



## Course Documentation Outline

### School of Business, Biosciences and Justice Studies

#### SECTION I

1. Program (s): Biofood, Biotechnology, Chemical, Environmental
2. Course Name: Instrumentation 1 Lab
3. Course Code: CHEM 2006
4. Credit Value: 3                      Course Hours: 45

Class	Lab	Field	Other	Total
	45			45

5. Prerequisites/Co-requisites/Equivalent Courses

PR/CO/EQ	Course Code	Title
PR	CHEM1003	General Chemistry 2
CO	CHEM 2001	Instrumentation 1 Theory

6. **Faculty:** Elinor Brunet                      **Date:** June 7, 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:

The labs performed in this course support the theory studied in CHEM2001 Chemical Instrumentation I Theory.

### 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
Lab Reports	90%	On going
Personal Assessment	10%	On going

16. **Other**

- All labs must be performed and the data recorded and initialled before leaving the lab (penalty -10%).
- A lab report must be submitted for each lab, one week after the lab is completed.
- Students will work with a partner to perform the labs but must each submit their own personalized, individual lab report (the penalty for duplicate reports is -50%)
- All labs will be returned in the final week of the semester (before the final test).
- There will be prearranged make up periods during the semester: students may perform only one make up lab.
- There may be a final evaluation test that may take the form of a practical exam at the end of the semester.
- The 10% assessment mark represents an evaluation of how well the students learn the lab techniques demonstrated, how safely the students work, and the cleanliness of their workstation.

Loyalist College has a **Violence Prevention** policy:

- All College members have a responsibility to foster a climate of respect and safety, free from violent behaviour and harassment.
- Violence (e.g. physical violence, threatening actions or harassment) is not, in any way, acceptable behaviour.
- Weapons or replicas of weapons are not permitted on Loyalist College property.
- Unacceptable behaviour will result in disciplinary action or appropriate sanctions. More information can be found in the "Student Manual and Guide - Rights & Responsibilities".

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### Section III

#### 17. Curriculum Delivery, Learning Plan and Learning Outcomes:

<b>Course Components/Content</b>	<b>Related Learning Outcomes</b>	<b>Learning Activities/Resources</b>
Spectroscopy  Spec 20	The student will be able to: - prepare a schematic - find, name and explain the purpose of the main parts of a Spec 20 - recognize that the detector and lamp respond differently at varying wavelengths of energy and use this to determine the wavelength at which this instrument is most responsive - relate the colour of light to its wavelength	Lab: Operation and Response of Spec



<p>Chromatography Thin Layer and Preparative Column</p>	<ul style="list-style-type: none"> <li>- set up the developing tank</li> <li>- prepare a TLC plate (apply mixture)</li> <li>- develop and visualize the TLC plate</li> <li>-calculate the <math>R_f</math> value for the components, the mobile and stationary phases affect of the <math>R_f</math> value and the resolution of the components</li> <li>-separate a mixture of compounds on a silica gel column, collect the fractions as they come off with a fraction collector, and prepare a TLC plate to identify the compound(s) present in each fraction by comparing their <math>R_f</math> value to the results that they obtained in the TLC 2 lab</li> </ul>	<p>Lab: Thin Layer 1 Thin Layer 2 Column Chromatography</p>
<p>Gas Chromatography Shimadzu GC8A</p>	<ul style="list-style-type: none"> <li>- point out the parts and describe their purpose</li> <li>- start up, run chromatograms and shut down the GC</li> <li>- introduce reproducible injections</li> <li>- predict, knowing the boiling points, the order of elution of a mixture of compounds</li> <li>- be able to describe the effects of changing column temperature, and attenuation on retention time and peak height</li> <li>- be able to calculate retention time from the recorder output</li> <li>- be able to measure the gas flow rate and install a column</li> </ul>	<p>Lab: GC 1</p>
<p>Fluoride Determination</p>	<ul style="list-style-type: none"> <li>-accurately prepare standards that contain fluoride by performing a serial dilution from a fluoride stock that was supplied</li> <li>- set up a potentiometer to which a combination fluoride electrode has been connected</li> <li>- obtain a millivolt reading for each of the fluoride standards and an unknown</li> <li>-plot the potential readings for the standards on semi-log graph paper and interpolate the reading obtained for the unknown so that the concentration of the unknown can be stated</li> </ul>	<p>Lab: Fluoride</p>

<p>Liquid Chromatography</p> <p>Shimadzu LC</p>	<ul style="list-style-type: none"> <li>- be able to identify the parts and explain their purpose</li> <li>- be able to start up, introduce samples, obtain chromatograms and shut down the instrument</li> <li>- appreciate the difference in reproducibility between student controlled injections and injections controlled by the sample loop</li> <li>- describe the effect on peak height of changing the absorbance setting</li> <li>- describe the relationship between pump pressure and mobile phase flow rate</li> <li>- understand the effect of recorder speed on peak width and height</li> </ul>	<p>Lab: HPLC 1</p>

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

- a) Prepare standards and samples accurately by dilution or dissolution
- b) Prepare, develop, visualize, and interpret thin layer chromatography plates of various polarity samples in various solvents and calculate  $R_f$  values for the components of the samples.
- c) Perform the following tasks on these instruments: GC (gas chromatography), HPLC (high performance liquid chromatography), Flame and Furnace Atomic Absorption (AA), polarimeter and refractometer, potentiometer set up for a fluoride determination and spectrophotometer
  - Identify the parts of the instrument and state their purpose
  - Trace the path of the light or mobile phase
  - Set-up and calibration
  - Introduction of standards and samples
  - Manipulation and evaluation of the qualitative and quantitative data obtained by using graphing

and linear regression

- Expression of results of **all** calculations to the appropriate number of significant figures or decimal places **with** the appropriate units
- d) Practise relevant safety procedures while performing lab exercises
- e) Use appropriate reference materials (Merck Index, CRC Handbook) to obtain required information
- f) Install and use the regulator on a gas cylinder safely