

## INTRODUCTORY CHEMISTRY

Revised 12/12/11

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**COURSE NUMBER:** CHM 100

**PREREQUISITE(S):** Completion of RDG 032 and MAT 101 OR 152

**CO-REQUISITE(S):** None

**COURSE DESCRIPTIONS**

This is an introductory course in general chemistry and principles of chemistry. Emphasis is placed on mathematical solutions and laboratory techniques. A minimum grade of "C" is required in order to receive credit in this course. (Non-degree credit)

**COURSE OUTCOMES:**

Students who complete the general education core curriculum should be able to demonstrate

1. rationality, logic and coherence, through critical thinking;
2. their ability to express themselves effectively in quantitative and qualitative terms;
3. their ability to express themselves effectively in written and oral communication;
4. the scientific method of inquiry;
5. their ability to access, retrieve, synthesize, and evaluate information

**TEXTBOOK(S):** Tro, Nivaldo. Introductory Chemistry. 4<sup>th</sup> ed. Upper Saddle River, NJ: Pearson Prentice Hall, 2011.

**REFERENCE(S):** N/A

**OTHER REQUIRED MATERIALS, TOOLS, AND EQUIPMENT:** Homework folder, safety glasses (OSHA approved), and scientific calculator. A lab jacket may be useful.

**METHOD OF INSTRUCTION:** Lecture and discussion, questioning, introductory laboratory assignments, collaborative and individual assignments, and article summaries are used in this course. Audio-visuals, chemistry software, and other resources are used, as the instructor deems appropriate.

<b><u>GRADING SYSTEM:</u></b>	93	-	100	=	A
	85	-	92	=	B
	77	-	84	=	C
	70	-	76	=	D
	Below	-	70	=	F

<b><u>GRADE</u></b>	Final exam	=	30%
<b><u>CALCULATION</u></b>	Exams	=	30%
<b><u>METHOD:</u></b>	Lab	=	15%
	Quiz	=	10%
	Article Assignment	=	10%
	Homework	=	5%
		=	100%

**ATTENDANCE POLICY:** See Student Handbook pages 77-80  
The withdrawal date for Spring semester will be April 2, 2011.

**ACADEMIC CONDUCT:**

**ACADEMIC DISHONESTY:**

Please see student handbook page 98.

**CELLULAR PHONES AND PAGERS/BEEPERS:**

Please see student handbook pages 76-77.

**CLASS/LAB PROCEDURES:**

CHM 100 is designed to allow students an opportunity to learn the basic principles of Chemistry. This course was developed to meet the need of students who desire to enter the Health Sciences, AA, and/or AS programs, but who lack the prerequisite high school Chemistry. This one-semester course seeks to help students discover general chemical principles. Students must read all text assignments and take an active part in both classroom lecture and laboratory discussions and activities. Two article assignments, described separately, are required. There are no make-ups on quiz assignments or exams.

**ACCOMMODATIONS:** Students who need special accommodations in this class because of a documented disability should notify Student Disability Services by calling (864) 592-4818, toll-free 1-800-922-3679; via email through the SCC web site at [www.sccsc.edu/resources/disabilities](http://www.sccsc.edu/resources/disabilities); or by visiting the office located in the East Building Room 30-B on the SCC Central campus. Contacting Student Disability Services early in the semester gives the College an opportunity to provide necessary support services and appropriate accommodations.

**COURSE  
COMPETENCIES &  
OBJECTIVES:**

**Upon satisfactory completion of this course, the student will be able to:**

- I. Understand science and technology.
  1. Define Chemistry.
  2. Explain what matter is and understand the different categories.
  3. Differentiate between physical and chemical properties and physical and chemical changes.
  4. Explain the difference between elements and compounds.
  5. Describe pure substances and mixtures.
  6. Learn the symbols of the elements.
  7. Describe the periodic table of elements.
  8. Explain what happens during a chemical reaction and identify the reactants and products.
  9. Describe the steps involved in the scientific method.
  
- II. Understand the mathematical aspects of chemistry.
  1. Describe and differentiate between accuracy and precision.
  2. Understand the use of significant figures.
  3. Convert numbers written in normal notation to scientific notation and vice versa.
  4. Perform arithmetic operations (addition, subtraction, division, and multiplication) on number written in scientific notation.
  5. Understand the metric and English systems of measurement.
  6. Convert between units of the metric system and English system and within the metric system.
  7. Describe the Celsius, Fahrenheit, and Kelvin temperature scales and perform conversions between the three temperature scales.
  8. Define density.

