

Texas State Technical College Waco

Course Syllabus

Course Rubric & Number: CHEM 1305

Lecture/Lab Hours: 3- 0

CIP Code: 400505139

Course Title: **Introductory Chemistry I**

Course Description: An introductory chemistry course primarily for allied health science majors or related science majors. Topics include standards for measurements, matter, nomenclature, quantitative composition, equations, atomic theory, bonding, gases, and solution.

Corequisites: CHEM 1105

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Department Chair: _____

Date: _____

Approved by CIP Committee: _____

Date: _____

End-of-Course Learning Outcomes:

Given a number, express the number in scientific notation. Given numbers in scientific notation, multiply, divide, add and subtract them in scientific notation.

Define the conversions between English and Metric measurements for volume mass and length.

Given a measurement in the metric system, convert it to any other related unit in the metric system.

Given a temperature measurement in one scale, convert it to one of the other scales. Given the mass and volume of a substance, calculate its density.

Calculate the volume or mass of a substance, given the specific gravity.

Calculate the mass or volume of substance, given the specific gravity or density of a substance.

Calculate the specific heat of a substance.

Determine physical and chemical properties and changes.

Give the names and symbols of the elements.

Determine states of matter. State the names, symbols, charges and relative masses of the three principle subatomic particles.

Determine the maximum number of electrons that can exist in a given principle energy level.

Determine the atomic number, atomic mass, and number of neutrons, protons and electrons, given sufficient data.

Using a periodic table, write the isotopic notation for various isotopes.

Draw the sublevels in each principle energy level showing order and number of electrons.

Distinguish the differences between isotopes. Predict whether an element is a metal, nonmetal, or metalloid.

Determine the atomic number of an element.

Determine the atomic mass (atomic weight) of an element. Determine the symbol or name of an element.

Given a known reaction, predict the reaction of other elements within the same group.

Determine the oxidation number and valence of selected elements.

Using oxidation numbers of elements, write the chemical formulas of inorganic compounds.

Given a chemical formula, calculate the oxidation numbers.

Give the name or formula for binary compounds which have a metal (fixed) and a nonmetal.

Give the name of a binary compound with a metal (variable) and a nonmetal using the Stock system.

Give the name or formula for a ternary compound which has a metal and a polyatomic ion.

Define how to determine whether a compound is an acid or base.

Identify the parts of an equation.

Balance chemical equations by the inspection method.

Calculate the percent composition of compounds. Determine the atomic (molecular) mass of elements and compounds.

Calculate the percent composition of compounds.

Determine moles, grams, and molecular mass.

Calculate the empirical and molecular formulas of compounds given elemental data.

Given the mass of one reactant or product and the equation, determine the mole-mole ratio, and the resulting masses of the other products and reactants. Determine the limiting reagent in a stoichiometry problem.

Determine percent yield.

Calculate the percent by volume and mass of a solution.

Calculate the molarity of a solution and determine how to prepare one.

Calculate the molarity of a solution and determine how to prepare one.
 Calculate the normality of a solution and determine how to prepare one.
 Using the dilution formula, show how to prepare new solutions.
 Determine pressures, volumes, and temperatures using the General Gas Law.
 Calculate partial pressures using Dalton's Law of Partial Pressures (including water vapour).
 Using the Ideal Gas Law, determine pressures, volumes, temperatures, moles, grams, and molecular masses of gases.
 Perform stoichiometry problems using the gas laws.

Resources:

Tools & Materials Students Purchase

Quantity	Item Description
1	Introductory Chemistry - Corwin – latest edition
2	Scientific Calculator (TI-35 or 36 recommended)

TSTC Grading Policy:

(Grades for all Major courses must be C or better)

Grade	Percent	Description	Grade Points
A	90-100	Excellent/Superior Performance Level	4
B	80-89	Above Required Performance Level	3
C	70-79	Minimum Required Performance Level	2
D	60-69	Below Required Performance Level	1
F	Below 60	Failure to meet Performance Requirements	0
IP	--	In Progress	
W	--	Withdrawal	0
CR	--	Credit	0
AUD	--	Audit of Course	0

See College Catalog for complete descriptions.

Grading Policy and Grading Scheme

Lecture:

UNANNOUNCED quizzes may be given during the lecture period. The lowest 10% + 1 quiz grade will be dropped and the remaining quizzes averaged. This will count as one test score. If no quizzes are given, the lecture grade will be based on the average of the test scores. Four (4) one-hour tests will be given.

