SUPPLEMENT to SYLLABUS
PRINCE GEORGE'S COMMUNITY COLLEGE

CHM 1010 General Chemistry I Fall 2025

SECTION HL01
Lec Tu 5:00 - 7:30pm REMOTE, **Rec** Tu 8:00 – 8:50 REMOTE, **Lab** Th 5:00 – 8:15pm CHES 312

INSTRUCTOR: Dr. William Antonio Boyle, Natural Sciences Department
Dept. Phone: 301.546.0420 **Office Phone**: 301.546.4105 **OFFICE:** CH-310-K
OFFICE HOURS: M Tu W Th 4:00-4:50 ZOOM, or in-person, or by appointment
WEBPAGE: https://www.angelfire.com/md/imsystem/WBhomePGCC.html
CANVAS SITE: Access the course Canvas site from myPGCC using your login and password.
E-MAIL: boylewa@pgcc.edu
NOTE: All credit students are required to use their PGCC student email account for all college communication. Full-time and adjunct faculty teaching online, remote, hybrid, and/or face-to-face courses are expected to respond to student emails and phone calls within 24-48 hours with the exception of weekends and holidays. Faculty should maintain regular communication with students.

REQUIRED MATERIALS:
① Chemistry: The Molecular Science, Moore/Stanitski, 5th Ed., Cengage, 2015 (or another general chemistry textbook for reference)
② Cengage Owl V2 online homework and assignment system (should come with new textbook but may be purchased separately)
③ Exploring the Chemical World, Gage/Sinex/Basili, 2003 version (Microsoft Word worksheets will be provided by the instructor for students to print before each activity)
④ Scientific calculator (TI-83 or 84 or similar graphing calculator strongly urged; it will be used for lab and class assignments)

How Will You Be Assessed?

Below is a list of the assessments for this semester.

3	1 hour exams @ 100 points each	300 points
1	comprehensive final exam	200
3	performance labs @ 50 points each	150
	additional lab reports	50
1	project @ 50 points	50
	on-line Mastery homework activities	150
	on-line StudyPlan homework activities	75
	attendance/participation/extra-credit	25
	Total	1000 points

GRADING CRITERIA: Grades are assigned based on the grading policy stated in the syllabus and not the Canvas grade book.

Course Description: CHM 1010 is the first semester of a university-parallel first-year chemistry sequence. This course is fully transferable to most four-year colleges and universities. Topics include: the structure of matter; elements and compounds; chemical reactions and stoichiometry; basic thermodynamics; modern atomic and molecular structure; chemical bonding, physical states of matter; and properties of solutions. Four (4) credit hours; seven (7) contact hours, including 4 hours of lecture, and 3 hours of laboratory per week.

Prerequisites include: MAT 1350 with a "C" or better or appropriate placement test scores

Course Learning Outcomes Upon successful completion of this course, the student will be able to:

1. Perform measurements with appropriate precision and accuracy.
2. Evaluate scientific observations using proper terminology and formatting, and in adherence to ethical standards.
3. Analyze the energetics associated with physical and chemical processes.
4. Apply the correct chemical symbolism, nomenclature, and formulation to chemical species.
5. Apply the rules governing the properties and behavior of matter in its different states.
6. Predict the chemical reactivity of atoms and compounds
7. Explain atomic properties, including periodic trends, based on the structure of atoms.
8. Explain the conditions and forces that govern chemical bonds, electron arrangements, molecular geometries, and intermolecular interactions
9. Solve stoichiometric problems and balance chemical equations.

Credit-hours:

At Prince George's Community College, for all credit courses, students are expected to spend a minimum of 37.5 hours of combined instructional time and related coursework time per credit hour.

This course is a 4-credit laboratory science course. This course achieves the minimum of 150 hours of instructional time by requiring 92.5 hours of instructional time and 57.5 hours of student work outside of instructional time.

NA and FX GRADES: Students are expected to attend and participate in class activities. Students who either never attended the class or who ceased attendance during the first during the first three weeks of class or 20 percent of the course will be assigned a "NA" grade by the instructor.

