Tompkins Cortland Community College

Master Course Syllabus

Course Discipline and Number: CHEM 101 **Year: 2025-2026**
Course Title: Principles of Chemistry I **Credit Hours: 4**

Attendance Policy: *To maintain good grades, regular attendance in class is necessary. Absence from class is considered a serious matter and absence never excuses a student from class work. It is the responsibility of all instructors to distribute reasonable attendance policies in writing during the first week of class. Students are required to comply with the attendance policy set by each of their instructors. Students are not penalized if they are unable to attend classes or participate in exams on particular days because of religious beliefs, in accordance with Chapter 161, Section 224-a of the Education Law of the State of New York. Students who plan to be absent from classroom activity for religious reasons should discuss the absence in advance with their instructors. See college catalog for more information.*

Services for Students with Disabilities: *It is the College's policy to provide, on an individual basis, appropriate academic adjustments for students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities should contact the Coordinator of Access and Equity Services, to discuss their particular need for accommodations. All course materials are available in alternate formats upon request.*

Course Description

This is a study of the basic principles of chemistry including measurement, atomic structure, bonding, mole concept, stoichiometry, and chemical formulas and equations. It is intended for students who have not had a chemistry course. Laboratory experiments are hands-on, wet-lab, performed in a traditional chemistry lab under supervision of a chemistry professor. Substantial outside preparation for the laboratories is required. CHEM 101 fulfills the SUNY General Education Natural Sciences requirement. A student may only apply credit earned in CHEM 101 **OR** CHEM 107 toward degree requirements. Prerequisites: MATH 095 or MATH 098 and RDNG 099 if required by placement testing; ENGL 099 or prior completion or concurrent enrollment in ESL 120, 121, and 122 (or prior completion of ESL 103) if required by placement testing. 4 Cr. (3 Lec., 2 Lab.)

Course Context/Audience

This course is part of the Liberal Arts Math/Science curriculum and can be used to fulfill a laboratory science requirement. It is a general education natural science course and should be of interest to anyone wanting to learn about chemistry.

Basic Skills/Entry Level Expectations

Writing: W2 Student should have completed ENGL 099 (if needed). The course requires short written responses and/or short papers without documentation, particularly personal reflection or narrative.

Math: M4 Completed MATH 095(if needed) - Course requires the use of basic mathematical skills plus basic algebra skills.

Reading: R2 Before taking this course, students must have a C or better in RDNG 099 or assessment indicating that RDNG 099 was not required.

Course Goals

As a result of successfully completing Principles of Chemistry, a student should be able to:

1. Demonstrate an understanding of matter, units of measurement and perform chemical calculations.
2. Demonstrating an understanding of atomic and molecular structure.
3. Name and write chemical formulas for simple inorganic compounds.
4. Demonstrate an understanding of the mole concept and perform calculations involving the mole.
5. Write and balance chemical equations for simple chemical reactions.

6. Perform chemical stoichiometric calculations.
7. Recognize and properly use simple chemical equipment in the laboratory.

Course Objectives/Topics

Objective/Topic	% Course
Topic 1. Matter and Measurement - Upon completion of this topic, the student should be able to: 1. Classify matter by physical state; 2. Distinguish among elements, compounds and mixtures; 3. Distinguish between physical and chemical changes; 4. Use scientific notation and significant figures; 5. Understand and calculate density; 6. Convert units; 7. Distinguish between kinetic and potential energy and relate these to changes in state.	13%
Topic 2. Atomic and Molecular Structure - Upon completion of this topic, the student should be able to: 1. Define the three most significant subatomic particles that make up atoms; 2. Define atomic number, mass number, isotope, ion, atomic weight; 3. Give the electron configuration of any atom; 4. Define quantum mechanics, energy level, orbital; 5. Write Lewis structures for atoms and simple molecules; 6. Understand, use, and relate the periodic table to the electron configuration of an atom; 7. Distinguish between ionic and molecular compounds; 8. Define covalent bond, polarity, electro negativity, ionic charge; 9. Determine the shape and polarity of simple inorganic molecules.	26%
Topic 3. Chemical Nomenclature - Upon completion of this topic, the student should be able to write chemical formulas of simple inorganic compounds from the chemical names and write the name of a chemical given its formula.	6%
Topic 4. The Mole - Upon completion of this topic, the student should be able to: 1. Give the two fundamental definitions of the mole; 2. Give Avogadro's number; 3. Perform calculations involving grams, moles, number of molecules, molecular weight; 4. Calculate empirical and molecular formulas.	11%
Topic 5. Balancing Chemical Equations - Upon completion of this topic, the student should be able to write, complete, and balance chemical equations for the five basic types of chemical reactions: composition, decomposition, single replacement, double replacement and oxidation.	6%
Topic 6. Stoichiometry - Upon completion of this topic, the student should be able to: 1. Interpret a chemical equation in moles; 2. From a balanced equation, perform the following conversions: mole to mole, grams to moles, moles to grams, grams to grams; 3. Define: theoretical yield, actual yield, and percentage yield.	12%
Topic 7. The Laboratory - Upon completion of this topic, the student should be able to: 1. Recognize, use, and distinguish among simple chemical laboratory equipment such as: beaker, Erlenmeyer flask, graduated cylinder, buret, barometer, thermometer, centigram balance, electronic milligram balance, Bunsen burner; 2. Perform simple chemical laboratory experiments; 3. Follow proper safety procedures and techniques.	26%

General Education Goals - Critical Thinking & Social/Global Awareness

CRITICAL THINKING OUTCOMES	HOW DOES THE COURSE ADDRESS THE OUTCOMES (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
Students will be able to ➢ develop meaningful questions to address problems or issues. ➢ gather, interpret, and evaluate relevant sources of information. ➢ reach informed conclusions and solutions. ➢ consider analytically the viewpoints of self and others.	Students will be presented with problems in which they have to use the basic principles of chemistry to get the solution. For example, students will be asked to determine the volume of oxygen needed to burn a given mass of a hydrocarbon fuel such as methane.

SOCIAL/GLOBAL AWARENESS OUTCOMES	HOW DOES THE COURSE ADDRESS THE OUTCOMES (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
➢ Students will begin to understand how their lives are shaped by the complex world in which they live. ➢ Students will understand that their actions have social, economic and environmental consequences.	Students will learn about how chemistry is involved in and affects the physical world and society. For example, the effects of pollutants like lead and mercury.

Instructional Methods
Classroom lectures, textbook reading and reviews of solutions to homework problems are appropriate instructional methods for this course.

Methods of Assessment/Evaluation

Method	% Course Grade
Lab	9%
Tests	51%
Homework	4%
Final Exam	23%
Quizzes	13%

Text(s)
Introductory Chemistry, Tro, Nivaldo J., Latest Edition, © 2009 Prentice Hall, Inc.
Required:
Selected Solutions Manual for Introductory Chemistry, Tro, Nivaldo J., Latest Edition, © 2009 Prentice Hall, Inc.
Required:
CHEM 101 Lab Manual, Bickford, Frank, Latest Edition
Required:

Bibliography
Chemistry: Principles of Reactions, William L. Marterton and Cecile N. Hurley, any addition, Harcourt College Publishing, Inc.

Journal of Chemical Education, past and present issues
Scientific American, past and present issues

Other Learning Resources

Audiovisual No resources specified
Electronic Compact disc that accompanies text.
Other No resources specified