Make-up Policy for Quizzes and Tests:

No test or quiz may be made up if absent from the class for any reason. If a quiz or test is missed, a score of zero (0) will be assessed. This includes missing a quiz due to tardiness.

$$\text{Final Grade} = (\text{Test 1} + \text{Test 2} + \text{Test 3} + \text{Test 4} + \text{Test 5} + \text{Test 6} + \text{Test 7} + \text{Quiz Avg}) / 8$$

Instructor's Participation Policy:

The student must be present for all tests, quizzes, and assignments. Failure to attend will result in a grade of zero for that particular test, quiz, laboratory or assignment.

Students with Disabilities:

If you have a documented disability that will impact your work in this class, please contact the Office of Deaf and Disabled Student Services (D/DSS) so that appropriate arrangements for your accommodations can be made. In accordance with the federal law, a student requesting accommodations must provide documentation of his/her disability to D/DSS. For information, visit D/DSS in the Fentress Center or call (254) 867-3600.

Once you and a D/DSS representative have signed a Letter of Special Accommodations, take the accommodations letter to each class for which an accommodation has been determined. Meet individually with each class instructor to discuss accommodations letter. Have the instructor sign and keep a copy of the letter. Take the original letter, signed by the instructor, back to D/DSS so they are aware that the instructor has been officially informed of the need for accommodations.

Course Assessments & Grading Scheme:

<i>Assessments</i>	<i>Points</i>	<i>% of Final Grade</i>
Quiz 1: Metric to metric conversions	10 points	0.568 %
Quiz 2: Metric/English conversions and temperature conversions	10 points	0.568 %
Quiz 3: Density, states of matter and compounds and elements	10 points	0.568 %
Quiz 4: Properties and Changes, Specific Heat, Symbols and Names of Elements	10 points	0.568 %
Quiz 5: Subatomic particles, metals, isotopes	10 points	0.568 %
Quiz 6: Electronic configuration and group names	10 points	0.568 %
Quiz 7: Oxidation numbers and valence	10 points	0.568 %
Quiz 8: Writing formulas and calculating oxidation numbers	10 points	0.568 %
Quiz 9: Naming binary compounds	10 points	0.568 %
Quiz 10: Naming tertiary compounds ion	10 points	0.568 %
Quiz 11: Acids, and balancing equations	10 points	0.568 %
Quiz 12: Molecular mass and percent composition	10 points	0.568 %
Quiz 13: Moles	10 points	0.568 %
Quiz 14: Empirical and molecular formula	10 points	0.568 %
Quiz 15: Simple stoichiometry	10 points	0.568 %
Quiz 16: Limiting reagents and % yield	10 points	0.568 %
Quiz 17: Percent solution	10 points	0.568 %
Quiz 18: Molarity	10 points	0.568 %
Quiz 19: Stoichiometry using molarity and dilution	10 points	0.568 %
Quiz 20: Combined gas laws	10 points	0.568 %
Quiz 21: Idea gas laws	10 points	0.568 %
Quiz 22: Stoichiometry using gas laws	10 points	0.568 %
Test 1: Measurements, matter and energy atomic structure, and periodic table	100 points	12.5 %
Test 2: Writing Formulas	100 points	12.5 %
Test 3: Nomenclature	100 points	12.5 %
Test 4: Balancing and Mass Relationships	100 points	12.5 %

Test 5: Stoichiometry	100 points	12.5 %
Test 6: Solutions	100 points	12.5 %
Test 7: Gas Laws	100 points	12.5 %
Final Course Grade		100%

Description of Graded Elements of the Course:

End-of-Course Learning Outcomes	Assessment Measure(s)	Submittal of assessment	Grading Criteria	% of Final Grade
Given a measurement in the metric system, convert it to any other related unit in the metric system.	Quiz 1	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Given a temperature measurement in one scale, convert it to one of the other scales. Define the conversions between English and Metric measurements for volume mass and length.	Quiz 2	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Given the mass and volume of a substance, calculate its density.	Quiz 3	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Calculate the volume or mass of a substance, given the specific gravity. Calculate the volume or mass of a substance, given the specific gravity. Calculate the specific heat of a substance. Determine physical and chemical properties and changes. Give the names and symbols of the elements. Determine states of matter	Quiz 4	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
State the names, symbols, charges and relative masses of the three principle subatomic particles. Predict whether an element is a metal, nonmetal, or metalloid.	Quiz 5	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Determine the maximum number of electrons that can exist in a given principle energy level. Draw the sublevels in each principle energy level showing order and number of electrons. State group names	Quiz 6	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Given a number, express the number in scientific notation. Given numbers in scientific notation, multiply, divide, add and subtract them in scientific notation. Define the conversions between English and Metric measurements for	Test 1	Written using a writing instrument	Correct answers based on scientific fact	12.5 %