The FX GRADE may be assigned by the faculty member to any student on the roster who did not officially withdraw from the course but who failed to participate in course activities through the end of the period. It is used when, in the opinion of the instructor, completed assignments or course activities or both were insufficient to make normal evaluation of academic performance possible.

WITHDRAWAL STATEMENT: As the semester continues, I hope to see all of you staying in my course and doing well. However, if you are considering withdrawing from this course, your withdrawal may result in financial aid and /or academic standing implications. Therefore, if you are

considering withdrawing at any point, please speak with me before making a final decision. I may be able to offer to direct you to help. If I am unavailable, please contact Prof. Nadene Houser-Archield via email at housernr@pgcc.edu or by telephone at 301-546-7593.

What is This Chemistry Course Going to Be Like?

This section of CHM 1010 will be structured differently than what you may expect. We want you to "discover" chemistry concepts through lab exploration and interaction with fellow students and the instructor. It is an exciting way to learn chemistry.

The *laboratory portion* of this course is time to discover chemistry concepts and practice science process and learn new skills. Many times concepts will be introduced and explored in the lab first. You will discuss what you see and do with other members of the class and the instructor. **You are responsible for all information learned here**. There are three labs that are designated as **performance labs**. On the days when you are engaged in a performance activity the instructor will be evaluating your understanding and skills. You generally work as an individual for these tasks.

The *lecture/discussion* portion of the course will have varied activities. Sometimes the instructor will provide information to extend or clarify what is learned in the laboratory. Sometimes you will engage in classroom activities that allow you to discover concepts in a way similar to your activities in lab. We will practice understanding through problem solving. You need to keep good notes on discussion from lab and lecture/discussion periods. We may use this time to go over assigned problems from the chapters in the text.

You are free to ask questions at anytime on material we are discussing or material related to it. Have your calculator and text with you during class. Exams will be given during the lecture/discussion time.

What Do You Need to Do to Be Successful In this Chemistry Class?

Attend (in mind and body) all class sessions. Arrive on time and stay for the whole time. Experience shows that you will not be successful if you are not present. If you arrive late let the instructor know so you can be registered as present.

⇒ Read and use your syllabus packet. Not only does this provide the lab/discussion schedule but it also provides knowledge and process goals, and textbook problem assignments.

⇒ Read the material in the textbook as it is covered in class. **Do the assigned questions at the end of each chapter as we finish the section. Don't wait until the end of the chapter or the night before the quiz or exam.** This is an excellent way of assessing your understanding of the concepts we have been covering.

⇒ The labs you will be doing are inquiry-based. That means you are investigating, testing, challenging ideas, and learning rather than just following directions to verify something you already know. **Read the lab activity before coming to lab class so that you will be oriented to the task. Do any pre-lab questions before getting to lab.**

⇒ Complete all assignments on time. Points are deducted for late assignments.

⇒ **ASK** if you have a question. Don't wait for revelation... The sooner you address a problem, the easier it is to solve.

⇒ Weekly out-of-class STUDYING time is at minimum the same amount as in-class time! Study and review notes and/or handouts *as soon as possible* after class. Work with classmates to help clarify your thought processes and as practice. Forming a study group is highly recommended.

⇒ During exams or quizzes, cellphones or internet-capable devices are **not** allowed, and graphing calculators may **not** be passed to another person.

⇒ Maintain your success record. Use the chart you are given for assignments and point values. Keep it up to date and assess your status now and then.

What Do You Do If You Are Absent?

Get notes from a classmate. If you have difficulty grasping a concept you missed come to office hours for a conference (however, please do not expect a private lecture).

If you are absent on the day of an exam with a documented excuse **YOU MUST EMAIL** as soon as you know you will be absent. A make-up exam will be scheduled for the **next** class meeting after the absence. No email, No make-up! *There are no make-ups for the performance labs.*

Where Can You Get Help?

Your first and best source of help is your instructor! Make use of my office hours. If you cannot come during the scheduled times, talk to me and I will try to arrange an alternate time.

