

NORTHWESTERN CONNECTICUT COMMUNITY COLLEGE

COURSE SYLLABUS

Course Title: General Chemistry I

Course #: CHE* 121

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: High School Chemistry, MAT* 137 Intermediate Algebra, and ENG*073 or satisfactory scores on placement tests.

Co-requisite: Must be taken concurrently with CHE* 121 lab.

Goals: This course will provide students with knowledge of the fundamentals of general chemistry. Along with General Chemistry II, 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:

METRIC UNITS & MEASUREMENTS	<ol style="list-style-type: none">1. Convert units of mass, volume and length from metric to English and from one metric unit to another.2. Use conversion factors (factor-label) method to solve conversion problems.3. Apply the rules of significant digits in solving problems.4. Distinguish between accuracy and precision.5. Calculate the density of substances and use density to solve quantitative problems.
NATURE OF MATTER	<ol style="list-style-type: none">1. Identify and classify different types of matter.2. Identify the subatomic particles, their charge and location in the atom.3. Recognize the important contributions to chemistry and to atomic theory including, but not limited to: Joseph Proust, John Dalton, J. J. Thomson, Wilhelm Röntgen, Ernest Rutherford, and James Chadwick.4. Distinguish between atomic number, mass number, atomic mass, and differences between isotopes of the same element.5. Compare and contrast metal and nonmetals, and use the periodic table to classify elements as metal, semi-metal, and nonmetal.6. Distinguish between atoms, molecules, ions, and compounds.7. Apply systematic and classical rules of chemical nomenclature to write formulas and name inorganic compounds.
CHEMICAL EQUATIONS & REACTIONS	<ol style="list-style-type: none">1. Complete and balance chemical equations.2. Solve stoichiometry problems:<ul style="list-style-type: none">• Mass to mass• Mass to volume of a gas• Volume to volume3. Determine the empirical formula and molecular formula.4. Solve stoichiometry problems involving limiting reagents and percent yield.5. Predict products for reactions in aqueous solution including:<ul style="list-style-type: none">• Single and double displacement reactions• Neutralization reactions

	<ul style="list-style-type: none"> • Oxidation – reduction reactions • Combination reactions • Decomposition reactions
REACTIONS IN SOLUTION	<ol style="list-style-type: none"> 1. Calculate the molarity of solutions and describe how solutions of specified molarity are made. 2. Describe how solutions are made when diluted using a stock solution of specified concentration. 3. Solve acid-base and redox titration problems to determine molarity or volume.
STATES OF MATTER – GASES	<ol style="list-style-type: none"> 1. Distinguish between the physical states of matter. 2. Solve gas law problems using Boyles Law, Charles Law, Dalton’s Law, combined law, ideal gas equation. 3. Explain the kinetic molecular theory of a gas. 4. Explain how the ideal gas law deviates from actual behavior under specific conditions.
THERMOCHEMISTRY	<ol style="list-style-type: none"> 1. Define energy and identify different forms of energy. 2. Explain enthalpy of reaction. 3. Calculate enthalpy change, ΔH. 4. Apply concepts of calorimetry to determine specific heat, heat of combustion, and heat of return. 5. Define and apply the first law of thermodynamics.
ELECTRONIC STRUCTURE OF THE ATOM	<ol style="list-style-type: none"> 1. Describe the nature of electromagnetic waves. 2. Apply quantum theory to solve for energy or wavelength using Planck’s equation. 3. Apply Bohr’s theory of the hydrogen atom. 4. Explain the dual nature of the electron. 5. Apply quantum theory to write the set of quantum numbers for electrons in atoms of elements. 6. Write electron orbital configuration using spdf with orbital detail. 7. Predict whether a metal is diamagnetic or paramagnetic.
PERIODIC TABLE	<ol style="list-style-type: none"> 1. Define ionization energy, electronegativity and electron affinity. 2. Predict period trends in atom radius, ionization energy, and electronegativity across a period and down a group. 3. Discuss historical development of the periodic table and identify individuals who contributed to the modern periodic table. 4. Write electron dot diagrams and structural formulas for molecules and ions.
STRUCTURE OF COMPOUNDS	<ol style="list-style-type: none"> 1. Predict molecular geometry and orbital hybridization. 2. Demonstrate knowledge of expanded octets. 3. Predict enthalpy of reaction when bonds are broken during specific reactions. 4. Explain the significance of dipole moment.
INTERMOLECULAR FORCES FOR LIQUIDS AND SOLIDS	<ol style="list-style-type: none"> 1. Predict how intermolecular forces influence the properties of specific liquids. 2. Explain the nature of crystalline solids vs. amorphous solids. 3. Contrast the different types of crystals: ionic, covalent, molecular, and metallic. 4. Define and use terms associated with phase changes of matter. 5. Calculate energy required to change the temperature and stage of substances.

