



Course Outline
CHM 1045C
General Chemistry with Qualitative Analysis I

General Course Information

Common Course Number: CHM1045C

Course Title: General Chemistry with Qualitative Analysis I

Prerequisite(s): Prerequisite: CHM 1025C or one year of high school chemistry with a minimum grade of C; and MAC 1102 or MAC 1105 or two years of high school algebra or an appropriate score on an approved mathematics assessment.

Contact Hour Breakdown: CR 4 CLASS 3 LAB 3

Discipline: Chemistry

Catalog Description: Prerequisite: CHM 1025C or one year of high school chemistry with a minimum grade of C; and MAC 1102 or MAC 1105 or two years of high school algebra or an appropriate score on an approved mathematics assessment. A study of the basic principles of chemistry including chemical reactivity, atomic structure, chemical bonding, molecular geometry, periodicity, stoichiometry, and kinetic-molecular treatment of gases. Laboratory illustrates principles discussed in classroom. (Special Fee: \$35.00)

Major Topics/ Concepts/ Skills/ Issues

- Acquire core vocabulary, concepts, and problem-solving processes (concept ramifications) pertaining to the history and application of chemical theories
- Develop ability to communicate basic chemical concepts and problem-solving processes effectively
- Develop appreciation of the scientific method as an effective problem-solving approach
- Apply scientific method principles to solve real-world problems

Major Learning Outcomes with Evidence, Core Competencies and Indicators

Understand and apply the principles of atomic structure theory with relation to observed chemical and physical properties.	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> ● Student will be able to Each student will demonstrate an understanding of an atom's electron configuration relative to its position on the periodic table. ● Student will be able to Using an element's position on the periodic table, each student will predict its chemical and physical properties. ● Student will be able to Each student will compare and contrast the different atomic theories/models. 	
Core Competency: Think	
Indicators	Assessments
<ul style="list-style-type: none"> ● analyze data, ideas, patterns, principles, perspectives 	<ul style="list-style-type: none"> ● Knowledge recall quiz ● Locally developed exam/essay ● Locally developed exam/objective ● Performance or Demonstration ● Problem-solving quiz
Understand the nature and ramifications of quantitative chemical and physical relationships.	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> ● Student will be able to Each student will demonstrate an understanding of, and ability to convert between, metric and SI units, convert numbers to scientific notation, and use significant figure and rounding rules appropriately in order to complete class and lab assignments. ● Student will be able to Each student will demonstrate their understanding of dimensional analysis in their ability to convert between base and derived quantities during class and lab assignments. 	
Core Competency: Think	
Indicators	Assessments