PGCC offers additional help at the Tutoring Center which is now offering ONLINE as well as in-person tutoring. Check it out at – https://pgcc.libguides.com/tutoring

If you can, form study groups with your classmates. This is a great way to sharpen your thoughts and get practice in a less threatening way.

MYPGCC: Use **myPGCC** to provide quick access to Canvas, Owl Alert, Owl Link, Owl Mail, PGCC news, information, student events and more. Access **myPGCC** at my.pgcc.edu or from www.pgcc.edu. Log in using your Owl Link user ID and password.

DELAYED COLLEGE OPENINGS:

To sign up for text alerts such as school closings and delays, go to www.pgcc.edu, click Services & Support, and then click the Owl Alert icon. Owl Alert is the college's instant messaging and email notification system.

CYBER DAY:

In the event of inclement weather, national or local emergency, or special event, the college may declare a cyber day. On cyber days all course formats will **continue** in a remote format. Students should consult their college email and the Canvas learning management system for further information about the class meeting.

COLLEGE POLICIES
All college policies regarding Disability Support Services; Community in Unity Civility Pledge; Title IX: Complaint and Grievance Process, Pregnant and Parenting Accommodations; Code of Conduct, Code of Academic Integrity, Health and Wellness, College Central Network (CCN), and more can be found on your Canvas course site under Academic and Important College Policies under the Syllabus menu link - OR - you can visit: https://catalog.pgcc.edu/content.php?catoid=31&navoid=5173

CODE OF CONDUCT

The Prince George's Community College Code of Conduct defines the rights and responsibilities of students and establishes a system of procedures for dealing with students charged with violations of the code and other rules and regulations of the college. A student enrolling in the college assumes an obligation to conduct himself/herself in a manner compatible with the college's function as an educational institution. Refer to the 2019-2020 Student Handbook for a complete explanation of the Code of Conduct, including the Code of Academic Integrity and the procedure for dealing with disruptive student behavior.

CODE OF ACADEMIC INTEGRITY

The college is an institution of higher learning that holds academic integrity as its highest principle. In the pursuit of knowledge, the college community expects that all students, faculty, and staff will share responsibility for adhering to the values of honesty and unquestionable integrity. To support a community committed to academic achievement and scholarship, the Code of Academic Integrity advances the principle of honest representation in the work that is produced by students seeking to engage fully in the learning process. The complete text of the Code of Academic Integrity is in the 2019-2020 Student Handbook and posted on the college's website.

COMMUNITY IN UNITY CIVILITY PLEDGE

As a member of Prince George's Community College, I agree to promote a community of scholarship, civility, accountability and respect. I understand that expressions of hate or bias against a particular group or towards an individual, threaten the safety of our campus community. Therefore, I pledge to be aware of my words and actions and how they impact others. I will show respect for myself, respect for others and respect for the college and its values. I will honor this commitment to promote unity and a culture of civility both inside and outside the classroom.

Civility is a college-wide commitment and in order to identify PGCC students, students are required to enter classrooms with their college IDs visible. ALL students must have their IDs visible while AT ANY COLLEGE SITE, WHETHER THEY ARE ON THE LARGO CAMPUS OR ANY EXTENSION SITE.

Pregnant and Parenting Accommodations

Due to Title IX regulations, PGCC is required to take reasonable steps to ensure that any student with certain pregnancy-related or post-pregnancy issues who must miss classes/coursework, take breaks during class, etc. due a pregnancy-related condition will return to the same position of academic progress as before they experienced medical challenges.

If you have a pregnancy-related issue, please contact the Title IX Coordinator at TitleIX@pgcc.edu or 301-546-7011 to discuss pregnancy or parenting accommodations. If a student discloses pregnancy to their course instructor, the instructor should inform the student that they have the right to contact the Title IX Coordinator for accommodations or to discuss accommodations directly with the instructor.

