Douglas College

EFFECTIVE: SEPTEMBER 2004
CURRICULUM GUIDELINES

A.	Division:	**Education**	Effective Date:		**September 2004**	
B.	Department / Program Area:	**Science and Technology Chemistry**	Revision	**X**	New Course	
			If Revision, Section(s) Revised:		**C, F, H, J**	
			Date of Previous Revision:		**September 13, 1994**	
			Date of Current Revision:		**September 2004**	

C: **CHEM 1105** **D**: **Introductory Chemistry** **E:** **5**

Subject & Course No.	Descriptive Title	Semester Credits

F: Calendar Description:

This course quickly reviews the content of CHEM 1104, including stoichiometry and atomic structure, and then continues with the study of the following topics: thermo chemistry, equilibrium, gases and liquids, solution chemistry, properties and reactions of acids and bases, and electrochemistry.

G: Allocation of Contact Hours to Type of Instruction / Learning Settings

Primary Methods of Instructional Delivery and/or Learning Settings:

Lecture / Laboratory

Number of Contact Hours: (per week / semester for each descriptor)

4 hours lecture / 3 hours laboratory

Number of Weeks per Semester:

15

H: Course Prerequisites:

CHEM 1104 (C or better) or CHEM 11 (B or better) and MATH 1101 or equivalent

I: Course Corequisites:

none

J: Course for which this Course is a Prerequisite

CHEM 1110

K: Maximum Class Size:

36

L: PLEASE INDICATE**:**

	Non-Credit
	College Credit Non-Transfer
X	College Credit Transfer:

SEE BC TRANSFER GUIDE FOR TRANSFER DETAILS (www.bccat.bc.ca)

M: Course Objectives / Learning Outcomes

The student will be able to:

1. Express the precision of a calculated quantity given the uncertainties in the measurements used in the calculation.
2. Given the mass of a substance, calculate the number of moles, and the number of particles in the sample.
3. Given the percent composition of a compound and the molar mass, find the empirical and molecular formulas.
4. Given the balanced equation for a chemical reaction, carry out the required stoichiometric calculations. The substances in the reaction may be gases, solids, liquids, or solutions.
5. Define any of the terms used in the course, for example: mole, specific heat capacity, ideal gas, colligative property etc.
6. Carry out thermochemical calculations based on data obtained in calorimetric measurements.
7. Use thermochemical tables to calculate ΔH, ΔS or ΔG for a given chemical reaction.
8. Solve problems involving gases, assuming ideal gas behaviour.
9. Describe the Kinetic Molecular Theory of Gases and use this to explain any of the observed properties of gases.
10. Given the solubility of ionic compounds in water, write the net ionic equation for any reaction occurring in aqueous solution.
11. Perform calculations involving any of the three colligative properties of solution: freezing point depression, boiling point elevation, and osmotic pressure.
12. Use the Principle of Le Chatelier to predict the direction of change in a system in equilibrium as the result of a given change in temperature, pressure, or volume of the system.
13. Solve problems involving the use of the concentration equilibrium constant, K_c, for gaseous systems.
14. Write balanced equations for all reactions or equilibria involving acids and bases.
15. Calculate the pH of a given solution of any strong acid or base.
16. Calculate the pH and percent ionization of a solution of given concentration of a weak acid or base (or the salt of a weak acid or base).
17. Explain how buffer solutions are prepared and describe their properties.
18. Given the concentration and volume of a strong acid which is titrated with a given concentration of strong base, calculate the initial pH, and the pH after the addition of various volumes of the base.
19. Balance any redox reaction.
20. For any given galvanic cell, write the cell reaction equation and calculate the standard cell emf.
21. Use tables of standard electrode potentials to predict reaction spontaneity for a given redoc reaction.
22. Do calculations of reactants consumed, products formed etc for a given electrolytic cell.

N: Course Content:

1. Introduction and Review

Measurement, problem solving, formulas and calculations, chemical reactions, stoichiometry.

2. Principles of Reactivity: Thermodynamics

Enthalpy, calorimetry, Hess's Law, standard enthalpies of formation and reaction, entropy.

3. Principles of Reactivity: Kinetics and Equilibrium

Rates of chemical reactions, chemical equilibrium, the equilibrium constant, calculations involving K, Le Chatelier's Principle, chemical reactivity.

4. Gases and Liquids

Gases: review of the gas laws, the ideal gas equation, Dalton's Law of Partial Pressures, Kinetic Molecular Theory, Graham's Law of Effusion, real gasses. Liquids: properties, vaporization and condensation, vapour pressure.

5. Solution Chemistry

Definitions, the solution process, Henry's Law, concentration units, colligative properties: boiling point elevation, freezing point lowering, osmotic pressure. Aqueous solutions: solubility product, common ion effect.

6. Properties of Acids and Bases

Properties, definitions, conjugate acid/base pairs, autoionization of water, relative acid strengths, K_a and K_b, salts and hydrolysis, buffers, acid-base titrations.

7. Electrochemistry

Redox reactions, oxidation numbers, balancing redox equations. Electrochemical cells, standard cell emf, using standard cell potentials, batteries, fuel cells and corrosion. Electrolysis.

Laboratory Content

The following laboratory experiments will be performed during the lab period:

1. Analytical balance and metric conversions
2. Density measurements
3. Acid-Base titrations
4. Thermochemistry
5. Redox: Determination of Water of Hydration
6. Chemical Equilibrium
7. Ideal Gas Constant
8. Freezing Point Depression
9. Acid Dissociation Constant
10. Electrochemistry

O: Methods of Instruction

P: Textbooks and Materials to be Purchased by Students

Kotz, J. C., M. D., Wood, J. L. and Moore, J. W., The Chemical World: Concepts and Applications, Saunders College Publishing, Toronto, 1994.

Chemistry 1105 Laboratory Manual, Douglas College

Q: Means of Assessment

The student's performance in the course will be based on the following evaluations:

1. Lecture Material (70%)

1.1. Two or three in-class tests will be given during the semester (30%).
1.2. A final exam covering the entire semester's work will be given during the final examination period (30%).
1.3. Problem assignments / quizzes (10%).

2. Laboratory (30%)

2.1. Written reports for each experiment will be handed in and graded. These reports will either be complete reports to be handed in in the laboratory notebook, or short reports, to be handed in on report sheets (20%).
2.2. Quantitative results of experiments performed on unknown samples will be graded (2%).
2.3. A practical laboratory exam will be given in the last lab period of the semester (8%).

R: Prior Learning Assessment and Recognition: specify whether course is open for PLAR

Course Designer(s) | Education Council / Curriculum Committee Representative

Dean / Director | Registrar