1st

Academic Program Curriculum
SUT
International Engineering Programs

First Year

Fall Term First Semester

		Lect	Tut	Lab	
MTH117	Calculus I	4	1		
MTH114	Linear Algebra	4	1		
CHY118	Chemistry	3		2	
PCS115	Physics (Mechanics)	3	2		
PCS120	Physics for Engineers	3		2	
CST100	Engineering Practice, Ethics & Technical Communications	2	1		
		19	5	4	= 28

Winter Term Second Semester

MTH227	Calculus II	4	1		
CPS210	Digital Computation & Programming	4		2	
CST	Impact of Technology on Society (one course from Electives Table B)	3			

For Electrical Engineering Students Only

PCS221	Applied Science	3		1†	
ELE212	Electric Circuits	6	2	3	
		20	3	6	= 29

For Chemical Engineering Students Only

MEC170	Engineering Graphics	1		3	
CHY217	Organic Chemistry	3		2	
ELE210	Fundamentals of Electrical Engineering	3	1	2	
		18	2	9	= 29

For Mechanical Engineering Students Only

MEC126	Scientific Principles of Mechanical Engg.	2	1	1††	
MEC170	Engineering Graphics	1		3	
ELE210	Fundamentals of Electrical Engineering	3	1	2	
		17	3	8	= 28

† Two Hour Laboratory session per alternate weeks

†† Four, 3 Hour Laboratory sessions spread out over the term

International Program in Chemical Engineering

SUT/TUNS

Academic Year	Summer	Fall	Winter	Program
I	<——— SUT 1	E S L SUT 2	———> SUT 3	SUT
II	WT 1	SUT 4	SUT 5	SUT
III	WT 2	TUNS 1	TUNS 2	TUNS
IV	WT 3	TUNS 3	TUNS 4	TUNS

WT 1 - In Thailand
WT 2 - In Thailand or Canada
WT 3 - In Canada

SUT1 - SUT 3 as agreed upon at meeting in Halifax, for first two terms (but spread over three terms as requested by ESL group).

SUT

Year	Summer	Fall	Winter	Summer
I	ESL	Calculus I Linear Algebra Chemistry Mechanics(Phys) Physics for Engrs CST (1)	Calculus II Digital Compt. Graphics Organic Chem. Fund. of EE CST (2)	Vacation or Work Term
II		Thermo(for engr) Fluid Mechanics Diff. Equation Fund. of ChE CST (3) Physical Chem.	Chem. Eng. Ther. MU Ops. Numerical Meth. Statics CST (4)	Vacation or Work Term

TUNS

Year	Fall	Winter	Summer
III	ChE 1032 Kinetics ChE 1025 Separations ChE 1050 PCI ChE 1044 CAD ChE 0812 Tech.Com. Met 0700 Mat. Sci.	ChE 0804 Ind. Chem. ChE 0824 Heat Trans. ChE 0870 Env. Eng. ChE 0812 Tech. Com. IE 0718 Economics AM 3131 Prob. & Stat	Vacation or Work Term
IV	ChE 1334 Reactor Design ChE 1326 Mass Trans ChE 1352 PC II ChE 1341 PD I XXXX Tech. Elective ChE 0812 Tech. Comm.	ChE 1428 Tran. Phen. XXXX Tech. Elective XXXX Tech. Elective ChE 1442 PD II XXXX ChE non Tech. Elective ChE 0812 Tech. Comm. MET 0811 Corrosion	

First Year (Winter)

ChE0802 Organic Chemistry (3-2)

The course covers the fundamental concepts of organic chemistry and the systematic nomenclature of organic compounds. Emphasis is given to structure and chemical reactions of hydrocarbons and derivatives of hydrocarbons that have commercial importance.

Second Year (Fall)

AM3711 Engineering Mathematics for Chemical and Metallurgical Engineers (3-2)
This course covers ordinary differential equations and their applications to problems in Chemical and Metallurgical Engineering. Topics include first order linear and non-linear differential equations, differential equations of higher order with constant and non-constant coefficients, Laplace transforms, Heaviside expansion theorem, periodic functions, convolution theorem, and applications of Laplace transforms to linear systems.

