



A POLYTECHNIC INSTITUTION

School of Manufacturing
Program: Chemical Sciences
Option:CHSC 2248
Industrial Chemical Processes

Start Date:	January 06	End Date:	May 06								
Total Hours:	55	Total Weeks:	18	Term/Level:	2	Course Credits:	4				
Hours/Week:		Lecture:	37	Lab:	18	Shop:		Seminar:		Other:	
Prerequisites						CHSC 2248 is a Prerequisite for:					
Course No.	Course Name					Course No.	Course Name				
None						CHSC 3341	Unit Operation 1				

■ Course Description (required)

To provide the learner with knowledge of how chemical principles are applied to industrial processes. To enable the learner to perform actual laboratory techniques and testing procedures used in industry, make judgements on the validity and reasonableness of results gathered and write succinct reports on the data obtained. To give the learner the skills and knowledge to *apply* the information gained in lecture and laboratory sessions to a literature search on a given industrial chemistry topic and write a comprehensive report on this research project.

■ Detailed Course Description

1. Introduction to Engineering Calculation:
 - Units and dimensions
 - Systems of units and conversion of units
 - Dimensional uniformity and dimension less quantities
 - Process data representation and analysis.
2. Process and Process Variables:
 - Mass and volume
 - Flow rate
 - Chemical composition
 - Pressure
 - Temperature.
3. Principles of Material Balance:
 - Material balance calculations
 - Balance on multiple-unit processes
 - Recycle, bypass and purge.
4. Energy and Energy Balances:
 - Forms of energy
 - Energy balance on closed systems
 - Energy balance on open systems at steady state
 - Energy balance procedures
 - Mechanical energy balances.

Experiments:

1. Variation of pressure difference with fluid velocity across a length of pipe.
2. The effect of fittings on pressure difference across a pipe.
3. Relationship between flow rate of fluids in a heat exchanger and the change of temperature.
4. Variation of discharge head and flow rate in a centrifugal pump.

Project:

The students are required to research and submit a report on a selected chemical industry or process.

■ Evaluation

Labs	15%	Comments: Passing grade – 50%
Midterm 1	15%	
Midterm 2	15%	
Project	25%	
Final Exam	30%	
TOTAL	100%	

■ Course Learning Outcomes/Competencies

Upon successful completion of this course, the learner will have the skills and knowledge to:

- Convert a quantity expressed in one set of units into any other dimensionally consistent unit using conversion factor tables.
- Identify units commonly used in SI, CGS and American Engineering units.
- Given a set of tabulated data for two variables (x and y), use linear interpolation to estimate one variable for a given value of the other, derive the expression for y (x).
- Explain the difference between density and specific gravity, the meaning of gram-mole, mole, kmol, methods of measuring temperature and pressure.
- Calculate two of the quantities mass/mass flow rate/volume/volumetric flow rate, moles/molar flow rate by knowing the third if density and molar mass of a substance is known.
- Calculate average molar mass of a mixture.
- Convert pressure expressed as a head of fluid to pressure expressed as force per unit area.
- Clearly explain and understand the terminology used in material balances.
- Given a process description:
 - ▶ draw a simple flowchart
 - ▶ choose a basis for calculation
 - ▶ identify sub systems within a system
 - ▶ perform mass balance calculations.
- List the components of the total energy of a process.
- Define isothermal and adiabatic processes.
- Define basic thermodynamic terms.
- Perform simple energy balance calculations.
- Research a topic using library and internet resources and write a report on the topic.

■ Verification

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

Faryar Ghaffari
Authoring Instructor

Dec. 08/05
Date

I verify that this course outline has been reviewed.

Mark McDonald
Program Head/Chief Instructor

Dec 08/05
Date

I verify that this course outline complies with BCIT policy.

[Signature]
Dean/Associate Dean

2005/12/08
Date

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

■ Instructor

Farzan Ghaffari Office Location: SW1-1415 Office Phone: 604-451-6847
Office Hrs.: By appointment E-mail Address: Farzan_Ghaffari@bcit.ca

■ Learning Resources

Required:

OL's Notes on Material and energy Balances
Sharp EL-520 WB scientific calculator

Recommended:

Richard M. Felder, *Elementary Principles of Chemical Processes*, John Wiley

■ Information for Students

Assignments:

Late assignments, lab reports or projects will **not** be accepted for marking. Assignments must be done on an individual basis unless otherwise specified by the instructor.

Makeup Tests, Exams or Quizzes:

There will be **no** makeup tests, exams or quizzes. Zero marks will be awarded for a missed test, exam or quiz. 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**.

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.

Attendance:

The attendance policy as outlined in the current BCIT Calendar 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:

A doctor's note is required for any illness causing you to miss assignments, quizzes, tests, projects, or exam. At the discretion of the instructor, students may complete the work missed or have the work prorated.

Attempts:

Students must successfully complete a course within a maximum of three attempts at the course. Students with two attempts in a single course will be allowed to repeat the course only upon special written permission from the Associate Dean. Students who have not successfully completed a course within three attempts will not be eligible to graduate from the appropriate 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 the class.

Lab and Midterm Exam Schedule

Date	Lab and Midterm
Jan. 10, 17	Video – Chemical Industries
Jan. 24, 31, Feb. 7, 14	Experiments 1 and 2
Feb 21, 28	Problem sessions and review
Mar. 1	Midterm 1
Mar. 7, 21, 28, Apr. 4	Experiments 3 and 4
Apr. 11, 18	Problem sessions and review
Apr. 19	Midterm 2
Apr. 25, May 2, 9, 16	Project completion