Some Information You Need to Know About the Science College Classroom at PGCC…

In the Division of Sciences, Technology, Engineering and Mathematics (STEM), we have set goals toward excellence for our students, faculty, and programs. While you are in class it is important to focus on the tasks at hand and to make the environment safe and conducive to learning for everyone. To accomplish our goals, there are some assumptions and policies you should be aware of.

- You are an adult and it is assumed that you will act accordingly. This means being on time for class, conducting yourself appropriately while in class, being prepared for class (reading the syllabus/schedule), participating in course activities, completing assignments on time, and taking responsibility for your own performance. You may have a complicated life but you must earn a grade on merit, not on extenuating circumstances. Instructors will assist you within reason but you must take the initiative to seek help if needed.

- PGCC has an "Academic Dishonesty" policy and unethical academic behavior (cheating, plagiarism, etc.) is not tolerated. There are serious ramifications for the student(s) involved. If you would like a copy of the policy, please ask the instructor.

- No food or drink is allowed in classrooms that serve as laboratories (all rooms on the 2nd and 3rd floors of Chesapeake Hall). Please observe this ban unless exceptions are approved by the instructor.

- Cell phones must be turned off or set to vibrate while in class. Only emergency calls can justify leaving a class in session. Phones <u>cannot</u> be used in the classroom during instruction of any type (lab, discussion, recitation, lecture). Cell-phones internet-capable devices are **<u>not</u>** allowed in exams!

- If you must leave a class early or miss class time, please let the instructor know. YOU are responsible for making up any missed material. Make-up exams/assignments may be available depending on the circumstances of the absence. See the instructor's individual policy in the syllabus regarding absences.

CHM 1010 Section HL02 **TENTATIVE SCHEDULE** **Fall 2025**

This schedule is subject to change based on contingencies such as weather. Exact dates for labs and assessments will be announced in class. If you are absent, be sure to check with the instructor or classmates to determine schedule changes or additions. Changes may be made at the discretion of the instructor.

Week/Dates	Lecture/Discussion Topics	Lab (Thu)	Assessments
1. 08/18-08/21	Introduction to Chemistry Measurement	Safety and Equipment	
2. 08/25-08/28	Properties and Classification of Matter Elements, Compounds, Mixtures	Measurements	HW: 01.01, 01.02, 01.03
3. 09/01-09/04 *No class on 09/01*	Symbols, formulas Physical vs chemical changes Conservation of matter Chemical Nomenclature	Kinds of Matter Separations I	HW: Ch. 01* StudyPlan. Ch. 01* Problems
4. 09/08-09/11	Chemical Reactions Assign Project	Investigation of Solutions	HW: Ch. 02 StudyPlan. Ch. 02 Problems
5. 09/15-09/18	The Mole Concept Stoichiometry	Performance Lab #1	
6. 09/22-09/25	Energy	Chemical Reactions 1	HW:Ch. 03 StudyPlan. Ch. 03 Problems
7. 09/29-10/02	Atomic Structure and Periodic Trends	Moles. Molecules, Formulas	Exam 1; HW: Ch. 04 StudyPlan. Ch. 04 Problems

Week/Dates	Lecture/Discussion Topics	Lab (Thu)	Assessments
8. 10/06-10/09	Bonding	Chemical Reactions 2	HW:Ch. 05 StudyPlan. Ch. 05 Problems
9. 10/13-10/16 *No class on 10/14*	Molecular Geometry, VSEPR Hybridization	Performance Lab #2	HW: Ch. 06 StudyPlan. Ch. 06 Problems
10. 10/20-10/23	Gas Laws	Ins and Outs of Energy in Systems	Element Project due. HW: Ch. 07 StudyPlan. Ch. 07 Problems
11. 10/27-10/30	Properties of Liquids and Solids	Exploring Acids and Bases	Exam 2, HW: Ch. 08 StudyPlan. Ch. 08 Problems
12. 11/03-11/06	Solution Concentrations Colligative Properties	Behavior of Gases	HW: Ch. 09 StudyPlan. Ch. 09 Problems
13. 11/10-11/13	Acids and Bases	Spectroscopy	Exam 3, HW: Ch. 13 StudyPlan. Ch. 13 Problems
14. 11/17-11/20	Intermolecular Forces	Performance Lab #3	HW: Ch. 14 StudyPlan. Ch. 14 Problems
15. 11/24-11/27 *No class on 11/27*	Phase Changes	(no Lab!)	
16. Final Exam	In-person.	Section HL01	Th Dec 04 6:00-8:20pm

CHM 1010 **Boyle**

Fall 2025

SUGGESTED TEXTBOOK READINGS AND PROBLEMS

Chemistry: The Molecular Science, Moore/Stanitski 5th Ed.

