



Course Documentation Outline

School of Business, Biosciences and Justice Studies

SECTION I

1. Program (s): Biofood, Biotechnology, Chemical, Environmental
2. Course Name: Analytical Chemistry 1
3. Course Code: CHEM 2000
4. Credit Value: 4 Course Hours: 60

Class	Lab	Field	Other	Total
30	30			60

5. Prerequisites/Co-requisites/Equivalent Courses

PR/CO/EQ	Course Code	Title
PR	CHEM1003	General Chemistry 2
PR	MATH1004	Math 2

6. **Faculty:** Elinor Brunet **Date:** June 8, 2010 **Effective Date:** Sept 7, 2010
7. **Dean Approval:** *Jim Whiteway* **Date:** August 2010
9. **Revision Number:** **Date:** **Effective Date:**
- 10: **Notes**

Section II

11. Calendar Description:

This course provides an introduction to some of the basic techniques and calculations associated with quantitative chemical analysis. Laboratory work supplements the theory and serves to introduce Beer's Law and the concept of standardizing solutions.

12. Provincial Context:

This course meets the following Ministry of Education and Training requirements:

a). Prior Learning Assessment (PLA)

Students may apply to receive credit by demonstrating achievement of the course learning outcomes through previous life and work experiences.

This course is eligible for challenge through the following method(s) indicated by *

Challenge Exam	Portfolio	Interview	Other	Not Eligible
*	*	*		

PLAR Contact:

13. Employability Skills emphasized in this course

	communication - written		communication - visual		communication - oral
*	analytical		creative thinking	*	decision making
*	interpersonal	*	numeracy	*	organizational
*	problem solving	*	technological		other (specify)

14. Required Texts, Materials, Resources or Technical Materials Required:

Lab manual produced at the college, lab coat and safety eyewear (CSA approved) with colourless lenses, as well as a scientific calculator capable of linear regression. A formal textbook is not required for this course.

15. **Evaluation Plan**

Students will demonstrate learning in the following ways:

Assignment Description	Evaluation Methodology	Due Date
Assignments	20 %	On going
Quizzes and midterm test	25 %	On going
Lab reports	25 %	Weekly
Final Test	30 %	Dec 2010

16. **Other**

Policy for missed tests/work and submission of assignments:

Students are expected to make every reasonable effort not to miss tests and to submit all assigned work on time. Students must advise the instructor **in advance** if they are unable to meet scheduled deadlines, **otherwise late assignments will not be accepted for evaluation and a grade of zero will be assigned.** Every effort will be made to accommodate students unable to meet specified deadlines as a result of extenuating circumstances; however, the instructor reserves the right to refuse late assignments and to refuse to reschedule assessments.

The total of the marks for the quizzes, midterm, assignments, lab reports and final test must be equal to or greater than 60% to obtain a pass in this course

The midterm test will cover material from the beginning of the semester to that point. The final test will cover material from the entire semester. The style of the questions will be exactly the same as those contained in the assignments and quizzes.

All labs must be performed, and the associated report for each lab must be submitted for grading. The format to be used for the lab report will be discussed in the lab period. The lab reports must be typed. Only one lab may be 'made up' during the scheduled make up period at the end of the semester

Loyalist College has a Violence Prevention policy:

All College members have a responsibility to foster a climate of respect and safety, free from violent behavior and harassment.

Violence (e.g. physical violence, threatening actions or harassment) is not, in any way, acceptable behavior.

Weapons or replicas of weapons are not permitted on Loyalist College property.

Unacceptable behavior will result in disciplinary action or appropriate sanctions.

More information can be found in the "Student Manual and Guide - Rights & Responsibilities".

Contact Information for Elinor Brunet:

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Section III

17. Curriculum Delivery, Learning Plan and Learning Outcomes:

Course Components/Content	Related Learning Outcomes	Learning Activities/Resources
Review of Selected Activities from General Chemistry	<p>The student will be able to:</p> <ul style="list-style-type: none"> - express the results of all calculations with the correct number of significant figures or decimal points - display an appreciation for the difference between the accuracy with which they have determined the concentration of their unknown, and the precision displayed during their titrations - perform conversions within the metric system - state the names and symbols of selected elements - use the periodic table to determine molar mass - give the name or chemical formula for specified compounds or ions - describe how to accurately prepare solutions by dissolution or dilution, using the appropriate glassware with the concentration units of mol/L, mg/L, % w/w, % w/v or % v/v - be able to convert a concentration in mol/L to mg/L or any other unit of concentration - extend the concept of concentration of a compound to the concentration of ions present 	<p>Curriculum objectives will be achieved through a combination of the following teaching strategies:</p> <ol style="list-style-type: none"> 1. Lecture 2. Laboratory activities (guided and discovery) 3. Cooperative study 4. Independent study (i.e. required readings and exercises) <p>Labs:</p> <ul style="list-style-type: none"> - Standardization of NaOH by KHP - Standardization of HCl by Na₂CO₃, determination of %w/w Na₂CO₃ in an unknown - % w/w nickel in an unknown - Determination of chloride with AgNO₃ -Determination of the hardness of water as calcium

Redox Equations	<ul style="list-style-type: none"> - calculate oxidation numbers of elements in a compound or a polyatomic ion - balance simple redox equations, identifying the $\frac{1}{2}$ reactions and oxidizing or reducing agents - balance redox equations in an acidic or alkaline environment 	<p>Lab: Preparation and standardization of KMnO_4</p> <p>Determination of % w/w Calcium in an Unknown</p>
Normality	<ul style="list-style-type: none"> - given a reaction equation, determine the equivalent weight of the compound(s) involved - manipulate the equation for Normality (eq/L) to calculate equivalents or mass of reagents - describe how to accurately prepare solutions by dissolution or dilution with a unit of Normality 	<p>Lab: Beer's Law Micropipetting</p> <p>Lab: Beer's Law</p>
Stoichiometry	<ul style="list-style-type: none"> - given a balanced reaction equation and the quantity of one of the reagent(s) or product(s) determine how much of the other reactants will react or how much of the products will be produced - be able to determine the limiting reagent, theoretical yield and per cent yield 	
Ionic Strength	<ul style="list-style-type: none"> - calculate the concentration of the ions present in a solution - calculate the concentration of all of the ions present when two or more solutions are combined with or without one or more precipitation reactions 	
WHMIS, MSDS, Other Reference Materials	Demonstrate a working knowledge of these subjects	

Upon successful completion of this course, the student will be able to:

- i** Calculate the quantities of reagents required and prepare solutions of specified concentration in mol/L (M), mg/L (ppm) or eq/L (N) by dilution or dissolution
- ii** Standardize NaOH, HCl, KMnO_4 against primary standards
- iii** Balance redox reactions in acidic or alkaline environments
- iv** Follow the process of a reaction to determine limiting reagents, theoretical yields and per cent yields regardless of units used to express quantities of reagents
- v** Determine the concentrations of ions present in a solution and use the molar concentrations to express the ionic strength of the solution
- vi** Practise relevant safety procedures while performing laboratory exercises
- vii** Demonstrate the manual skills required to carry out laboratory exercises effectively and accurately
- viii** Express the results of **all** calculations to the appropriate number of significant figures or decimal places **with** the appropriate units