CHEM 1211 - Chemistry I (version 201003L)

Course Title	Course Development	Learning Support
Chemistry I	Standard	No

Course Description

Provides an introduction to basic chemical principles and concepts which explain the behavior of matter. Topics include measurement, physical and chemical properties of matter, atomic structure, chemical bonding, nomenclature, chemical reactions, and stoichiometry and gas laws.

Pre-requisites

Pre-requisites: One Required

MATH 1101 - Mathematical Modeling (201003L)
MATH 1103 - Quantitative Skills and Reasoning (201614L)
MATH 1111 - College Algebra (201003L)

Regstr. Co-requisites

Regstr. Co-requisites: None

True Co-requisites

True Co-requisites: All Required

CHEM 1211L - Chemistry Lab I (201003L)

Course Length

	Lecture Contact Time	Regular Lab Type	Reg. Lab Contact Time	Other Lab Type	Oth. Lab Contact Time	Total Contact Hrs
Contact Hours Per Week	**3 hrs**	**N/A**	**0 hrs**	**N/A**	**0 hrs**	**3 hrs**
Contact Min/Hrs Per Semester	**2250 min**		**0 min**		**0 min**	**45 hrs**

	Lecture Credit Hours	Lab Credit Hours	Total Credit hours	WLU
Semester Credit Hours	**3**	**0**	**3**	**101.25**

Competencies & Outcomes

Order	Description

1 **Measurement**

Order	Description	Learning Domain	Level of Learning
1	Use basic metric measurement prefixes and factor multipliers to convert units within the metric system. Describe justifications for S.I. convention.	Cognitive	Application
2	Perform calculations involving density, specific gravity, mass, and volume measurements.	Cognitive	Synthesis
3	Apply the conventions of exponential notation and significant figures to mathematical operations.	Cognitive	Application
4	Convert between the Fahrenheit, Celsius and Kelvin temperature scales.	Cognitive	Comprehension
5	Use dimensional analysis (unit-factor analysis) in calculations involving conversions from one set of units to another.	Cognitive	Application
6	Perform gravimetric analysis and volumetric analysis.	Cognitive	Synthesis

2 **Physical and Chemical Properties of Matter**

Order	Description	Learning Domain	Level of Learning
1	Describe and distinguish the general properties of gases, liquids, and solids.	Cognitive	Knowledge
2	Explain changes of state (phase changes) in matter and relate to heat.	Cognitive	Comprehension
3	Define physical and chemical changes of matter.	Cognitive	Knowledge
4	Classify an element as a metal, non-metal or metalloid and relate this to its position on the periodic table.	Cognitive	Analysis
5	Identify diatomic elements.	Cognitive	Knowledge
6	Determine the relative electron negativity, atomic radius and other characteristics of an atom by its position on the periodic chart.	Cognitive	Application
7	Describe pure substances and mixtures. Introduce mixture separation strategies.	Cognitive	Knowledge

3 **Atomic Structure**

Order	Description	Learning Domain	Level of Learning
1	Describe Dalton's model, Bohr's model and the modern quantum mechanical theory of atomic structure.	Cognitive	Knowledge
2	Describe the electron configuration of any element and how its electron configuration relates to its properties and its position on the periodic table.	Cognitive	Knowledge
3	Relate the electronic configuration of an element to its position on the periodic table.	Cognitive	Analysis
4	Describe the electronic configuration of any element on the periodic table and how it relates to an element's properties.	Cognitive	Knowledge

4 **Chemical Bonding**

Order	Description	Learning Domain	Level of Learning
1	Describe and identify ionic and covalent bonding and van der Waals forces.	Cognitive	Knowledge
2	Draw Lewis dot structures for molecules.	Cognitive	Knowledge
3	Determine the change of monoatomic ions and simple inorganic radicals. Explain oxidation numbers of elements and compounds.	Cognitive	Application
4	Assign electronic geometry and molecular geometry from Lewis dot structure of a molecule.	Cognitive	Knowledge

5 **Nomenclature**

Order	Description	Learning Domain	Level of Learning
1	Name inorganic compounds by the IUPAC system based on their formulas.	Cognitive	Knowledge
2	Write formulas of common inorganic compounds based on their IUPAC names.	Cognitive	Knowledge

3	Determine if a compound is an acid, base, salt, or covalent compound.	Cognitive	Application

6 **Chemical Reactions**

Order	Description	Learning Domain	Level of Learning
1	Calculate molar mass and percent composition of compounds.	Cognitive	Application
2	Convert between mass, moles, and number of atoms using formula, formula weight, and Avogadro's number.	Cognitive	Comprehension
3	Calculate empirical formulae and molecular formulae of compounds.	Cognitive	Application
4	Write and balance chemical equations.	Cognitive	Knowledge
5	Predict reactions in aqueous solutions: acids, bases, salts.	Cognitive	Application

7 **Stoichiometry**

Order	Description	Learning Domain	Level of Learning
1	Perform calculations involving composition stoichiometry and reaction stoichiometry.	Cognitive	Synthesis
2	Classify chemical reactions as to type of reaction. Write examples of each type of chemical reaction.	Cognitive	Analysis

8 **Gas Laws**

Order	Description	Learning Domain	Level of Learning
1	Summarize the general properties of gases and relate them to the kinetic molecular theory of gases.	Cognitive	Comprehension
2	Describe factors that affect the pressure, volume, and temperature of a gas.	Cognitive	Knowledge
3	Solve problems associated with gas laws including: Boyle's Law, Charles's Law, Gay-Lussac's Law, Combined Gas Law, Dalton's Law of Partial Pressures, and Ideal Gas Law.	Cognitive	Application