please contact the UFIT helpdesk (http://helpdesk.ufl.edu/, 352-392-4357 M–F from 8:00 am till 5:00 pm,email helpdesk@ufl.edu or learning-support@ufl.edu).

HONOR STUDENT REQUIREMENTS

A minimum grade of B is required to earn academic points towards your Honors Completion Requirements. Once you have earned your final grade in this course, please upload the course information and final grade from your Unofficial Transcript into your Honors Canvas Cohort: Honors Completion module to earn Honors Milestone/Completion credit.

MATH REQUIREMENTS

Students are expected to have a solid grasp of pre–calculus algebra and trigonometry and need to have college credit for MAC1147 on their record. Ideally, they should be co–registered for MAC2311 (Calculus 1). During lectures, concepts from calculus may be briefly discussed but will not appear on exams. When derivatives or integrals are mentioned the focus is primarily on their graphical interpretation to aid understanding of chemical or physical concepts. When homework problems require their use, feel free to employ computational solvers such as Wolfram Alpha: http://www.wolframalpha.com/.

MAJORS ONLY COURSE

Majors Only: The two sections of this course 205H (class #18409) and 205R (class #18410), are primarily for chemistry and biochemistry majors. This allows for a smaller classroom environment more conducive to an interactive learning environment. It also allows for chemistry/biochemistry students to get to know each other sooner. While we cover the same topics as the main CHM2045 sections there are a few important differences to note: We will focus on topics that are important to students who will take more advanced chemistry courses in the future. That means that electronic atomic structure will be discussed to a greater extent and we will focus on Lewis structures. Less time will be spent on drills and more on modern applications of chemistry. We do not have a recitation session. However, example problems will be provided and solved in class. Homework sets will contain long–response problems that focus on understanding the material and students are encouraged to form study groups to work together on these problem sets. No worksheets are used in our sections but relevant problems from the textbook will be pointed out for voluntary self–study.

COURSE BEST PRACTICES

Study Habits: The course demands on average 10 – 12 hours/week of work outside of class. The class will not be taught 'by the book.' It is expected that you read the assigned pages from the textbook (or corresponding chapters in comparable textbooks) before coming to class. The instructor will build on this material and you are expected to be able to follow in–class discussion. The course demands a regular sustained effort throughout the semester. Most importantly, do not allow yourself to fall behind! The material builds up and you need to stay ahead of the game. If you find that you are not grasping essential material by reading the textbook and following in–class discussion, seek help! Visit your instructor's and/or TAs' office hours, talk to other students, compare notes, form a study group, consult other textbooks, etc.

Study Groups: It is highly encouraged to form study groups and meet with them on a weekly basis to discuss course material and to prepare for exams. In this course it is permissible to work on HW assignments together with

your study partners. However, you are responsible to fully understand your own worked–out HW submissions and may not just copy someone else's

Group-Me: The TAs will set up team group–me groups for easier communication among teams for their projects. The class is encouraged to set up a whole–class group–me as well.

Cell Phone Etiquette: Please put all cell phones or other electronic devices on "silent mode" during all class periods. Please do not leave the classroom during lecture to make a phone call. Use your cell phone for 'iclick' activities while class is in session. Thank you

Class Attendance: Regular attendance is essential for your success in this class. However, we will not do roll–calls. Repeated absence in class will make it very difficult to earn full participation points. For further information on UF's attendance policies which are in effect for this course, see: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

COURSE CALENDAR

Unforeseen circumstances including university closure (weather related, etc.) may necessitate a schedule adjustment. Any changes are communicated promptly to students and posted to Canvas.

Holidays: September 1: Labor Day; Homecoming: October 17 – 18; November 11: Veterans Day; November 24 - 29: Thanksgiving Break

Date	Topic	Readings/Preparation	Silbergberg
August 21, 2025	Discussion of Syllabus and review of chap. 1, Phases, Matter, Physical and Chemical Properties, Measurement Units, Unit Conversion, Greek Prefixes, Significant Figures.	Chap. 1 Pgs. 9-47	Chapter 1 Pgs 3-30
August 26, 2025	Review of chap. 2, Historic Evolution of Atomic Theory, Atomic Structure, Symbols, Chemical Formulae.	Chap. 2 Pgs. 61-93	Chapter 2 Pgs 41-80
August 28, 2025	Review of formula mass, empirical/molecular formulae, and molarity, other concentration measures	Chap. 6.1 – 6.4 Pgs. 277-300	Ch 3 pgs. 93-112
September 2, 2025	Stoichiometry, Reaction Yields, Quantitative Chemical Analysis.	Chap. 7.3 – 7.5 Pgs. 328-345	Ch. 3.4 Pgs. 113-124
September 4, 2025	Classification of Chemical Rxns, Acid/Base, Precip., Redox	Chap. 7.1 – 7.2 Pgs. 307-327	Chapter 4 141-185
September 9, 2025	Gases, Pressure, Volume, Amount, Temp., Ideal Gas Law.	Chap. 8.1 – 8.2 Pgs. 359-380	Ch 5 Pgs. 201-217,

