

Standard  Institutionally Developed College: N/A

EDGE Compatible: No

**Pre-requisites**

**Co-requisites**

CHEM 1151L - Survey of Inorganic Chemistry Lab ( 201203 )

**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.

**Course Length**

	Minutes	Contact Unit
Lecture:	2250	
Lab 2:	0	
Lab 3:	0	
Practicum/Internship:	0	
Clinical:	0	
Total:	2250	3

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Semester Credit Hours: 3

**Competencies**

Order	Description	Lecture	Lab2	Lab3	Practicum/Internship	Clinical	Total Minutes	Semester Credit Hrs
1	Measurement and Units	225	0	0	0	0	225	0
2	Structure of Matter	338	0	0	0	0	338	0
3	Chemical Bonding	337	0	0	0	0	337	0
4	Chemical Reactions	450	0	0	0	0	450	0
5	Gas Laws	225	0	0	0	0	225	0
6	Liquid Mixtures	225	0	0	0	0	225	0
7	Acids and Bases	113	0	0	0	0	113	0
8	Salts and Buffers	112	0	0	0	0	112	0
9	Nuclear Chemistry	225	0	0	0	0	225	0

Order	Description	Lecture	Lab2	Lab3	Practicum/ Internship	Clinical	Total Minutes	Semester Credit Hrs
Totals for Course CHEM 1151 - Survey of Inorganic Chemistry ( version 201003 ):		2250	0	0	0	0	2250	3

## Learning Outcomes

### 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

### Structure of Matter

Order	Description	Learning	Level of
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

### 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

### 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

#### 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

#### Liquid Mixtures

Order	Description	Learning	Level of
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

#### 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

Order	Description	Learning Domain	Level of Learning
4	Explain pH scale. Calculate pH from $[H_3O^+]$ or $[OH^-]$ .	Cognitive	Comprehension

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

Nuclear Chemistry

Order	Description	Learning Domain	Level of Learning
1	Explain alpha, beta, and gamma decay.	Cognitive	Comprehension

## References

Order	Reference Type	Description
1	Book with Author(s) Listed	Bettelheim, Brown & March. (2006). Introduction to general, organic and biochemistry. (8th). Belmont, CA: Brooks Cole.
2	Book with Author(s) Listed	Block & McKelvy. (2006). Lab experiments for general chemistry. (5th). ? : Thomson.
3	Essays or Chapters in Edited Books - One Author	Brady, J. & Senese, F.. (2007). Chemistry: The study of matter and its changes. 5th. pp. 1144 New York, NY: Wiley & Sons
4	Book with Author(s) Listed	Brown, LeMay & Burstein. (2006). Chemistry: The central science. (10th). Englewood Cliffs, NJ: Prentice Hall.
5	Book with Author(s) Listed	Burns, R.. (2004). Fundamentals of chemistry. (4th). Englewood Cliffs, NJ: Prentice Hall.
6	Book with Author(s) Listed	Chang, R.. (2005). Chemistry. (8th). New York, NY: McGraw Hill.
7	Book with Author(s) Listed	Denniston, K. & et al.. (2006). General, organic, and biochemistry. (5th). New York, NY: McGraw Hill.
8	Book with Author(s) Listed	Hein, M., Pattison, S., Arena, S., & Best, L.. (2008). Introduction to general, organic, and biochemistry. (9th). New York, NY: John Wiley & Sons.
9	Book with Author(s) Listed	Kelter, Mosher & Scott. (2008). Chemistry: The practical approach. (?). Boston, MA: Houghton Mifflin.
10	Book with Author(s) Listed	Kotz, Treichel & Weaver. (2006). Chemistry and chemical reactivity. (6th). Belmont, CA: Brooks Cole.
11	Book with Author(s) Listed	Masterton & Hurley. (2008). Chemistry: Principles and reactions. (6th). Belmont, CA: Brooks Cole.
12	Book with Author(s) Listed	Moore, Stanitski & Jurs. (2007). Chemistry: The molecular science. (3rd). ? : Delmar.
13	Book with Author(s) Listed	

Order	Reference Type	Description
		Olmstead & Williams. (2004). Chemistry. (4th). New York, NY: Wiley & Sons.
14	Book with Author(s) Listed	Sackheim & Lehman. (1998). Chemistry for the health sciences. (8th). Englewood Cliffs, NJ: Prentice Hall.
15	Book with Author(s) Listed	Stanton, Zhu & Atwood. (2005). Experiments in general chemistry. (1st). Belmont, CA: Brooks Cole.
16	Book with Author(s) Listed	Tro & Nivaldo. (2006). Introductory chemistry. (2nd). Englewood Cliffs, NJ: Prentice Hall.
17	Book with Author(s) Listed	Whitten, Davis, Peck & Stanley. (2006). General chemistry. (8th). Belmont, CA: Brooks Cole.
18	Book with Author(s) Listed	Zumdahl & Steven. (2007). Basic chemistry. (6th). Boston, MA: Houghton Mifflin.