A POLYTECHNIC INSTITUTION

School of Manufacturing, Electronics and Industrial Processes

Program: Chemical Sciences
Option: A4

Course Outline

CHSC 4408
Ore Analysis

Start Date:	January 4, 2006				**End Date:**	May 26, 2006		
Total Hours:	60	**Total Weeks:**	20		**Term/Level:**	4	**Course Credits:**	4
Hours/Week:	3	**Lecture:**	1	**Lab:** 2	**Shop:**		**Seminar:**	**Other:**

Prerequisites

Course No.	**Course Name**
CHSC 3318	Analytical Techniques & Application 1

CHSC 4408 is a Prerequisite for:

Course No.	**Course Name**

■ Course Description (required)

Covers methods for the determination of a wide variety of elements in ores, concentrates, and industrial process streams. Emphasis is on selection of the most suitable technique for the particular samples under investigation. Classical methodology includes gravimetric and volumetric analysis as well as fire assay. Specific sampling & analyses pertaining to environmental chemistry, geochemistry and acid mine drainage will also be done. Analytical instruments used are electrochemical, uv-visible, atomic absorption, inductively coupled plasma, X-ray fluorescence, and ion chromatograph. An industry practicum will be scheduled during and after spring break.

■ Evaluation

Final Examination	No	Comments:
Laboratory	20%	
Practicum & Participation	30%	
Tests	30%	
Project	20%	
TOTAL	100%	

■ Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

- Understand some general concepts involved in the subject of applied environmental chemistry.
- Collect representative samples of air, soil, water and wastewater by using proper sampling techniques.

- Apply appropriate laboratory procedures to process-collected air, soil, water and wastewater samples.
- Perform the following techniques on real samples: sampling, sample preparation, weighing, acid digestion, and fusion microwave digestion, filtration, and precipitation.
- Time-schedule all analytical procedures for efficient and effective use of time and resources.
- Determine quantitative elemental composition of exploration samples ore samples, ore concentrates product solutions from metallurgical recovery process, typical mining effluents, metallic alloys, common pollutants, pulp & paper and chemical processes.
- Apply the following analytical techniques to determine a wide variety of elements: fire assaying, volumetric analysis, gravimetric analysis, colorimetric, atomic absorption (AA), inductively coupled plasma (ICP), x-ray fluorescence (XRF), potentiometric methods and ion chromatography.
- Establish the reliability of analyses obtained by the use of instrumental analyses (i.e., AA, ICP, ion chromatograph, potentiometric methods and XRF) and decide if confirmation by classical wet method is required.
- Calculate and report the composition of real samples.
- Understand the quality control concepts and quality assurance procedures.
- Perform in a team environment, have positive attitude, and flexibility.

■ Verification

I verify that the content of this course outline is current.

Authoring Instructor — Date: Dec 30, 2005

I verify that this course outline has been reviewed.

Mark McDonald — Program Head/Chief Instructor — Date: Dec 30/2005

I verify that this course outline complies with BCIT policy.

Dean/Associate Dean — Date: 2006/01/04

Note: Should changes be required to the content of this course outline, students will be given reasonable notice.

■ Instructor(s)

Elaine Woo | Office Location: SW1-1085 | Office Phone: 604-432-8393
Office Hrs.: TBA | E-mail Address: ewoo@bcit.ca

■ Learning Resources

Required:

Notebook, Laboratory Coat, and Safety Glasses.

Recommended:

Reference Texts:

1. Beamish, F.E. and J.C. Van Loon. (1977). Analysis of Noble Metals: Overview and Selected Methods. New York: Academic Press

2. Bassett, J., R.C. Denney, G.H. Jeffery and J. Mendham. (1989). Vogel's Textbook of Quantitative Inorganic Analysis (5th Ed.). London: Longman Group Ltd.

3. Donaldson, E.M. (1982) Methods for the Analysis of Ores, Rocks, and Related Materials (2nd Ed.). Canmet Monograph 881.

4. Johnson, W.M. and J.A. Maxwell. (1981). Rock and Mineral Analysis (2nd Ed.). New York: Wiley-Interscience.

5. Standard Methods for the Examination of Water and Waste Water, ALPHA, AWWA, WPCF. 7th Ed. 1989.

6. Willard, H.H., L.L. Merritt and J.A. Dean. (1974). Instrumental Methods of Analysis (5th Ed.). New York: D. Van Nostrand Co.