<ul style="list-style-type: none"> employ the facts, formulas, procedures of the discipline 	<ul style="list-style-type: none"> Locally developed exam/objective Performance or Demonstration Problem-solving quiz
Understand and apply the rules of nomenclature and its underlying importance relative to various chemical concepts.	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> Student will be able to Each student will utilize an understanding of the electronic ramifications of the atom's position on the periodic table to identify the type of compound/molecule formed between atoms/ions. Student will be able to Each student will classify chemical compounds by type and apply the appropriate rules of nomenclature to them. Student will be able to Each student will write the name of the formula and the formula from the name. 	
Core Competency: Communicate	
Indicators	Assessments
<ul style="list-style-type: none"> employ methods of communication appropriate to your audience and purpose 	<ul style="list-style-type: none"> Knowledge recall quiz Locally developed exam/essay Locally developed exam/objective Problem-solving quiz
Understand the nature and characteristics of the chemical bond.	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> Student will be able to Each student will compare and contrast the difference between the ionic and covalent bond and correctly predict the type and degree of bonding in a given compound/molecule. Student will be able to Given the molecular formula, draw possible Lewis structures, calculate formal charges, and predict the most likely structure. Student will be able to Each student will identify bond order, bond length, and bond energy relative to the bonding type and structure. Student will be able to Each student will predict the effects of electronegativity upon the nature of a covalent bond. Student will be able to Each student will demonstrate the ramification of electronic configuration upon chemical bonding. 	
Core Competency: Think	
Indicators	Assessments
<ul style="list-style-type: none"> revise conclusions consistent with new observations, interpretations, or reasons 	<ul style="list-style-type: none"> Locally developed exam/essay Locally developed exam/objective Problem-solving quiz
Understand the factors influencing chemical reactivity.	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> Student will be able to Each student will predict the products of a chemical reaction, including precipitation, acid/base, and redox. Student will be able to Each student will recognize and categorize reaction types. Student will be able to Each student will balance all classes of reactions. 	
Core Competency: Think	
Indicators	Assessments
<ul style="list-style-type: none"> draw well-supported conclusions 	<ul style="list-style-type: none"> Knowledge recall quiz Locally developed exam/essay Locally developed exam/objective Performance or Demonstration Problem-solving quiz
Understand the relationship between temperature, energy and heat with respect to predicting process spontaneity.	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> Student will be able to Each student will relate the internal energy to ethalpy of matter and their exchange between the system and surroundings. Student will be able to Each student will integrate calorimetric data with delta heats of reaction or physical processes. Student will be able to Each student will relate the standard heat of formations to chemical formation reactions. Student will be able to Each student will write the thermochemical equation for a chemical or physical process and use stoichiometry to relate the quantity of matter to the amount of heat exchanged. Student will be able to Each student will compare and contrast the specific heat, heat capacity, and molar heat capacity of a sample of matter and relate them to the temperature change of that sample. Student will be able to Each student will calculate the heat of reaction or heat of phase changes using Hess's Law or the standard enthalpies of formation. 	
Core Competency: Think	
Indicators	Assessments
<ul style="list-style-type: none"> analyze data, ideas, patterns, principles, perspectives 	<ul style="list-style-type: none"> Knowledge recall quiz

	<ul style="list-style-type: none"> ● Locally developed exam/essay ● Locally developed exam/objective ● Performance or Demonstration ● Problem-solving quiz
Understand the relevance of quantum mechanics theories to the fundamental nature of light and spectroscopic ramifications	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> ● Student will be able to Each student will compare and contrast valence bond theory with molecular orbital theory. ● Student will be able to Each student will relate the wavelength and frequency of electromagnetic radiation to its velocity. ● Student will be able to Each student will calculate the energy of a photon. ● Student will be able to Each student will compare the energies of the electron to the different energy levels of the hydrogen atom. 	
Core Competency: Think	
Indicators	Assessments
<ul style="list-style-type: none"> ● employ the facts, formulas, procedures of the discipline 	<ul style="list-style-type: none"> ● Knowledge recall quiz ● Locally developed exam/essay ● Locally developed exam/objective ● Performance or Demonstration ● Problem-solving quiz
Understand the relationship of physical behavior of gases and be able to apply it on a microscopic and macroscopic scale	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> ● Student will be able to Each student will identify the cause of gas pressure. ● Student will be able to Each student will demonstrate an understanding of the relationship among pressure, temperature, quantity, and volume. ● Student will be able to Each student will identify and demonstrate the correct unit conversions to solve ideal and combined gas law calculations. ● Student will be able to Each student will compare and contrast the simple gas laws and demonstrate an understanding of each law by solving for an unknown variable. 	
Core Competency: Think	
Indicators	Assessments
<ul style="list-style-type: none"> ● analyze data, ideas, patterns, principles, perspectives 	<ul style="list-style-type: none"> ● Knowledge recall quiz ● Locally developed exam/essay ● Locally developed exam/objective ● Performance or Demonstration ● Problem-solving quiz
Core Competency: Communicate	
Indicators	Assessments
	<ul style="list-style-type: none"> ● Essay less than 1000 words ● Documented problem solutions
Enhance Students' Understanding of the Application of the Scientific Method to Solve Complex Problems	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> ● Student will be able to Each student will differentiate among the different physical laws leading to the development of early atomic theory. ● Student will be able to Each student will design an experiment to test a simple hypothesis. ● Student will be able to Each student will identify the components of the scientific method within a published experiment. ● Student will be able to Each student will apply the components of the scientific method to everyday activities. 	
Core Competency: Value	
Indicators	Assessments
<ul style="list-style-type: none"> ● distinguish among personal, ethical, aesthetic, cultural, and scientific values 	<ul style="list-style-type: none"> ● Essay less than 1000 words ● Locally developed exam/essay ● Performance or Demonstration ● Project
Core Competency: Act	
Indicators	Assessments
<ul style="list-style-type: none"> ● implement effective problem-solving, decision-making, and goal-setting strategies 	<ul style="list-style-type: none"> ● Knowledge recall quiz ● Locally developed exam/essay ● Locally developed exam/objective ● Performance or Demonstration ● Problem-solving quiz

