NORTHWESTERN CONNECTICUT COMMUNITY COLLEGE

COURSE SYLLABUS

Course Title: **General Chemistry II**   **Course #: CHE*** 122

Course Description: 4 semester hours (3 class hours, 3 laboratory hours). Principles, theories, and laws of chemistry dealing with chemical bonding, molecular formation, periodic trends, states of matter, gas laws, and thermochemistry.

Pre-requisite: General Chemistry I, MAT* 137 Intermediate Algebra, and ENG*073 or satisfactory scores on placement tests.

Co-requisite: Must be taken concurrently with CHE* 122 lab.

Goals: This course will provide students with knowledge of the fundamentals of general chemistry.   Along with General Chemistry I, this course is intended to provide the basic knowledge of chemistry that is required for careers in natural and physical sciences, medicine, and many other related fields of science and technology.

Outcomes: Upon completion of this course, the student will demonstrate ability to:

SOLUTIONS	1. Calculate solution concentration using percent mass, molarity and molality.
	2. Explain factors that influence solubility of ionic solids and gases.
	3. Predict freezing point depression and boiling point elevation.
	4. Define colloid, hydrophobic, and hydrophilic.
CHEMICAL KINETICS	1. Calculate the rate of a chemical equation
	2. Write and explain rate laws for chemical reactions
	3. Calculate reactant concentration over time
	4. Explain activation energy and temperature dependence of rate constants
	5. Explain and apply reaction mechanisms
	6. Define catalysts
CHEMICAL EQUILIBRIUM	1. Explain the concept of equilibrium
	2. Calculate equilibrium constants and equilibrium concentrations
	3. Explain the relationship between chemical kinetics and chemical equilibrium.
	4. Explain factors that affect equilibrium
ACIDS AND BASES	1. Apply Brønsted and Lewis definition of acids and bases.
	2. Calculate pH, pOH, $[H^+]$, and $[OH^-]$
	3. Explain the strength of acids and bases
	4. Calculate ionization constants for weak acids and bases

	5. Calculate ionization constants from conjugate acids and bases
	6. Explain the acid-base properties of salts, hydroxides, and oxides
ACID-BASE EQUILIBRIA AND SOLUBILITY EQUILIBRIA	1. Explain homogeneous and heterogeneous solution equilibria
	2. Apply the common ion effect
	3. Define buffers
	4. Calculate solubility equilibria and how temperature and pH affect it.
ENTROPY, FREE ENERGY, AND EQUILIBRIUM	1. Explain and apply the second law of thermodynamics
	2. Calculate entropy and Gibbs free energy
	3. Apply Gibbs free energy to find out when a reaction is spontaneous
	4. Explain the thermodynamics in living systems
ELECTROCHEMISTRY	1. Explain redox reactions and galvanic cells.
	2. Explain the thermodynamics of redox reactions
	3. Calculate the electromotive force using standard reduction potentials
	4. Define batteries, corrosion, and electrolysis
NUCLEAR CHEMISTRY	1. Explain the nature of nuclear reactions and nuclear stability
	2. Apply kinetics to nuclear reactions
	3. Explain nuclear fission and fusion
	4. Explain use of isotopes
CHEMISTRY OF THE ENVIROMENT	1. Define ozone depletion, greenhouse effect, photochemical smog, acid rain, and indoor pollution
	2. Explain the water cycle and water treatment
	3. Explain green chemistry
TRANSITION METALS CHEMISTRY AND COORDINATION COMPOUNDS	1. Explain the chemistry and properties of transition metals
	2. Explain what a coordination compound is
	3. Apply molecular geometry to coordination compounds
	4. Explain reactions of coordination compounds and their applications
ORGANIC CHEMISTRY	1. Apply chemical nomenclature to simple aliphatic and aromatic organic compounds

	2. Complete the reactions of simple aliphatic and aromatic organic compounds
BIOCHEMISTRY	1. Describe proteins, lipids, carbohydrates, and nucleic acids