FLORIDA SOUTHWESTERN STATE COLLEGE

School of Pure and Applied Sciences

PROFESSOR:	**PHONE NUMBER:**
OFFICE LOCATION:	**E-MAIL:**
OFFICE HOURS:	**SEMESTER:**

I. COURSE NUMBER AND TITLE, CATALOG DESCRIPTION, CREDITS:

CHM 2045 GENERAL CHEMISTRY I (3 CREDITS)
This course is the first half of a two-semester general chemistry sequence. It deals, in depth, with the topics of matter, chemical measurement, stoichiometry, atomic theory, bonding, molecular geometry, gases, liquids, and solids.

II. PREREQUISITES FOR THIS COURSE:
(MAT1033 with a C or better) AND (one credit of High School Chemistry or CHM2025, 1020C or 2032 with a C or better)

CO-REQUISITES FOR THIS COURSE:
CHM 2045L

~~III.~~ **GENERAL COURSE INFORMATION:** Topic Outline.

- Atomic theory.
- Electronic structure and periodic properties of elements.
- Chemical bonding
- Composition ao substances and solutions.
- Chemical reactions and stoichiometry.
- Properties of gases.
- Thermochemistry.
- Intermolecular forces and properties of liquids and solids
  - ~~Chemical reactions and stoichiometry~~
  - ~~Atomic theory~~
  - ~~Chemical bonding~~
  - ~~Gases~~
  - ~~Intermolecular forces and properties of solids,liquids,and gases~~

IV. ALL COURSES AT FLORIDA SOUTHWESTERN STATE COLLEGE CONTRIBUTE TO THE GENERAL EDUCATION PROGRAM BY MEETING ONE OR MORE OF THE FOLLOWING GENERAL EDUCATION COMPETENCIES:

VPAA: Revised 9/11, 11/16, 5/18, 7/19

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Communicate clearly in a variety of modes and media.
Research and examine academic and non-academic information, resources, and evidence.
Evaluate and utilize mathematical principles, technology, scientific and quantitative data.
Analyze and create individual and collaborative works of art, literature, and performance.
Think critically about questions to yield meaning and value.
Investigate and engage in the transdisciplinary applications of research, learning, and knowledge.
Visualize and engage the world from different historical, social, religious, and cultural approaches.
Engage meanings of active citizenship in one's community, nation, and the world.

A. General Education Competencies and Course Outcomes
Listed here are the course outcomes/objectives assessed in this course which play an integral part in contributing to the student's general education along with the general education competency it supports.

1. General Education Competency: **Evaluate**
- Classify and balance chemical reactions and perform calculations based on chemical compounds and their reactions.
- Explain how the Bohr model of the atom relates to the modern description by quantum theory, and using terms of the quantum theory, relate atoms to the Periodic Table.
- Predict molecular shapes and other molecular properties utilizing the VSEPR method.
- Calculate changes in properties of gases, including reactions involving gases.
- Calculate and interpret heat and enthalpy changes for various chemical reactions, explain and use Hess's Law to compute reaction enthalpies.
- Describe intermolecular attractive forces, explain their effect on selected physical properties of solids, liquids, and gases, and interpret phase diagrams.

B. In accordance with Florida Statute 1007.25 concerning the state's general education core course requirements, this course meets the general education competencies for science.

- Students will demonstrate the ability to critically examine and evaluate scientific observation, hypothesis, or model construction, and to use the scientific method to explain the natural world.
- Students will successfully recognize and comprehend fundamental concepts, principles and processes about the natural world

C. Other Course Objectives/Standards
- Describe the basic properties and classify matter regarding to its physical state and composition
- Set up and solve problems involving unit analysis and metric system, correctly applying significant digits and scientific notation.
- Use the basic principles of modern atomic theory to write and interpret symbols of subatomic particles and calculate the number of subatomic particles in an atom or ion and an average atomic mass.
- Apply the mole concept to perform calculations based on the relation between mass, moles, and numbers of atoms or molecules.
- Describe the wave-particle nature of electromagnetic radiation in relation to Bohr's model, and quantum mechanical theory including identification of quantum numbers and atomic orbital shapes.