<p>volume mass and length. Given a measurement in the metric system, convert it to any other related unit in the metric system.</p> <p>Given a temperature measurement in one scale, convert it to one of the other scales. Given the mass and volume of a substance, calculate its density.</p> <p>Calculate the volume or mass of a substance, given the specific gravity.</p> <p>Calculate the mass or volume of substance, given the specific gravity or density of a substance. Calculate the specific heat of a substance. Determine physical and chemical properties and changes. Give the names and symbols of the elements. Determine states of matter. State the names, symbols, charges and relative masses of the three principle subatomic particles.</p> <p>Determine the maximum number of electrons that can exist in a given principle energy level. Determine the atomic number, atomic mass, and number of neutrons, protons and electrons, given sufficient data. Using a periodic table, write the isotopic notation for various isotopes.</p> <p>Draw the sublevels in each principle energy level showing order and number of electrons. Distinguish the differences between isotopes. Predict whether an element is a metal, nonmetal, or metalloid. Determine the atomic number of an element.</p> <p>Determine the atomic mass (atomic weight) of an element. Determine the symbol or name of an element.</p> <p>Given a known reaction, predict the reaction of other elements within the same group.</p>				
Determine the oxidation number and valence of selected elements.	Quiz 7	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Using oxidation numbers of elements, write the chemical formulas of inorganic compounds. Given a chemical formula, calculate the oxidation numbers.	Quiz 8	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Determine the oxidation number and valence of selected elements. Using oxidation numbers of elements, write the chemical formulas of	Test 2	Written using a writing instrument	Correct answers based on	12.5 %

inorganic compounds. Given a chemical formula, calculate the oxidation numbers.			scientific fact	
Give the name or formula for binary compounds which have a metal (fixed) and a nonmetal. Give the name of a binary compound with a metal (variable) and a nonmetal using the Stock system.	Quiz 9	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Give the name or formula for a ternary compound which has a metal and a polyatomic ion.	Quiz 10	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Give the name or formula for binary compounds which have a metal (fixed) and a nonmetal. Give the name of a binary compound with a metal (variable) and a nonmetal using the Stock system. Give the name or formula for a ternary compound which has a metal and a polyatomic ion. Define how to determine whether a compound is an acid or base.	Test 3	Written using a writing instrument	Correct answers based on scientific fact	12.5 %
Identify the parts of an equation. Balance chemical equations by the inspection method.	Quiz 11	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Calculate the percent composition of compounds. Determine the atomic (molecular) mass of elements and compounds. Calculate the percent composition of compounds.	Quiz 12	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Determine moles, grams, and molecular mass.	Quiz 13	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Calculate the empirical and molecular formulas of compounds given elemental data.	Quiz 14	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Identify the parts of an equation.. Balance chemical equations by the inspection method. Calculate the percent composition of compounds. Determine the atomic (molecular) mass of elements and compounds. Calculate the percent composition of compounds. Determine moles, grams, and molecular mass. Calculate the empirical and molecular formulas of compounds given elemental data.	Test 4	Written using a writing instrument	Correct answers based on scientific fact	12.5 %
Given the mass of one reactant or product and the equation, determine the mole-mole ratio, and	Quiz 15	Written using a writing instrument	Correct answers based on	0.568 %