7. Eckschlager, K. (1969). Errors, Measurements and Results in Chemical Analysis. London: Van Nostrand Reinhold.

8. Dux, J.P. (1990). Handbook of Quality Assurance for the Analytical Chemistry Laboratory (2nd Ed.). New York: Van Nostrand Reinhold.

9. Gy, P.M. (1979). Sampling of Particulate Materials, Theory and Practice. New York: Elseview Scientific Publishing Co.

■ Information for Students

(Information below can be adapted and supplemented as necessary.)

Information for Students:

Note: Please refer to BCIT policy number 5002, Student Regulations Policy, for additional information. Policies are available at **http://www.bcit.ca/about/administration/policies.shtml**.

Ethics: BCIT assumes that all students attending the institute will follow a high standard of ethics. Incidents of cheating or plagiarism may, therefore, result in a grade of zero for the assignment, quiz, test, exam or project for all parties involved and/or expulsion from the course.

Assignments: Assignments, lab reports or projects must be done on an individual basis unless otherwise specified by the instructor. Late assignments, lab reports or projects will be devalued 10% per day late to a maximum of 3 days late.

Makeup Tests, Exams or Quizzes: There will be **no** makeup tests, exams or quizzes. If you miss a test, exam or quiz, you will receive zero marks. Exceptions may be made for **documented** medical reasons or extenuating circumstances. In such a case, it is the responsibility of the student to inform the instructor **immediately**.

Attendance: The attendance policy as outlined in BCIT Policy 5002 will be enforced. Attendance will be taken at the beginning of each session. Students not present at that time will be recorded as absent.

Illness: If you miss an evaluation such as an assignment, quiz, exam, or project, or you miss 3 or more consecutive days of class, you must provide the department with a BCIT Student Medical Certificate (available at http://www.bcit.ca/admission/downloads.shtml). You may be asked to complete the work that you missed or the course evaluation may be adjusted to reflect the missed component(s).

Attempts: Students must successfully complete a course within a maximum of three attempts. Students with two attempts in a single course must get written permission from the Associate Dean to attempt the course for the third time. Students who have not successfully completed a course within three attempts will not be eligible to graduate from the program.

Advancement: Students who fail three or more courses in a term cannot advance to the next term and may be asked to discontinue from the program.

Course Outline Changes: The material or schedule specified in this course outline may be changed by the instructor. If changes are required, they will be announced in class.

■ Assignment Details

TBA

Schedule

Week of/ Number	Outcome/Material Covered	Reference/ Reading	Assignment	Due Date
1	Introduction to ore analysis, project and WHMIS Training.			January 4
2	Introduction to analytical instrumentation and field sampling techniques: Environmental and Geo-Chemical Survey			11
3	Analytical instrumentation techniques, Environmental and Geo-Chemical Survey – 1			18
4	Analytical instrumentation techniques, Environmental and Geo-Chemical Survey – 2			25
5	Analytical instrumentation techniques, Environmental and Geo-Chemical Survey – 3 **Mid-term test - 1**			February 1
6	Analytical instrumentation techniques, Environmental and Geo-Chemical Survey – 4			8
7	Analytical instrumentation techniques, Environmental and Geo-Chemical Survey – 5			15
8	Analytical instrumentation techniques, Environmental and Geo-Chemical Survey – 6			22
9	Analytical instrumentation techniques, Environmental and Geo-Chemical Survey – 7			March 1
10	**Project Report due** **Mid-term test 2**			March 8

Week of/ Number	Outcome/Material Covered	Reference/ Reading	Assignment	Due Date
11	Spring Break (Industry Practicum)			March 13 - 17
12	**Start Industry Practicum – 1**			22
13	Industry Practicum – 2			29
14	Industry Practicum – 3			April 5
15	Industry Practicum – 4			12
16	Industry Practicum – 5			19
17	Industry Practicum – 6			26
18	Industry Practicum – 7			May 3
19	Industry Practicum – 8			10
20	Oral Presentation			17
21	**Exam week**			24