



Green Process Engineering

Department of Chemical and Biochemical Engineering

The Department of Chemical and Biochemical Engineering is dedicated to offering innovative programs of high quality and academic standards. Graduates from our department have won several National Awards and Scholarships. Some examples include: NSERC, OGS, Canadian Society of Chemical Engineering Design Competition, Ontario Engineering Design Competition, and the Governor General's Canada Scholarship in Environmental Engineering (sponsored by DuPont Canada) which is offered to only 15 engineering students from across Canada. Some students continue their studies to obtain graduate Master's and Ph.D. degrees, which may lead to careers in research and teaching.

Western's Green Process Engineering program is the first of its kind in Canada. The basic objective of the program is to combine and integrate the fundamental principles of chemical engineering to design commercial products and processes that are safe, economical and environmentally friendly. Some of the distinguishing features of the program include the emphasis on green chemistry, green power, solar and bio-fuel cells, and conversion of waste (such as agricultural byproducts) to bio-fuels.

Program

Engineering has always been a caring profession with a focus on design and innovation to respond to the pressing needs of mankind. In the past, many chemical products and processes were designed by traditional chemical engineers. However, the energy crisis, pollution problems such as global warming and environmental sustainability call for a specific set of skills that are not currently incorporated in the chemical engineering curriculum. Implementing Green Engineering principles at the beginning of the design process can lead to substantial environmental benefits and cost savings to achieve more sustainable processes and products. Chemical products designed and processed by innovations that are benign to the environment are at the forefront of green technologies.

First year courses are common to all Engineering programs. Upon completion of first year students must be admitted into the Green Process Engineering program. In Year 2 students take primarily green process engineering courses that include: green chemistry, physical chemistry and reaction equilibria, thermodynamics and chemical process calculations. In Year 3, students learn how to design the unit operations of green process engineering, and how to generate power in a sustainable way. In Year 4, they work on the design of green processes for a capstone project.

Employment Opportunities

In response to the growing need for green approaches for product and process development, the Green Process Engineering Program in the Department of Chemical and Biochemical Engineering will capitalize on our expertise and successes. The training of undergraduate students in Green Process Engineering will fulfill a need that is not addressed by traditional engineering programs. Graduates of the Green Process Engineering program will have an employment opportunity in broad-based areas such as biofuel, green power, and green chemical processing industries.



Green Process Engineering cont'd



First year program (2010-11): Applied Math 1413, Eng Sci 1050, Physics 1026, Applied Math 1411 a/b, Chemistry 1024a/b, Eng Sci 1021a/b, Eng Sci 1022a/b/y, Eng Sci 1036a/b, 1.0 non-technical elective.

Second year program (2011-12):

Term 3:	Course Title
AM 2411	Applied Math for Engineering II
GPE 2213a	Green Chemistry I
CBE 2214a	Engineering Thermodynamics
CBE 2220a	Chemical Process Calculations
ES 2211F	Engineering Communications

Term 4:	Course Title
AM 2411	Applied Math for Engineering II
GPE 2214b	Green Chemistry II
CBE 2221b	Fluid Flow
GPE 2218b	Physical Chemistry and Reaction Equilibria
CBE 2291b	Computational Methods for Engineers
ECE 2238b	Introduction to Electrical Engineering

Third year program (2012-13):

Term 5:	Course Title
GPE 3315a	Reaction Engineering with Green Engineering Applications
GPE 3322a	Heat Transfer Operations with Green Engineering Applications
GPE 3382a	Fundamentals of Green Engineering
CBE 3317a	Intro to Plant Design and Safety
CBE 3323a	Staged Operations

Term 6:	Course Title
GPE 3310b	Process Dynamics and Control with Green Engineering Applications
GPE 3324b	Mass Transfer Operations with Green Engineering Applications
GPE 3383b	Solar and Fuel Cells
GPE 3385b	Green Power
CBE 3325b	Particulate Operations
SS 2143b	Applied Statistics and Data Analysis

Fourth year program (2013-13):

Term 7:	Course Title
Bus 2299	Business Organization
GPE 4497	Green Process Design
GPE 4484a	Green Fuels and Chemicals
One of:	CBE 4407a/b, CBE 4409a/b, CEE 4405a/b
	Non-technical elective taken from the approved list

Term 8:	Course Title
Bus 2299	Business Organization
GPE 4497	Green Process Design
ES 4498G	Engineering Ethics, Sustainable Development and the Law
	Two technical electives

Technical Electives:

CBE 4407 a/b	Solid Waste Treatment	CEE 4405a/b	Air Pollution
CBE 4409 a/b	Wastewater Treatment	CEE 3361a/b	Water Resources Management
CBE 4417 a/b	Catalytic Processes	CEE 3362a/b	Drinking Water Quality and Treatment
CBE 4418a/b	Industrial Multiphase Reactor Design	MME 3303a/b	Fluid Mechanics II
CBE 4425 a/b	Mathematical Methods in Chemical Engineering	MME 4423a/b	Internal Combustion Engines
CBE 4432a/b	Oil Refining and Processes	MME 4443a/b	Energy Conversion
CBE 4433a/b	Instrumentation Analysis for Eng.	MME 4481a/b	Applied Computational Fluid Mechanics and Heat Transfer
CBE 4493a/b	Polymer Engineering	MME 4483a/b	Heating Ventilation and Air Conditioning

Some technical electives may not be offered in a given academic year.