the resulting masses of the other products and reactants.			scientific fact	
Determine the limiting reagent in a stoichiometry problem. Determine percent yield.	Quiz 16	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Given the mass of one reactant or product and the equation, determine the mole-mole ratio, and the resulting masses of the other products and reactants. Determine the limiting reagent in a stoichiometry problem. Determine percent yield.	Test 5	Written using a writing instrument	Correct answers based on scientific fact	12.5 %
Calculate the percent by volume and mass of a solution.	Quiz 17	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Calculate the molarity of a solution and determine how to prepare one. Calculate the normality of a solution and determine how to prepare one.	Quiz 18	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Given volumes and concentrations, perform titration calculations.	Quiz 19	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Calculate the percent by volume and mass of a solution. Calculate the molarity of a solution and determine how to prepare one. Calculate the molarity of a solution and determine how to prepare one. Calculate the normality of a solution and determine how to prepare one. Using the dilution formula, show how to prepare new solutions.	Test 6	Written using a writing instrument	Correct answers based on scientific fact	12.5 %
Determine pressures, volumes, and temperatures using the General Gas Law.	Quiz 20	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Using the Ideal Gas Law, determine pressures, volumes, temperatures, moles, grams, and molecular masses of gases.	Quiz 21	Written using a writing instrument	Correct answers based on scientific fact	0.568 %
Perform stoichiometry problems using the gas laws.	Quiz 22	Written using a writing instrument	Correct answers based on scientific fact	0.568 %

Determine pressures, volumes, and temperatures using the General Gas Law. Calculate partial pressures using Dalton's Law of Partial Pressures (including water vapour). Using the Ideal Gas Law, determine pressures, volumes, temperatures, moles, grams, and molecular masses of gases. Perform stoichiometry problems using the gas laws.	Test 7	Written using a writing instrument	Correct answers based on scientific fact	12.5 %
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Course Policies:

Late Work:

Late work receives a zero.

Electronic Devices:

All cell phones, pagers, computers and other electrical communication devices will be turned off completely during class (this includes no vibrate mode). Failure to comply with this requirement will result in the student being required to leave the class for the rest of the class period during which the violation occurs. Any work missed may not be made up.

Make-up work:

Make-up work receives a zero

Course Schedule:

Week # 1: Review syllabus. Mass, scientific notation, rounding numbers, metric system and temperature conversion.		
Week # 2: Specific gravity, States of matter, Compounds and elements, and Density		
Given a measurement in the metric system, convert it to any other related unit in the metric system.	Quiz 1	Metric to metric conversions
Week # 3 Properties of matter, Specific heat, and metal. Structure of the atom, isotopes, atomic and mass numbers. Energy levels, ions, and electron configuration.		
Given a temperature measurement in one scale, convert it to one of the other scales. Define the conversions between English and Metric measurements for volume mass and length. Given the mass and volume of a substance, calculate its density. Calculate the volume or mass of a substance, given the specific gravity. Calculate the volume or mass of a substance, given the specific gravity. Calculate the specific heat of a substance. Determine physical and chemical properties and changes. Give the names and symbols of the elements. Determine states of matter	Quiz 2	Metric/English conversions and temperature conversions
	Quiz 3	Density, states of matter and compounds and elements
	Quiz 4	Properties and Changes, Specific

		Heat, Symbols and Names of Elements
Week 4: Group names, electron dot structure, and valence. Test review. Test		
<p>Given a number, express the number in scientific notation. Given numbers in scientific notation, multiply, divide, add and subtract them in scientific notation. Define the conversions between English and Metric measurements for volume mass and length. Given a measurement in the metric system, convert it to any other related unit in the metric system. Given a temperature measurement in one scale, convert it to one of the other scales. Given the mass and volume of a substance, calculate its density. Calculate the volume or mass of a substance, given the specific gravity. Calculate the mass or volume of substance, given the specific gravity or density of a substance. Calculate the specific heat of a substance. Determine physical and chemical properties and changes. Give the names and symbols of the elements. Determine states of matter. State the names, symbols, charges and relative masses of the three principle subatomic particles. Determine the maximum number of electrons that can exist in a given principle energy level. Determine the atomic number, atomic mass, and number of neutrons, protons and electrons, given sufficient data. Using a periodic table, write the isotopic notation for various isotopes. Draw the sublevels in each principle energy level showing order and number of electrons. Distinguish the differences between isotopes. Predict whether an element is a metal, nonmetal, or metalloid. Determine the atomic number of an element. Determine the atomic mass (atomic weight) of an element. Determine the symbol or name of an element. Given a known reaction, predict the reaction of other elements within the same group.</p>	Quiz 5	Subatomic particles, metals, isotopes
	Quiz 6	Electronic configuration and group names
	Test 1	Quiz 1: Metric to metric conversions
Week 5: Writing formulas and calculating oxidation numbers. Naming binary compounds. Naming ternary compounds.		
<p>Determine the oxidation number and valence of selected elements. Using oxidation numbers of elements, write the chemical formulas of inorganic compounds. Given a chemical formula, calculate the oxidation numbers.</p>	Quiz 7	Oxidation numbers and valence
	Quiz 8	Writing formulas and calculating oxidation numbers
Week 6: Acids, balancing equations and types of chemical reactions		
<p>Give the name or formula for binary compounds which have a metal (fixed) and a nonmetal. Give the name of a binary compound with a metal (variable) and a nonmetal using the Stock system. Give the name or formula for a ternary compound which has a metal and a polyatomic ion.</p>	Quiz 9	Naming binary compounds
	Quiz 10	Naming tertiary compounds ion