Below are suggested readings and practice problems at the end of chapters. The problems should be done at home after we complete the discussion of the material in class. Bring the worked problems to class on discussion days. You will not be graded on these but working on them greatly enhances your chances for success in CHM 1010 and sometimes exam questions are selected (or modified) from these assignments.

TOPIC	CHAPTER	SECTIONS	PROBLEMS
Nature of Science	1	1.3-1.4	9, 10
Measurement	1	1.5	15, 19, 21, 23, 25, 27
Characteristics of Matter	1	1.4-1.8	29, 31, 33, 35, 37, 39, 41
Atomic Structure (basic)	1	1.10	51, 53
Compounds and Nomenclature	2	2.4-2.8	30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 54, 56, 58, 60
Chemical Reactions	1	1.11	57, 59
	3	3.1-3.5	10, 12, 18, 20, 22, 35, 38, 52,
Moles (atoms and molecules)	2	2.10-2.12	68, 72, 74, 78, 82, 87, 89, 91
	3	3.6	59, 63, 67,
Stoichiometry	3	3.7-3.12	69, 71, 73, 78, 82, 86
Energy in Chemical Processes	4	4.1-4.10	9, 11, 13, 17,21, 23, 25, 29, 31, 39, 43, 45, 47, 53, 55, 64, 68, 72, 76, 81
Atomic Structure (electrons)	5	5.1-5.8	11, 15, 17, 22, 28, 45, 49, 52, 61, 64
Atomic Properties and Periodic Trends	5	5.9-5.12	83, 85, 89
Bonding	6	6.1-6.10	13, 15, 17, 19, 21, 37, 39, 41, 49, 58, 60
Molecular Geometry & Hybridization	7	7.1-7.5	13, 15, 17, 19, 32, 34, 37, 39, 43, 46
Gases	8	8.1-8.9	10, 12, 15, 17, 19, 21, 23, 25. 31, 33, 37, 41, 43, 50, 52, 57, 61, 63

Liquids, Solids, Phase Changes and Intermolecular Forces	9	9.1-9.7	11, 13, 15, 17, 23, 24, 26, 27, 29, 33, 37, 40, 45, 46, 52, 67
Solutions & Colligative Properties	13	13.1-13.8	18, 27, 29, 33, 35, 39, 44, 46, 48, 52, 54, 66, 70, 80
Acids and Bases	3	3.4, 3.12	40, 42, 44, 46, 47, 93, 95, 97
	14	14.1-14.4	9, 11, 13, 17, 19, 25, 27, 29, 31, 33, 37

GENERAL COURSE OUTCOMES FOR Chemistry 1010

(specific goals are listed after this page)

Upon successful completion of this course a student will be able to:

- perform laboratory measurements of physical and chemical systems with appropriate precision and accuracy, and report measurements in proper scientific format.
- analyze scientific data of physical and chemical systems.
- utilize scientific tools such as the graphing calculator, spreadsheet, and appropriate software to analyze data.
- create graphical representations of data. Perform proper data analysis procedures including computing, interpreting, predicting and concluding.
- explain issues addressing data fabrication.
- explain and analyze the energetics associated with physical and chemical processes.
- apply the correct chemical symbolism and nomenclature to chemical species and reactions.
- apply the rules governing the behavior of matter on a microscopic scale to chemical systems.
- compare the characteristics of different types and phases of matter on a microscopic scale.
- analyze ideal gas systems qualitatively and quantitatively.
- apply the concepts of chemical reactivity to chemical systems
- explain the factors determining chemical reactivity.
- determine the stoichiometry of reactions.
- apply the stoichiometry of reactions to chemical computations.
- explain atomic properties, including periodic trends, based on the structure of atoms.
- characterize the components and structures of atoms as described by historical and modern research.
- explain the conditions and forces that govern chemical bonds, electron arrangements, molecular geometries and intermolecular interactions.
- characterize electrolyte and non-electrolyte solutions; determine the solubilities of solutes and the concentrations of solutions.