ChE0720 Fundamentals of Chemical Engineering (3-2)
The main objective of this course is to develop the student's ability to perform mass and energy balances on reactive and non-reactive processes. Introductory topics include systems of units and a study of process variables such as temperature, pressure and flowrate. Also covered are fundamental properties of multiphase systems: phase equilibrium, vapour pressure, phase rule, Raoult's and Henry's Laws, and colligative properties. Emphasis is placed on developing problem solving skills.

Second Year (Winter)

ChE0830 Chemical Engineering Thermodynamics (3-2)
The course deals with theory and practice of chemical thermodynamics. A brief review is given of concepts in physical chemistry: partial molal quantities and vapour-liquid equilibria in ideal and non-ideal systems including miscible and partially miscible components. The course also deals with thermophysical properties of pure liquids, properties of solutions, and a comprehensive study of vapour-liquid equilibrium and equilibrium constants in chemical reactions.

ChE0722 Mechanical Unit Operations (3-3)
This course introduces the student to the principles and practices involved in contacting, conveying, separating and storing single and multiphase systems. It includes the flow of incompressible and compressible fluids in conduits and past immersed bodies, as well as the transportation, metering, and mixing of fluids. Unit operations involved in the contacting and separation of phases, such as fluidization, sedimentation and centrifugation, are also studied.

Prerequisite: An introductory course in fluid dynamics.

AM3652 Applied Numerical Methods (3-2)
This course deals with the use of computers for numerical solution of engineering problems. Instructions are provided on the use of micro and mainframe computers. After a brief review of FORTRAN programming, computer solution methods are introduced for the following problems: interpolation and approximation, systems of linear and non-linear algebraic equations, numerical integration and differentiation, and ordinary differential equations. Relevant topics from matrix algebra are covered and use of library subroutines and spreadsheets is emphasized.

Third Year (Fall)

ChE1032 Kinetics and Ideal Reactors (3-2)
This course introduces the subject of chemical reaction engineering. Classical reaction kinetics concerning rates, mechanisms, temperature effects, and multiple reactions are studied. The concepts of batch, continuous stirred-tank and plug flow reactors are introduced for the ideal case.

ChE1025 Separation Processes (3-2)
This course provides an introduction to cascade theory and develops fundamentals for design and analysis of staged operations such as leaching, liquid-liquid extraction and distillation. Topics include single-stage operations, multi-stage, counter-current cascade with and without reflux, and binary and multi-component distillation.

ChE1050 Process Dynamics and Control (2-3)
This course provides an introduction to control of chemical processes. The dynamics of behaviour of simple processes is analysed through transfer functions and means of determining the dynamic performance of feedback control systems are presented. An introduction to stability of control systems is made. Procedures for selecting and designing proportional, proportional-integral and proportional-integral-derivative controllers are discussed.

ChE1044 Computer-Aided Process Design (3-2)
The course aims to develop the student's ability to solve process design problems using packaged software. Major emphasis is placed on how to translate a flow sheet into a suitable form for simulation and design. Other topics include relational data bases, and design of specific unit operations using both available software and student-developed programs.

ChE0812 Technical Communication (0-1)
This course builds upon the introductory course (Communications) and continues over the succeeding four academic terms of the program. The subject materials is drawn from work terms and work term reports, and from reports and presentations required for courses in the curriculum. Formal lectures and tutorials emphasize invention and revision in the writing process, and practice in oral presentation. The course uses a variety of computer software. The student is assessed at the end of each term; the course grade is given at the end of the last term.

MET0700 Materials Science (3-3)
This course correlates properties of engineering materials with their structure. Laboratory objectives include preparation of reports in publication format and illustration of lecture material. Basic concepts of crystallography, chemical bonding and binary phase diagrams are introduced. These are used to describe properties of metallic and nonmetallic materials and how these may be controlled by engineers. Materials discussed include ferrous and nonferrous metals and alloys, ceramics, polymers, concrete, composites and semiconductors.

Third Year (Winter)

ChE0804 Industrial Chemistry (3-1)
This course reviews chemical knowledge as applied to the industrial chemical process industries, with particular emphasis on Canadian applications. An examination of the relationships between kinetics, thermodynamics, unit operations and process design is made.