Week 7: Molecular mass, Percent Composition and Moles and Test		
Determine the oxidation number and valence of selected elements. Using oxidation numbers of elements, write the chemical formulas of inorganic compounds. Given a chemical formula, calculate the oxidation numbers.	Test 2	Writing Formulas
Week 8: Moles and empirical and molecular formulas. Review for nomenclature test. Test		
Identify the parts of an equation. Balance chemical equations by the inspection method.	Quiz 11	Acids, and balancing equations
Identify the parts of an equation.. Balance chemical equations by the inspection method.	Quiz 12	Molecular mass and percent composition
Calculate the percent composition of compounds. Determine the atomic (molecular) mass of elements and compounds. Calculate the percent composition of compounds. Determine the oxidation number and valence of selected elements. Using oxidation numbers of elements, write the chemical formulas of inorganic compounds. Given a chemical formula, calculate the oxidation numbers.	Test 3	Nomenclature
Week 9: Stoichiometry, limiting reagents and percent yield.		
Determine moles, grams, and molecular mass. Calculate the empirical and molecular formulas of compounds given elemental data.	Quiz 13	Moles
	Quiz 14	Empirical and molecular formula
Week 10: Titrations. Review for test over balancing and mass relationships		
Identify the parts of an equation.. Balance chemical equations by the inspection method. Calculate the percent composition of compounds. Determine the atomic (molecular) mass of elements and compounds. Calculate the percent composition of compounds. Determine moles, grams, and molecular mass. Calculate the empirical and molecular formulas of compounds given elemental data. Given the mass of one reactant or product and the equation, determine the mole-mole ratio, and the resulting masses of the other products and reactants. Determine the limiting reagent in a stoichiometry problem. Determine percent yield.	Quiz 15	Simple stoichiometry
	Quiz 16	Limiting reagents and % yield
	Test 4	Balancing and Mass Relationships
Week 11: Solutions. Review for Stoichiometry test		
Given the mass of one reactant or product and the equation, determine the mole-mole ratio, and the resulting masses of the other products and reactants. Determine the limiting reagent in a stoichiometry problem. Determine percent yield.	Test 5	Stoichiometry
Week 12: Molarity, normality, dilution and titrations		
Calculate the percent by volume and mass of a solution.	Quiz 17	Percent solution

Calculate the molarity of a solution and determine how to prepare one. Calculate the normality of a solution and determine how to prepare one.	Quiz 18	Molarity
Week 13: Review for test over solutions and test.		
Calculate the percent by volume and mass of a solution. Calculate the molarity of a solution and determine how to prepare one. Calculate the molarity of a solution and determine how to prepare one. Calculate the normality of a solution and determine how to prepare one. Using the dilution formula, show how to prepare new solutions.	Test 6	Solutions
Week 14: Gases, combined gas law, idea gas law, law of partial pressures. Stoichiometry using the idea gas law.		
Determine pressures, volumes, and temperatures using the General Gas Law.	Quiz 20	Combined gas laws
Week 15: Stoichiometry using the idea gas law, Review for test over gas laws.		
Determine pressures, volumes, and temperatures using the General Gas Law. Calculate partial pressures using Dalton's Law of Partial Pressures (including water vapour). Using the Ideal Gas Law, determine pressures, volumes, temperatures, moles, grams, and molecular masses of gases. Perform stoichiometry problems using the gas laws.	Quiz 21	Idea gas laws
	Quiz 22	Stoichiometry using gas laws
	Test 7	

Modification of the syllabus:

This syllabus is intended as a tentative set of guidelines for this course and is not a contract. At any time during the semester, the instructor reserves the right to make modifications in content, schedules and requirements as deemed necessary to promote the best education possible within the prevailing conditions and circumstances affecting this course.