A POLYTECHNIC INSTITUTION

Course Outline

School of Manufacturing, Electronics and Industrial Processes
Program: Chemical Sciences
Option:

CHSC 4411
Pollution Science and Microbiology

Start Date:	January, 2006			**End Date:**	May, 2006		
Total Hours:	120	**Total Weeks:**	20	**Term/Level:**	4	**Course Credits:**	8
Hours/Week:	6	**Lecture:**	3 **Lab:** 3	**Shop:**		**Seminar:**	**Other:**

Prerequisites

Course No.	Course Name
CHSC 1119	Environmental Science

CHSC 4411 is a Prerequisite for:

Course No.	Course Name
None	

Course Description

The following topics are discussed: air pollution meteorology, air pollution chemistry, air sampling methods, classical and instrumental techniques for measuring atmospheric contaminants (i.e., hydrogen sulfide, mercaptan, sulfur oxides, carbon monoxide, ozone, nitrogen oxides, various organic contaminants, and heavy metals in air), particulate counting and sizing, and some principles and techniques used in water pollution microbiology.

Detailed Course Description

The goals of this course are to:

- provide a range of material which will enable the student to understand the transformations that take place in air when pollutants are present, and to familiarize him/herself with the analytical techniques currently used for air testing. Upon completion of this course, the student should be able to perform detailed laboratory analyses for the major atmospheric contaminants as required by engineering consulting firms, private laboratories, and government laboratories involved in pollution analysis.

- familiarize the student with some of the principles and techniques used in water pollution microbiology.

Evaluation

Final Exam	40%	Comments:
Midterm	30%	
Labs	30%	
TOTAL	100%	

Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to understand and use modern methods of chemical and instrumental methods of air analysis, and introductory microbial assay.

■ Verification

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

Authoring Instructor — Date: Jan 27/06

I verify that this course outline has been reviewed.

Mark McDonald — Program Head/Chief Instructor — Date: Jan 27, 2006

I verify that this course outline complies with BCIT policy.

Dean/Associate Dean — Date: 2006/02/02

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

■ Instructor(s)

Joffre Berry
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■ Assistant Instructor

Terry Malakoff
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■ Learning Resources

Recommended:

Environmental Chemistry by Stanley Manahan.

Atmospheric Chemistry and Physics by John N. Seinfeld and Spyros N. Panolis.

■ Information for Students

The following statements are in accordance with the BCIT Student Regulations Policy 5002. To review the full policy, please refer to: http://www.bcit.ca/~presoff/5002.pdf.

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 three 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 three 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.

Lecture Schedule

Week of/ Number	Outcome/Material Covered	Reference/ Reading	Assignment	Due Date
1, 2	Air pollution meteorology: macro and micro-scale, meteorological conditions affecting dispersion of pollutants.			
3	Introduction to environmental toxicology: sources of toxicants, dose-response theory, types of toxicity tests relevant to human safety.			
4	Atmospheric gases: chemistry of CO, carbon dioxide, sulfur oxides, nitrogen oxides, and hydrocarbons. Carbon monoxide detection methods.			
5, 6	Indoor air pollution.			
7	Sulfur oxides: sources, effects, classical and instrumental methods of analysis.			
8	Nitrogen oxides: sources, effects, classical and instrumental methods of analysis.			
9, 10	Atmospheric photochemical reactions, kinetic and thermodynamic NO, NO_2 formation. Combustion parameters.			
11	Organic air contaminants: sources, health effects, instrumental methods of analysis.			
12	Particulates: health effects, sizing and counting techniques, analysis of heavy metals.			
13	Odours: characterization of odorous compounds, sampling techniques.			
14	Phase I site assessments.			
15	Phase II site assessments.			
16, 17	Water pollution: fundamental concepts, BOD, COD, TOC, DO, etc., organic contaminants, intro to water pollution microbiology; water, sediment, and soil sampling.			
18	Microorganisms: types, structure, growth, survival, fecal and non-fecal coliforms.			

Week of/ Number	Outcome/Material Covered	Reference/ Reading	Assignment	Due Date
19	Detection and counting methods, MPN, waterborne viruses, treatment.			
20	Environmental laws and regulations.			

Lab Schedule

Lab Number	Outcome/Material Covered	Reference/ Reading	Assignment	Due Date
1	Calibration of instrumentation.			
2, 3	Sampling techniques and analytical methods for: SO_2, No_x, CO, O_3. – formaldehyde, heavy metals, mercaptans, acetic acid, ammonia, DMS, H_2S			
4, 6	GC analysis of environmental contaminants.			
5	Field sampling.			
4, 6	GC analysis of environmental contaminants.			
7–10	Indoor air pollutants – microorganisms – CO / CO_2 / O_2 – particulate – hydrocarbon – ventilation – temperature, R.H.			
11	Field trip.			
12, 13	Study of automobile exhaust: NO_x, CO, and hydrocarbons.			
14, 15, 16	Sampling and analysis techniques for water, sediment, and soils.			