CHEM 1151 - Survey of Inorganic Chemistry (version 201003L)

Course Title	Course Development	Learning Support
Survey of Inorganic Chemistry	Standard	No

Course Description

Provides an introduction to basic chemical principles and concepts which explain the behavior of matter. Topics include measurements and units, structure of matter, chemical bonding, chemical reactions, gas laws, liquid mixtures, acids and bases, salts and buffers, and nuclear chemistry.

Pre-requisites

Pre-requisites: None

Regstr. Co-requisites

Regstr. Co-requisites: NoneMATH 1101 OR MATH 1103 OR MATH 1111 AND CHEM 1151L

True Co-requisites

True Co-requisites: All Required

CHEM 1151L - Survey of Inorganic Chemistry Lab (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 and Units**

Order	Description	Learning Domain	Level of Learning
1	Convert among metric, English, and S.I. units using dimensional analysis (unit-factor analysis).	Cognitive	Comprehension
2	Be able to use scientific notation.	Cognitive	Knowledge
3	Measure and solve problems of density and specific gravity.	Cognitive	Knowledge
4	Measure temperature, understand and convert between Fahrenheit, Celsius, and Kelvin scales.	Cognitive	Knowledge

2 **Structure of Matter**

Order	Description	Learning Domain	Level of Learning
1	Identify the three subatomic particles, their properties, and relationships.	Cognitive	Knowledge

2	Determine and explain significance of atomic number and mass number.	Cognitive	Application
3	Describe atomic structure relating to energy level, sublevels, orbitals, and electrons.	Cognitive	Knowledge
4	Relate atomic structure to the arrangement of the periodic table.	Cognitive	Analysis
5	Compare the composition of elements, compounds, and mixtures.	Cognitive	Synthesis
6	Describe the physical basis of the solid, liquid, and gaseous states of matter.	Cognitive	Knowledge
7	Determine melting point and boiling point. Describe the energy considerations of phase changes.	Cognitive	Application

3 **Chemical Bonding**

Order	Description	Learning Domain	Level of Learning
1	Describe ionic, polar, and non-polar covalent bonds. Describe van der Waals interactions.	Cognitive	Knowledge
2	Describe the formation of stable (unstable) ions.	Cognitive	Knowledge
3	Determine electron-dot structure for atoms, ions, radicals, and covalent compounds.	Cognitive	Application
4	Name ionic and covalent compounds using IUPAC inorganic nomenclature.	Cognitive	Knowledge
5	Calculate ionic charges from a chemical formula. Define basic rules of oxidation numbers.	Cognitive	Application
6	Calculate the molecular weight of a compound from chemical formula.	Cognitive	Application
7	Determine the empirical formula from percent composition data.	Cognitive	Application

4 **Chemical Reactions**

Order	Description	Learning Domain	Level of Learning
1	Identify the basic types of chemical reactions.	Cognitive	Knowledge
2	Describe oxidation and reduction. Identify oxidizing and reducing agents.	Cognitive	Knowledge
3	Describe reactions with balanced equations.	Cognitive	Knowledge
4	Describe Avogadro's number as it relates to the mole concept.	Cognitive	Knowledge
5	Use stoichiometry to balance molar relationships and masses of species in a chemical reaction.	Cognitive	Application
6	Describe reaction theory and collision theory. Explain activation energy and catalysis.	Cognitive	Knowledge
7	Identify factors that affect an equilibrium reactions.	Cognitive	Knowledge
8	Interpret the meaning of equilibrium constant.	Cognitive	Comprehension
9	Calculate the equilibrium constant for a given reaction.	Cognitive	Application
10	Explain Le Chatelier's Principle.	Cognitive	Comprehension
11	Define reaction kinetics and the meaning of forward and reverse rates. Describe factors which affect the rate of reaction.	Cognitive	Knowledge

12	Describe the difference between rate and equilibrium.	Cognitive	Knowledge

5 **Gas Laws**

Order	Description	Learning Domain	Level of Learning
1	Describe the kinetic molecular theory as it relates to the properties of gases.	Cognitive	Knowledge
2	Interpret and compare Boyle's Law, Charles' Law, and Gay Lusaac's Law.	Cognitive	Comprehension
3	Interpret Dalton's Law and Graham's Law.	Cognitive	Comprehension
4	Demonstrate calculations using the combined gas law and ideal gas law.	Cognitive	Application

6 **Liquid Mixtures**

Order	Description	Learning Domain	Level of Learning
1	Describe properties of a solution.	Cognitive	Knowledge
2	Describe methods of expressing concentration, including percent w/w, percent w/v, and molarity.	Cognitive	Knowledge
3	Solve problems calculating concentrations and converting concentrations to different units.	Cognitive	Application
4	Identify properties of a suspension.	Cognitive	Knowledge
5	Identify properties of a colloidal dispersion.	Cognitive	Knowledge
6	Describe the properties and physical constraints of water.	Cognitive	Knowledge

7 **Acids and Bases**

Order	Description	Learning Domain	Level of Learning
1	Identify the properties, uses, and reactions of acids and bases.	Cognitive	Knowledge
2	Describe ionization as it relates to acid or base strength.	Cognitive	Knowledge
3	Briefly describe the Arrhenius and Bronsted-Lowry models of acids and bases.	Cognitive	Knowledge
4	Explain pH scale. Calculate pH from [H30+] or [OH-].	Cognitive	Comprehension

8 **Salts and Buffers**

Order	Description	Learning Domain	Level of Learning
1	Describe the formation of salts in a neutralization reaction.	Cognitive	Knowledge
2	Explain how buffers maintain pH. Relate this to Le Chatelier's Principle.	Cognitive	Comprehension

9 **Nuclear Chemistry**

Order	Description	Learning Domain	Level of Learning

1	Explain alpha, beta, and gamma decay.	Cognitive	Comprehension