9. Use the density equation to solve for mass, volume, and density.
  10. Define specific heat capacity.
  11. Use the specific heat capacity equations to solve for heat capacity, difference in temperature and the mass of an object.
  12. Explain the difference between intensive and extensive properties.
  13. Perform algebraic manipulations to solve algebraic equations.
- III. Describe and explain the modern atomic theory.
1. State the Law of Conservation of Matter, the Law of Definite Proportions, and the Law of Multiple Proportions.
  2. List the five postulates in Dalton's Atomic theory.
  3. Describe the structure of the atom.
  4. Understand the subatomic particles of an atom.
  5. Explain what is meant by atomic number and mass number.
- IV. Understand the modern periodic table and explain the different properties exhibited by the configuration thereof.
1. Explain the difference between relative and average atomic weight.
  2. Define and explain what an ion is and how it is formed.
  3. Understand the electromagnetic spectrum.
  4. Define isotopes and explain how they differ from each other.
- V. Understand the electronic structure of the atom.
1. Explain the difference between classical physics and quantum physics.
  2. Understand the Bohr model of an atom.
  3. Understand the octet rule and describe how valence shell configurations are related to the properties of the elements.
  4. Differentiate between the ground state of an atom and the excited states.
  5. Use the periodic table to construct the electron configuration of any element.
  6. Draw the Bohr representation of an atom to show its electron configuration.

- VI. Understand bonding between atoms.
1. Explain what a molecule is.
  2. Explain what covalent bonds are and why they are formed.
  3. Draw a Lewis dot diagram for the atom of any main group element.
  4. Explain the difference between paired electrons and unpaired electrons.
  5. Differentiate between bonding pairs and lone pairs.
  6. Understand single, double and triple bonds.
  7. Explain what polyatomic ions are.
  8. Explain what ionic bonds are and how they are formed.
  9. Define electronegativity and explain its significance in determining whether a bond is covalent, polar covalent, or ionic.
  10. Give the correct name from the formula or the correct formula from the name for any binary ionic or covalent compound.
  11. Give the names and formulas of compounds containing polyatomic ions.
- VII. Understand chemical reactions.
1. Define the term chemical reaction and identify the reactants and products.
  2. Explain how chemical reactions occur.
  3. Write a balanced equation for any chemical reaction.
  4. Explain stoichiometry.
  5. Calculate the molar mass of a substance from its formula.
  6. Explain the relationship between moles and the number of molecules (or atoms) of a substance when given the number of grams.
  7. Calculate the number of moles and the number of molecules (or atoms) of a substance when given the number of grams.
  8. Determine the percent composition of a compound.
- VIII. Understand intermolecular forces and the phases of matter.
1. State the three phases of matter and describe the characteristics of each phase.
  2. Explain the properties of the three intermolecular forces.
  3. Differentiate between the forces that act within a liquid.

4. Explain the difference between crystalline solids and atomic solids.
  5. List the categories and type of compounds that are crystalline solids.
  6. List the categories and types of compounds that are atomic solids.
  7. Differentiate between intermolecular and intramolecular forces.
  8. Understand what an ideal gas and a real gas means.
  9. Perform calculations using the: Ideal gas law, Boyle's law, Charles' law, Gay Lussac's law, the combined gas laws, Dalton's Law of partial pressure, and Avogadro's Law.
- IX. Describe how acids and bases differ
1. Describe all the parts of a solution.
  2. Classify solvents and understand solubility.
  3. Explain the different types of solution strength concentrations.
  4. Perform operations using mass and volume percent.
  5. Define molarity and perform calculations.
  6. Define acids and bases and compare the properties of each.
  7. Distinguish between strong and weak acids and strong and weak bases.
  8. Differentiate between electrolytes and nonelectrolytes.
  9. Distinguish between strong and weak electrolytes.
  10. Differentiate between an Arrhenius acid and base and a Bronstead-Lowry acid and base.
  11. Understand water, auto dissociation, and  $K_w$ .
  12. Perform calculations using the ion product constant for water,  $K_w$ .
  13. Define pH and describe the pH scale.
  14. Calculation of the pH.
  15. Explain what buffers are and how they work.
- X. Understand and classify organic compounds.
1. Describe what is meant by organic chemistry.
  2. Draw and correctly name organic compounds.
  3. Classify different organic compounds based upon their functional groups.