Definition of Terms:
Understand: be able to identify, define in words different from what appears in the textbook; apply meaning of concept in new situation; give examples
Explain: elaborate on the connection between cause and effect; describe what happened and why in detail
Know: state in clear and concise fashion; be able to distinguish from something else; recognize
Distinguish: tell the difference between
Appreciate: be able to discuss the importance of something

Please note that specific goals are presented under the anticipated week of discussion or first exposure. As with all things in life, the timing is subject to change.

WEEK 1-2:

1. Know the steps in scientific investigation, the purpose and nature of science and of chemistry in particular. Appreciate the role chemistry plays in the economy and everyday life (a goal that spans all weeks of the course).
2. Distinguish among the terms theory, belief, hypothesis, truth, and fact.
3. Understand the nature of measurement, and measurement standards, and significant figures as measures of degrees of uncertainty. Appreciate the importance of measurement in all science. Know the metric units for length, volume, and mass. Be able to accurately measure these parameters for any object given measuring devices of varied precision. Distinguish between accuracy and precision. Perform unit conversions between English and Metric systems and within each system.
4. Distinguish among the terms mass, weight, volume, density. Determine the volume of regular and irregularly shaped objects. Define matter and give example of matter and non-matter.
5. Perform density calculations (determine density, mass, or volume, given appropriate data).
6. Understand the role of density in determining whether an object will sink or float in water. Know that objects that sink displace their own volume and object that float displace their own mass

WEEK 2-3:

1. Know the physical properties (state, color, odor, density, solubility, luster, hardness, malleability, ductility, melting and boiling points, conductivity of heat and electricity…) and chemical properties (does it react…) and appreciate their importance in chemistry.
2. Distinguish between physical and chemical changes and give examples of each.
3. Know methods for separating mixtures. Perform separations on mixtures containing 2, 3 or 4 components.
4. Understand that mixtures can be separated by physical means whereas compounds require chemical means to separate and form them.
5. Understand the nature of elements, compounds, mixtures, atoms, molecules, formula units
6. Know the chemical symbols for at least 44 common elements indicated by the instructor.

7. Understand the information conveyed by a chemical formula (understand the meaning of subscripts and coefficients). Understand Law of Definite Proportions.
8. Understand the Law of Conservation of Matter and its implications in physical and chemical changes.
9. Know the characteristics of the basic sub-atomic particles.
10. Distinguish among types of compounds from the formula and name the compound using IUPAC rules for nomenclature. Included in these compound types are: binary ionic, binary covalent, ionic containing polyatomic ions, binary acids, oxyacids. Write the formula for the above types given the name. Know the stock system and common names of certain common substances.
11. Know the names, formulas, and charges of common polyatomic ions.
12. Construct simple graphs that illustrate the response of one variable with change in another variable. Be able to assign values and properly space, label, and plot the data on the graph. Understand the concept of slope and its calculation. Relate the shape of a curve to the type of equation that describes the relationship between variables.

WEEK 4:

1. Understand chemical equations as representations of chemical changes. Be able to balance equations by inspection and explain the necessity for balancing them.
2. Distinguish among some types of chemical reactions (synthesis, analysis, single and double replacement, redox). Understand the nature of combustion. Understand additional reaction symbolism (aq, l, s, Δ...)
3. Make reasonable predictions of products of simple reactions given reactants.