		• Project
Understand the Nature of Molecular Geometry as It Relates to the Physical and Chemical Properties of Molecules.		
Corresponding Evidence of Learning		
<ul style="list-style-type: none"> • Student will be able to Each student will predict electron pair and molecular geometries for a given compound. • Student will be able to Each student will relate the VSEPR formula to the level of hybridization of an atom in a molecule. • Student will be able to Each student will compare and contrast valence bond theory with molecular orbital theory. • Student will be able to Each student will relate molecular symmetry to its dipole moment. • Student will be able to Each student will relate nonbonding electron pairs present in a molecule to Lewis acid/base theory. 		
Core Competency: Think		
Indicators	Assessments	
<ul style="list-style-type: none"> • analyze data, ideas, patterns, principles, perspectives 	<ul style="list-style-type: none"> • Locally developed exam/objective • Performance or Demonstration • Problem-solving quiz 	
Understand the Nature of Matter with Regard to Its Physical and Chemical Characteristics.		
Corresponding Evidence of Learning		
<ul style="list-style-type: none"> • Student will be able to Each student will explain the consequences of the physical state of matter to its properties. • Student will be able to Each student will distinguish between the chemical and physical properties and changes in a sample of matter. • Student will be able to Each student will suggest ways to separate the components in a mixture. 		
Core Competency: Communicate		
Indicators	Assessments	
<ul style="list-style-type: none"> • communicate your understanding of concepts and their ramifications 	<ul style="list-style-type: none"> • Locally developed exam/essay • Locally developed exam/objective • Performance or Demonstration • Problem-solving quiz 	
Core Competency: Act		
Indicators	Assessments	
<ul style="list-style-type: none"> • implement effective problem-solving, decision-making, and goal-setting strategies 	<ul style="list-style-type: none"> • Knowledge recall quiz • Locally developed exam/essay • Locally developed exam/objective • Performance or Demonstration • Problem-solving quiz 	
Lab Activities will Provide Kinesthetic Support for Conceptual Learning Outcomes as well as Provide Experience in Essential Lab Techniques Necessary for Laboratory Careers.		
Corresponding Evidence of Learning		
<ul style="list-style-type: none"> • Student will be able to Each student will prepare for and complete confirmation labs to internalize the practical application of chemical concepts. • Student will be able to Each student will apply chemical concepts to new situations during inquiry labs. • Student will be able to Each student will master essential laboratory techniques critical to his or her success in future classes/careers. 		
Core Competency: Act		
Indicators	Assessments	
<ul style="list-style-type: none"> • implement effective problem-solving, decision-making, and goal-setting strategies 	<ul style="list-style-type: none"> • Performance or Demonstration • Lab report 	

Shared Assessment(s) in this Course

- Exams
- Quizzes
- Lab Reports

Addenda

- [Sample CHM1045C Sample Syllabus](#)

[College Curriculum Committee Website](#)

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