SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE:	**GENERAL CHEMISTRY**		
CODE NO. :	**CHM107**	**SEMESTER:**	**II**
PROGRAM:	**PRE-HEALTH SCIENCES, GENERAL ARTS AND SCIENCE**		
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DATE:	**JUNE 2015**	**PREVIOUS OUTLINE DATED:**	**DEC 2014**
APPROVED:	*"Marilyn King"*		*Aug. 2015*
	CHAIR, HEALTH PROGRAMS		**DATE**
TOTAL CREDITS:	**5**		
PREREQUISITE(S):	**CHM102**		
HOURS/WEEK:	**3 HOURS LECTURE, 2 HOURS LAB**		

I. COURSE DESCRIPTION:

In this course, students will continue to apply the mathematical skills learned in CHM102 to quantitatively analyze various chemical systems.

This course includes topics in organic chemistry, energy changes in chemical reactions, chemical equilibrium, acids and bases, and electrochemistry.

Students will also complete a series of laboratory experiments involving common lab procedures and calculations. The purpose of the lab work is to develop practical and safety skills while gaining a better understanding of the theoretical concepts covered in this course and CHM102.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE

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

1) Identify organic and biochemical compounds by name and formula and describe their physical and chemical characteristics.

Potential Elements of Performance:

- Use the IUPAC system of nomenclature to name organic and biochemical compounds.
- State the common names of some organic compounds.
- Draw structural formulae for simple organic and biochemical compounds.
- Construct models of organic compounds using a molecular modeling kit.
- Identify functional groups found in organic and biochemical compounds.
- Determine physical properties of organic compounds.
- State and describe different types of organic and biochemical reactions.
- Predict the products of reactions involving organic and biochemical reactants.

2) Describe, analyze, and calculate energy changes in physical and chemical processes.

Potential Elements of Performance:

- Define and describe specific heat capacity, enthalpy, and enthalpy change.
- Determine if a physical change or chemical reaction is endothermic or exothermic.
- Sketch and interpret potential energy diagrams.
- Express and interpret thermochemical equations with energy terms.
- Solve problems involving specific heat capacity, mass, temperature change, and enthalpy change of a substance.
- Calculate the enthalpy change of a physical or chemical process.

3) Explain the factors that affect the rate of reaction

Potential Elements of Performance:

- State five factors that affect reaction rate.
- Explain each factor by applying the collision theory.
- Use a potential energy diagram to explain the effect that a catalyst (such as an enzyme) would have on reaction rate.

4) Analyze chemical equilibria.

Potential Elements of Performance:

- Explain the concept of dynamic equilibrium.
- Describe different types of chemical equilibria.(ex. involving gases, solubility, acid/base)
- Predict, using Le Chatelier's principle, the effect of a variety of stresses (adding/removing a substance, changing pressure, changing temperature) on a system at equilibrium.
- Write expressions for common equilibrium constants (Keq, Ksp, Ka, Kb, Kw).
- Solve problems involving concentration and equilibrium constants.
- Predict the direction of a reaction given the concentrations of substances in a reaction mixture.

5) Recognize and analyze precipitation reactions and perform quantitative calculations involving solubility equilibria.

Potential Elements of Performance:

- Describe precipitate formation.
- Use solubility rules to predict whether or not two soluble ionic compounds will react to form a precipitate.
- Perform a precipitation reaction and determine (by gravimetric analysis) the amount of precipitate formed.
- Write net ionic equations.
- Solve problems involving concentration and Ksp.

6) Describe and analyze acid-base reactions and perform quantitative calculations involving acid-base equilibria.

Potential Elements of Performance:

- Define and identify strong acids, strong bases, weak acids, weak bases, and conjugate acid-base pairs.

- Describe the amphoteric nature of water.
- Solve problems involving pH, pOH, Ka, Kb, Kw, and concentration.
- Perform an acid-base titration.
- Compare the strengths of various acids and bases based on their equilibrium constants.
- Decide whether an aqueous solution of a given salt will be acidic, basic, or neutral.
- Describe how buffers stabilize the pH of a solution and calculate the pH of buffer systems.

7) Identify and describe oxidation-reduction reactions.

Potential Elements of Performance:

- Describe and differentiate between oxidation and reduction.
- Identify oxidizing and reducing agents in a reaction.
- Write and balance redox reactions.
- Describe the transfer of electrons in redox reactions.
- Explain the roles of oxygen and hydrogen in biochemical redox reactions.

IV. TOPICS

1. Organic Chemistry and Biochemistry
2. Energy Changes
3. Kinetics and Reaction Rate
4. Chemical Equilibrium
5. Acids and Bases
6. Introduction to Electrochemistry

LABORATORY WORK

In a laboratory setting, the student will conduct experimental procedures to support the theoretical concepts in this course and CHM102. The laboratory topics will include:

1) Construction of models to represent the main types of organic compounds.
2) Investigation of the physical and chemical properties of organic compounds.
3) Observation of chemical reactions that produce gases, precipitates, and colour changes.

4) Recovering the mass of a substance which has been subjected to a sequence of chemical reactions.
5) Gravimetric analysis of a precipitate.
6) Spectrophotometric determination of a metal in aqueous solution.
7) Titration of acids and bases and determination of an unknown acid

V. 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)

VI. EVALUATION PROCESS/GRADING SYSTEM

Evaluation methods:

Written tests (5 at 10% each)	50%
Lab Work	30%
Final Exam	20%

Notes:

1. ***Students must achieve an average of at least 50% on test and exam material, independent from the lab work, to obtain a passing grade in the course.***
2. ***Students must achieve a minimum grade of 50% on lab material, independent from the test/exam grade, to obtain a passing grade in the course.***
3. ***Missed tests, labs, or exam will be assigned a grade of 0 unless notification of a LEGITIMATE reason is given PRIOR to the test/lab time. Regardless of the circumstances, students should discuss the situation and available options with the professor upon return to class.***
4. ***All policies and procedures as outlined in the Student Code of Conduct will be followed.***

The following semester grades will be assigned to students in postsecondary courses:

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.	

If a faculty member determines that a student is at risk of not being successful in their academic pursuits and has exhausted all strategies available to faculty, student contact information may be confidentially provided to Student Services in an effort to offer even more assistance with options for success. Any student wishing to restrict the sharing of such information should make their wishes known to the coordinator or faculty member.

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.