Date	Topic	Readings/Preparation	Silbergberg
September 11, 2025	Stoichiometry of Gases, Mixtures, Rxns, Molecular Kinetic Gas Theory	Chap. 8.3, 8.5 Pgs 381-401	Ch 5. Pgs. 218-239
September 16, 2025	Thermochemistry Basics, Calorimetry.	Chap. 9.1 – 9.2 pgs. 419-440	Ch 6 Pgs. 253-263
September 18, 2025	Enthalpy, Bond Strengths of Ionic and Covalent Bonds.	Chap. 9.3 – 9.4 Pgs. 441-462	Ch 6 Pgs. 264-279
September 23, 2025	Exam #1 (all of the above)		
September 25, 2025	Fundamental Forces and Energy, Waves, Blackbody Radiation, Photoelectric Effect, Atomic Line Spectra, The Bohr Atomic Model.	Chap. 3.1-3.2 Pgs. 103-119	Ch7 291-317
September 30, 2025	Quantum Mechanics, Electrons in Atoms, Atomic Orbitals, and Electron Spin	Chap. 3.3 Pgs. 120-132	Ch 8 Pgs. 328-339
October 2, 2025	Pauli Exclusion Principle, Electronic Structure of Atoms, Electron Configuration, Aufbau Principle, Quantum Numbers.	Chap. 3.4 pgs. 133-140	Ch 8 Pgs. 328-339
October 7, 2025	The Periodic Chart, Periodic Trends in Element Properties, Molecular and Ionic Compounds.	Chap. 3.5 – 3.7 Pgs 141-161	Ch 9 363-373
October 9, 2025	Electronegativity, Ionic Bonding, Covalent Bonding, Nomenclature, Lewis Structures	Chap. 4.1 – 4.4 Pgs 175-201	Ch 9 384-390
October 14, 2025	Lewis Structures, Formal Charges, Resonance, Molecular Structure and Polarity, VSEPR Theory	Chap. 4.4 – 4.6 Pgs 192-220	Ch 10 Pgs. 399-411,
October 16, 2025	VSEPR Theory	Chap. 4.6 Pgs 206-220	Ch 10 Pgs. 412-426,
October 21, 2025	Valence Bond Theory, Hybrid Atomic Orbitals.	Chap. 5.1 – 5.2 Pgs 237-252	Ch 11 Pgs. 437-448,
October 23, 2025	Inorganic Molecules, MO Theory, Diatomics, Bond Order	Chap. 5.3 – 5.4 Pgs 253-270	Ch 11 449-460

Date	Topic	Readings/Preparation	Silbergberg
October 28, 2025	Exam #2 (Ch 3,4,5)		
October 30, 2025	Intermolecular Forces, Properties of Liquids, Phase Transitions.	Chap. 10.1 – 10.3 Pgs. 475-502	Ch 12 467-485
November 4, 2025	Phase Diagrams, Solid State, Crystalline Solids, Lattice Structure	Chap. 10.4 – 10.6 Pgs 504-533	Ch12 486-506,
November 6, 2025	Dissolution Process, Electrolytes, Solubility. Colligative Properties and Colloids	Chap. 11.1 – 11.3, 11.4 – 11.5 Pgs 547- 591	CH 13 531-566
November 11, 2025	Chemical Rxn Rates, Factors Affecting Rates	Chap. 17.3 – 17.4 Pgs 807-824	Ch16 687-702,
November 13, 2025	Rate Laws, Differential and Integral Rate Laws.	Chap. 17.3 – 17.4 Pgs 807-824	Ch 16 703-710,
November 18, 2025	Reaction mechanisms	Chap 17.5-17.6 Pgs 825-835	Ch16, 711-723
November 20, 2025	Review		
November 24-29, 2025	**HOLIDAY - NO CLASS**		
December 2, 2025	Exam #3 covering chapters 9 through 11 and 17.	Chap. 10,11,17	
December 8, 2025	Cumulative Final Exam 3:00pm-5:00pm, in ROOM TBA		

UNIVERSITY POLICIES AND RESOURCES

"This course complies with all UF academic policies. For information on those polices and for resources for students, please visit https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/.

HONORS PROGRAM

Honors Program contact information:

- Honors Program, 201 Walker Hall, 352-392-1519
- Quick questions for an Honors advisor? Email advisor@honors.ufl.edu
- Need an Honors advising appointment? Schedule via Microsoft Bookings: https://bit.ly/ufhonorsadvising