<p>Competencies: <i>Scientific Reasoning:</i> Upon the completion of this course, students should be able to:</p>	<ol style="list-style-type: none"> 1. Explain the methods of scientific inquiry that lead to the acquisition of knowledge. Such methods include observations, testable hypotheses, logical inferences, experimental design, data acquisition, interpretation, and reproducible outcomes. 2. Apply scientific methods to investigate real-world phenomena, and routine and novel problems. This includes data acquisition and evaluation, and prediction. 3. Represent scientific data symbolically, graphically, numerically, and verbally. 4. Interpret scientific information and draw logical references from representations such as formulas, equations, graphs, tables, and schematics. 5. Evaluate the results obtained from scientific methods for accuracy and/or reasonableness
<p>Competencies: <i>Scientific Knowledge:</i> Upon the completion of this course, students should be able to:</p>	<ol style="list-style-type: none"> 1. Communicate using appropriate scientific terminology. 2. Use representations and models to communicate scientific knowledge and solve scientific problems. 3. Plan and implement data collection strategies appropriate to a particular scientific question. 4. Articulate the reasons that scientific explanations and theories are refined or replaced. 5. Evaluate the quality of scientific information on the basis of its source and the methods used to generate it.

College Policies

Plagiarism: Plagiarism and Academic Dishonesty are not tolerated at Northwestern Connecticut Community College. Violators of this policy will be subject to sanctions ranging from failure of the assignment (receiving a zero), failing the course, being removed/expelled from the program and/or the College. Please refer to your “Student Handbook” under “Policy on Student Rights,” the Section entitled “Student Discipline,” or the College catalog for additional information.

Americans with Disabilities Act (ADA): The College will make reasonable accommodations for persons with documented learning, physical, or psychiatric disabilities. Students should notify Dr. Christine Woodcock, the Counselor for Students with Disabilities. She is located at Green Woods Hall, in the Center for Student Development. Her phone number is 860-738-6318 and her email is cwoodcock@nwcc.edu.

School Cancellations: If snowy or icy driving conditions cause the postponement or cancellation of classes, announcements will be made on local radio and television stations and posted on the College’s website at www.nwcc.edu. Students may also call the College directly at **(860) 738-6464** to hear a recorded message concerning any inclement weather closings. Students are urged to exercise their own judgment if road conditions in their localities are hazardous.

Use of Electronic Devices: Some course content as presented in Blackboard Learn is not fully supported on mobile devices at this time. While mobile devices provide convenient access to check in and read information about your courses, they should not be used to perform work such as taking tests, quizzes, completing assignments, or submitting substantive discussion posts.

Sexual Assault and Intimate Partner Violence Resource Team: NCCC is committed to creating a community that is safe and supportive of people of all gender and sexual identities. This pertains to the entire campus community, whether on ground or virtual, students, faculty, or staff.

Sexual assault and intimate partner violence is an affront to our national conscience, and one we cannot ignore. It is our hope that no one within our campus community will become a victim of these crimes. However, if it occurs, NCCC has created the SART Team - Sexual Assault and Intimate Partner Violence Resource Team - to meet the victim's needs.

SART is a campus and community based team that is fully trained to provide trauma-informed compassionate service and referrals for comprehensive care. The team works in partnership with The Susan B. Anthony Project to extend services 24 hours a day, 7 days a week throughout the year.

The NCCC team members are:

Ruth Gonzalez, Ph.D.	860-738-6315	Green Woods Hall Room 207
Susan Berg	860-738-6342	Green Woods Hall Room 223
Kathleen Chapman	860-738-6344	Green Woods Hall Room 110
Michael Emanuel	860-738-6389	Founders Hall Annex Room 308
Seth Kershner	860-738-6481	Library
Jane O'Grady	860-738-6393	Founders Hall Annex Room 212
Robin Orloski	860-738-6416	Business Office Room 201
Patricia Bouffard, Ex-Officio	860-738-6319	Founders Hall Room 103
Savannah Schmitt		Student Representative

At NCCC we care about our students, staff and faculty and their well-being. It is our intention to facilitate the resources needed to help achieve both physical and emotional health.