WEEK 5:

1. Understand the concept of a mole.
2. Determine molar mass of an element or compound using a periodic table.
3. Use the mole concept to determine the mass of a single atom or molecule.
4. Understand the mole concept in relation to chemical equations. Perform mole to mole, mole to gram or gram to mole, and gram to gram conversions using stoichiometric relationships.
5. Solve problems involving percent composition using the mole concept.
6. Understand the concept of limiting reactant and use of the mole concept to determine theoretical yield or percentage yields.
7. Distinguish between empirical and molecular formulas.
8. Determine empirical or molecular formulas given percentage composition by mass or actual masses of component elements of a compound and experimentally determined molar masses.
9. Understand that a more active metal can replace a less active one in a compound. Use this information and observations of single replacement reactions to develop a reactivity series.

WEEK 6:

1. Understand the concept of energy and the Law of Conservation of Energy.
2. Know the classes of energy - potential and kinetic- and give examples of each. Understand the interconvertibility of energy forms.

3. Understand heat as a form of energy; know units of heat energy- joule, calorie. Recognize kilocalorie as related to food energy.
4. Distinguish between the terms heat and temperature.
5. Know and interconvert temperature scales of Fahrenheit, Celsius, and Kelvin.
6. Explain the relationship of heat content of matter to motion of particles. Know meaning of absolute zero.
7. Distinguish between exothermic and endothermic processes.
8. Understand the concept of stability as related to low energy state.
9. Understand the concept pf change in enthalpy and how to determine the energy transferred in a chemical process
10. Understand concept of activation energy. Give examples.
11. Understand the concept of entropy.

WEEK 7:

1. Know some of the historical aspects of the evolution of our knowledge of atomic structure. Know the atomic model as conceptualized by Bohr and begin an understanding of the modern concept of electron as wave and particle.
2. Know mass, location, and charge of three main sub-atomic particles. Know the meaning of atomic number, atomic mass, and mass number. Understand the concept of isotopes. Be able to construct simple atom diagrams that include electron main energy levels for any atom.
3. Appreciate the development of the periodic table.
4. Understand subshells and differentiate orbitals by energy and shape. Be able to write electron configurations ($1s^2 2s^2 ...$) and orbital diagrams for elements 1 through 30.
5. Explain the relationship between an element=s electronic structure and its location in a "block" on the periodic table.
6. Know and explain the relationship between atomic structure and atomic radius and ionic radius (as periodic trends).
7. Understand the concept of ionization potential and explain the periodic trend in ionization potential.

WEEK 8:

1. Understand the concept of a chemical bond as a force between atoms in a compound (an intramolecular force). Relate the general concept of bond-making to stabilization by reduction of energy content. Relate addition of energy to bond-breaking. Know that atoms bond in order to become more stable.
2. Differentiate between covalent and ionic type bonds. Be able to draw simple atomic diagrams depicting the formation of each type of bond.
3. Relate stable atoms to octet rule.
4. Draw Lewis dot diagrams for elements.
5. Use Lewis dot diagrams to depict covalent molecules.
6. Relate number of atoms needed to achieve octet rule to chemical formulas.

7. Understand electronegativity and how it changes based on element position on the periodic table. Understand the concept of polar and non-polar bonds. Relate bond polarity to electron density. Determine relative bond
8. Understand and depict by dot diagrams double and triple bonds.
9. Understand the concept of coordinate covalent bond.

WEEK 9:

1. Understand the meaning of VSEPR Theory and use the theory to explain molecular shapes. Given a formula, be able to predict and sketch a molecular model (linear, triangular planar, pyramidal, tetrahedral, trigonal pyramidal, trigonal bipyramidal, square planar, octahedral).
2. Understand the relationship of molecular shape (geometry) to polarity.
3. Utilize the Valence Bond Theory to explain what happens (hybridization) to electrons on a central atom of a compound or ion when bonding occurs. Relate molecular geometry to hybridization patterns.

