SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE:	Principles of Chemistry I		
CODE NO. :	CHM102	**SEMESTER:**	I
PROGRAM:	Pre-Health Sciences, General Arts and Science		
AUTHOR:	Lise St. Hilaire, Christine Giardino		
DATE:	June 2016	**PREVIOUS OUTLINE DATED:**	June 2015
APPROVED:	*"Marilyn King"*		*June, 2016*
	CHAIR		**DATE**
TOTAL CREDITS:	4		
PREREQUISITE(S):	Grade 10 Science or equivalent		
HOURS/WEEK:	3 hours lecture, 2 hours lab (alternate weeks)		

I. COURSE DESCRIPTION:

This introductory chemistry course provides students with the scientific knowledge required to understand the structure, properties, and changes of matter, as well as the mathematical knowledge and skills required to perform quantitative calculations for chemical reactions, solutions, and gases.

This course includes topics in physical and chemical properties of matter, atomic structure, chemical bonding, chemical nomenclature, shape and polarity of molecules, chemical reactions, the mole concept, stoichiometry of chemical reactions, states of matter, interactions between molecules, the gas laws, and solubility and solutions.

The theory will be supported by laboratory experiments where students will be required to carry out common lab procedures and calculations. The purpose of the lab work is to develop practical skills while gaining a better understanding of the theoretical concepts.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Define the general terms commonly found in chemistry and perform related calculations.

   Potential Elements of the Performance:

   - Utilize the S.I. system of units and describe and apply the scientific rules of rounding and the rules of significant digits.
   - Define matter, mass, weight, volume, density, specific gravity, and temperature.
   - Calculate density, volume, or mass in theoretical applications and through lab procedures.
   - Describe three commonly used temperature scales and perform conversions from one to the other.

2. Describe matter.

   Potential Elements of the Performance:

   - Describe and distinguish between physical and chemical properties and changes of matter.
   - Describe the classification of matter.

- Describe atomic structure and determine numbers of subatomic particles and the identity of elements given incomplete data.
- Differentiate between Dalton's Atomic Theory and the Modern Atomic Theory.
- Describe the organization and trends in the periodic table.
- Identify and compare the properties of metals, nonmetals, and metalloids.

3. Explain chemical bonding.

   Potential Elements of the Performance:

   - Use Lewis structures to demonstrate an understanding of ionic and covalent bonding.
   - Compare ionic and covalent bonding and the properties of ionic and covalent compounds.
   - Describe and predict the polarity and molecular shape of molecules and their effects on the properties of compounds.

4. Represent compounds by formula and by name.

   Potential Elements of the Performance:

   - Predict chemical formulae based on oxidation states.
   - Count atoms in a chemical formula.
   - Use the IUPAC system of nomenclature to name inorganic compounds.

5. Describe chemical reaction types and perform quantitative calculations for chemical reactions.

   Potential Elements of the Performance:

   - Describe synthesis, decomposition, combustion, and single and double replacement reactions.
   - Identify these reaction types given chemical equations.
   - Apply knowledge of reactions to determine products given reactants.
   - Balance chemical equations.
   - Define mole, molar mass, percent composition, empirical and molecular formula, limiting reagent, and percent yield.
   - Calculate moles, mass, and number of particles in theoretical applications.
   - Calculate the percent composition of a compound.
   - Determine empirical and molecular formulae of compounds using percent composition or experimental data.

- Use stoichiometry to determine limiting reagents and to calculate chemical quantities and percent yield.

6. Describe solutions and perform quantitative analysis of solutions.

   Potential Elements of the Performance:

   - Describe the components and types of solutions.
   - Explain the factors affecting solubility and the rate of dissolving.
   - Compare the types of intermolecular forces and how these forces affect the properties of compounds.
   - Describe and differentiate between diffusion and osmosis.
   - Calculate the percent concentration and molar concentration of solutions.
   - Determine quantities needed to dilute solutions to specific concentrations.
   - Perform stoichiometric calculations for ions and compounds in solutions.

7. Describe and apply the gas laws.

   Potential Elements of the Performance:

   - Use the particle theory of matter to compare solids, liquids, and gases.
   - Describe the assumptions made when describing an ideal gas.
   - Describe and apply the gas laws theoretically and quantitatively.
   - Perform stoichiometric calculations for chemical reactions involving gases.

8. Conduct laboratory investigations using appropriate scientific techniques.

   Potential Elements of the Performance:

   - Use proper measurement techniques for the precise and accurate collection of quantitative data.
   - Portray scientific data using charts, tables, and appropriate scientific language.
   - Use scientific reasoning to draw conclusions that explain investigation results.

III. TOPICS:

1. Measurement and Measurement Systems
2. Classification and Properties of Matter
3. Chemical Bonding
4. Chemical Nomenclature
5. Chemical Quantities
6. Chemical Reactions and Stoichiometry
7. Solutions and Solubility
8. Gas Laws

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

1. Textbook: Corwin, Charles H. (2014). *Introductory Chemistry: Concepts and Critical Thinking,* 7th Edition. Pearson Education, Inc.
2. Lab Materials: Lab Coat, Safety Glasses
3. Sault College Learning Management System (D2L)

V. EVALUATION PROCESS/GRADING SYSTEM:

Written tests	60%
Quizzes/Assignments	10%
Lab Work	30%

Notes:

1. Written tests are cumulative in nature and may not be equally weighted. Students must complete all written tests and achieve an overall test grade of at least 50%, independent of other components, to pass this course.
2. Students must achieve an average of 50% on lab work, independent of other components, to pass this course.
3. Missed tests, labs, or quizzes/assignments will be assigned a grade of 0 unless notification of a LEGITIMATE reason is given PRIOR to the test/lab time or due date. Regardless of the circumstances, students should discuss the situation and available options with the professor upon return to class.

4. All policies and procedures outlined in the Student Code of Conduct will be followed.

The following semester grades will be assigned to students:

Grade	Definition	Grade Point Equivalent
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI. SPECIAL NOTES:

Attendance:
Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located in D2L and on the portal form part of this course outline.