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- Derive the ground-state electron configurations of elements and ions and relate electron configurations to the classifications of elements and main trends in the Periodic Table.
- Distinguish formation and properties of ionic and molecular compounds based on electronic structure and electronegativity differences of elements and draw the correspondent Lewis dot structures.
- Interpret Lewis structures for molecular compounds and describe electron geometry and resonance along with the molecular shape and polarity, using VSEPR theory.
- Relate atomic hybrid orbitals to the corresponding molecular geometries and describe multiple covalent bonding in terms of atomic orbital overlap according to the Valence Bond theory.
- Correctly write molecular formulas from names of compounds and names from molecular formulas for both ionic and covalent compounds using IUPAC system.
- Apply the mole concept to solve problems including determining empirical and molecular formulas from percent composition and performing calculations with molarity and other units of solution concentrations.
- Identify, complete, and balance various types of chemical equations.
- Identify the mole ratio and correctly perform mole and mass calculations to determine the yield and limiting reactant in the different types of chemical reactions including titrations.
- Apply gas laws and kinetic molecular theory to solving problems related to the behavior of gases and the stoichiometry of chemical reactions involving gaseous reactants or products.
- Define the types of energy changes in chemical reactions and use the concepts of heat capacity and temperature to perform calculations related to thermochemical equations and calorimetry
- Apply the first law of thermodynamics to perform thermochemical calculations including Hess's law, standard enthalpies, and bond energies.
- Identify the intermolecular attractive forces, recognize their effect on the properties of the states of matter and phase transitions, and calculate the energy associated with these transitions.
- Identify the phase transitions on the cooling curves and phase diagrams and calculate the energy associated with these transitions.

- ~~Students will classify matter as an element, compound, heterogeneous mixture, or homogeneous mixture.~~
- ~~Students will perform calculations using the Metric System.~~
- ~~Students will identify properties and changes in matter as physical or chemical.~~
- ~~Students will use descriptive terms to characterize energy.~~
- ~~Students will identify different models of the atom.~~
- ~~Students will use modern atomic theory to identify the number of protons, neutrons, and electrons in an atom.~~
- ~~Students will name molecular and ionic compounds, and represent compounds using chemical formulas.~~
- ~~Students will write and balance the chemical reactions~~
- ~~Students will perform stoichiometric reaction calculations.~~
- ~~Students will perform calculations by employing gas laws.~~
- ~~Students will calculate internal energy change by determining heat and work changes in the system and the surroundings.~~
- ~~Students will determine reaction enthalpies using standard enthalpy data.~~
- ~~Students will determine wavelength and frequency of hydrogen spectral lines.~~

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- ~~Students will write electron configurations for atoms.~~
- ~~Students will identify shapes of atomic orbitals.~~
- ~~Students will identify trends in the Periodic Table utilizing Periodic Law.~~
- ~~Students will predict molecular geometry and polarity using VSEPR and Valence Bond Theory.~~
- ~~Students will determine the intermolecular forces involved in substances.~~

V. DISTRICT-WIDE POLICIES:

PROGRAMS FOR STUDENTS WITH DISABILITIES

Florida SouthWestern State College, in accordance with the Americans with Disabilities Act and the College's guiding principles, offers students with documented disabilities programs to equalize access to the educational process. Students needing to request an accommodation in this class due to a disability, or who suspect that their academic performance is affected by a disability should contact the Office of Adaptive Services at the nearest campus. The office locations and telephone numbers for the Office of Adaptive Services at each campus can be found at http://www.fsw.edu/adaptiveservices.

REPORTING TITLE IX VIOLATIONS

Florida SouthWestern State College, in accordance with Title IX and the Violence Against Women Act, has established a set of procedures for reporting and investigating Title IX violations including sexual misconduct. Students who need to report an incident or need to receive support regarding an incident should contact the Equity Officer at equity@fsw.edu. Incoming students are encouraged to participate in the Sexual Violence Prevention training offered online. Additional information and resources can be found on the College's website at http://www.fsw.edu/sexualassault.

VI. REQUIREMENTS FOR THE STUDENTS:

List specific course assessments such as class participation, tests, homework assignments, make-up procedures, etc.

VII. ATTENDANCE POLICY:

The professor's specific policy concerning absence. (The College policy on attendance is in the Catalog, and defers to the professor.)

VIII. GRADING POLICY:

Include numerical ranges for letter grades; the following is a range commonly used by many faculty:

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

(Note: The "incomplete" grade ["I"] should be given only when unusual circumstances warrant. An "incomplete" is not a substitute for a "D," "F," or "W." Refer to the policy on "incomplete grades.)

IX. REQUIRED COURSE MATERIALS:

(In correct bibliographic format.)

X. RESERVED MATERIALS FOR THE COURSE:

Other special learning resources.

XI. CLASS SCHEDULE:

This section includes assignments for each class meeting or unit, along with scheduled Learning Resource Center (LRC) media and other scheduled support, including scheduled tests.

XII. ANY OTHER INFORMATION OR CLASS PROCEDURES OR POLICIES:

(Which would be useful to the students in the class.)