WEEK 10:

1. Know properties of gases (obtained through observation and manipulation) such as compressibility, indefinite shape and volume, that gases have mass, density is variable, gases flow, some are flammable. Understand through investigation the relationships among volume (V), temperature (T), pressure (P), and moles (n).
2. Solve problems involving V, T, P, and n. Understand the concept of standard molar volume.
3. Understand the conditions under which gas laws do not predict gas behavior (non-ideal behavior).
4. Know the relationship between molar mass and rate of gaseous diffusion.
5. Relate particle motion to T and P.

WEEK 11:

1. Understand and explain the origin of intermolecular forces (IMFs) such as London, dipole-dipole, and hydrogen bonding. Be able to explain the relation of IMFs to normal physical state at room temperature. Explain the change in strength of IMFs with change in molar mass, general molecular geometry, and polarity.
2. Distinguish between properties of gases, liquids, and solids, such as: compressibility, relative density, definite or indefinite volume, shape, and particle behavior.
3. Know and explain some of the special properties of liquids such as surface tension, wetability, ease of vaporization, and relative boiling points.

WEEK 12:

1. Discuss the flow of energy and change in entropy in relation to phase change and describe changes in motion and relative distance of particles.
2. Distinguish among the terms heat of fusion (and crystallization), specific heat, heat of vaporization (and condensation). Understand that values are dependent on structure and molar mass.
3. Do simple calculations involving heat transfer during changes in phase of substances.

4. Understand the contiguousness of liquid and solid particles and the presence of vibrational but not translational motion in solids. Distinguish between amorphous and crystalline solids.
5. Distinguish between particles at lattice points and relative melting points of ionic, covalent, molecular, and metallic crystals.
6. Explain criteria for electrical conductivity and explain conductivity of metals and non-conductivity of other solids.
7. Understand vapor pressure, boiling point, and conditions that affect boiling point.
8. Explain in terms of an increase in entropy why a liquid evaporates even though evaporation is an energy requiring process (known as a destabilizing factor in a system).

Week 13:

1. Distinguish between types of mixtures with specific regard to particle size (suspensions, colloids, true solutions). Know properties and examples of each.
2. For true solutions, understand and be able to describe the process of solution making for soluble ionic and molecular solids. Explain energy transfer during the solution process. Distinguish between dissociation of ionic compounds and ionization of some molecular compounds. Relate ionization and dissociation to strong, weak, and non-electrolytes.
3. Know and solve problems using solutions concentration expressions, particularly molarity. Distinguish among dilute, concentrated, saturated, unsaturated, and supersaturated solutions. Be able to calculate number of particles (ions or molecules) in a given solution of known concentration.
4. Explain changes in vapor pressure of a solvent with increase in solution concentration. Understand some additional colligative properties such as freezing point depression, boiling point elevation, and osmotic pressure.

WEEK 14-15:

1. Distinguish between properties of acids and bases.
2. Explain Arrhenius acids and bases.
3. Distinguish between strong and weak acids. Understand the ionization process. Write equations for the ionization of polyprotic acids.
4. Understand the Brønsted-Lowry definition of acids and bases.
5. Understand the Lewis definition of acids and bases.
6. Distinguish between acidic and basic anhydrides, especially as an explanation for natural environmental problems.
7. Be able to write neutralization reactions.
8. Understand reactions of carbonates and bicarbonates as bases.
9. Understand the concept of pH. Perform simple pH calculations.
10. Understand the concept of buffers.

CHM 1010 **STUDENT GRADE RECORD** **Fall 2025**

Your current grade (%) = (Your total points/Total of maximum possible points to date) x 100

100-90% = A 89-80% = B 79-70% = C 69-60% = D below 60% = F

Assessment	Maximum Possible Points	Your Points	%
Exam 1	100		
Exam 2	100		
Exam 3	100		
Online HW Mastery	150		
Online HW StudyPlans	75		
Project	50		
Performance Lab 1	50		
Performance Lab 2	50		
Performance Lab 3	50		
Lab Reports	50		
Final Exam	200		
Participation/Ex-Cr	25		
Total	1000		

Note: Do not make the mistake of averaging the %s for each assessment to arrive at your overall %. Not all assessments have equal weight and averaging