ChE0824 Heat Transfer (3-2)
This course deals mainly with theories of heat transfer and their applications. The course includes heat transfer by steady and unsteady conduction in solids, convection heat transfer and an introduction to radiation heat transfer. Evaporation and design of heat exchangers are also discussed.

ChE0870 Environmental Engineering (2-2)
The course presents the most important aspects of environmental engineering in a manner which promotes the interest of students in environmental matters. Sources of, and management practices applied to solid, liquid and gaseous wastes are discussed. The course is intended to impress the students with the complex regulatory demands for environmental performance in society and industry. Special attention is paid to the difficult issues being faced by present and future generations.

IE0718 Engineering Economics (3-0)
This course deals with the economics of decision making. After introducing fundamental concepts and cash flow diagrams, interest factors are dealt with in some detail. A variety of discounted cash flow techniques are covered including rate of return calculations. Inflation, accounting, tax and risk are also amongst the topics considered.

AM3030 Applied Probability and Statistics (3-2)
This is a course in probability and statistics with emphasis on engineering applications. Topics included are probability laws and interpretation of numerical data, bias in sampling, standard deviation, probability error, weighted means and correlation functions, Gaussian and Poisson probability distributions, confidence limits, linear regression, and applications to the analysis of experimental results.

Fourth Year (Fall)

ChE1334 Chemical Reactor Design (3-2)
This course is a continuation of *Kinetics and Ideal Reactors*, and involves the application of reaction kinetics to problems of reactor design. After a review of ideal, isothermal reactors, the topics of multiple reactions, temperature effects (non-isothermal reactors) and non-ideal flow are considered in the design of a chemical reactor system. Heterogeneous reactors and catalysis are also discussed. Emphasis is placed on computational techniques for reactor problem solution.

ChE1326 Mass Transfer (3-2)
Unit operations based on the theory of diffusional mass transfer are discussed. Emphasis is on engineering applications and the understanding of basic design theory. Topics include molecular and turbulent diffusion, interfacial mass transfer, simultaneous heat and mass transfer, and design of mass transfer equipment.

ChE1352 Process Modelling, Simulation & Control (2-3)
This course deals with formulation of mathematical models describing the dynamic behaviour of chemical processes. Numerical methods for analysing the dynamic response of lumped parameter and distributed parameter systems on digital computers are presented. Frequency response techniques are used to analyse and design control systems. Design methods for control of processes with dead time, inverse response and those requiring control of more than one variable are discussed.

Prerequisite: ChE1050 - Process Dynamics and Control.

ChE1341 Process and Plant Design I (2-4)
This course aims to develop the student's abilities in the synthesis of processing elements into an integrated plant that is capable of achieving a prescribed goal. Various design projects are undertaken to emphasize: process selection and economic evaluation, and detailed design of process equipment as well as optimization of processing subsystems such as distillation systems.

Prerequisites: ChE0722 - Mechanical Unit Operations and ChE0824 - Heat Transfer.

Fourth Year (Winter)

ChE1428 Transport Phenomena (3-2)
This course covers the field of transport phenomena in an integrated manner. The similarities and differences of the three transport phenomena (heat, mass and momentum) which have previously been studied as separate subjects are explained and the resulting equations of change applied to several situations to illustrate the different processes. Turbulence and transient phenomena are also studied.

ChE1442 Process and Plant Design II (2-3)
This course is a continuation of *Process and Plant Design I*, but emphasizes the synthesis of whole systems. Design projects cover process identification and selection, material and energy balance, system sensitivity to various parameters and preliminary process optimization, design and specification of processing units, plant layout, costing and economic evaluation.

Prerequisites: ChE0722 - Mechanical Unit Operations and ChE0824 - Heat Transfer

MET0811 Corrosion and its Prevention (2-2)
This course covers the basic theories of corrosion and their application to its prevention. It includes a description of corrosion testing methods, metal failure arising from corrosion processes and design factors affecting corrosion. Laboratory experiments are used to illustrate the processes involved in corrosion.