



ENGINEERING CHEMISTRY

WHAT IS ENGINEERING CHEMISTRY

Established in 1895, the program is distinguished by the breadth and depth of its offerings in fundamental and applied chemistry, many of these courses having been especially developed for the program. It is accredited by the Canadian Engineering Accreditation Board (CEAB) as a distinct engineering program, and by the Canadian Society for Chemistry (CSC) as a chemistry program. This dual accreditation allows graduates to pursue professional careers in both fields – a unique benefit of an Engineering Chemistry degree.

The curriculum creates Engineers that have a firm grasp of fundamental science as well as the engineering tools needed to put this knowledge into practice. An in-depth understanding of chemical principles makes Engineering Chemists particularly adept at early-stage design, when knowledge of chemical phenomena is needed to create and/or advance new technology. Extensive training in core engineering principles such as fluid mechanics, thermodynamics, and transport phenomena ensure that graduates can contribute equally well to late-stage design efforts involving detailed equipment specifications and financial analyses.

Engineering Chemistry design activities focus on three areas – **Electrochemical Energy Systems**, **Chemical Diagnostics**, and **Process Synthesis**. Students apply knowledge of thermodynamics and electrochemistry to design energy generation, conversion and storage devices. Courses in analytical chemistry and electronics allow students to design instruments that detect compounds in chemical / biological process streams and the environment. Instruction in organic chemistry and reaction engineering are used to scale up chemical syntheses from laboratory amounts to production volumes, and to create environmentally responsible alternatives to existing processes.

WHO EMPLOYS ENGINEERING CHEMISTS?

Companies with interests in the applied chemical and material science realm hire Engineering Chemistry graduates in a wide range of roles, including research and development, consulting, production and marketing. Some specific fields of operation include:

- conventional and alternative energy systems;
- electrochemistry, batteries, electrolyzers, fuel cells;
- synthesis of fine chemicals, pharmaceuticals and agrochemicals;
- medical diagnostics and environmental monitoring technology;
- environmental protection and industrial health;
- green chemistry and responsible process (re)design;
- polymer synthesis, formulation and processing;
- food science and technology;
- waste management systems;
- water quality monitoring and protection;
- mineral processing;
- engineering and financial consulting.

NEED MORE INFORMATION?

A summary of the current curriculum is provided on the back of this page. More information about the program and its graduates can be found on the Department of Chemical Engineering website, and by contacting Liann Joannette, Undergraduate Program Assistant (liann.joannette@queensu.ca).

Engineering Chemistry Curriculum^a

Second Year		Term	Credits
CHEE 209	Analysis of Process Data	F	3.5
CHEE 221	Chemical Processes and Systems	F	3.5
CHEE 270	ChemEtronics	F	3.0
ENCH 211	Main Group Chemistry	F	4.5
ENCH 212	Principles of Chemical Reactivity	F	3.75
MTHE 225	Ordinary Differential Equations	F	3.5
APSC 200	Engineering Design & Practice II	W	4.0
APSC 293	Engineering Communications	W	1.0
CHEE 210	Thermodynamics and Energy Conversion	W	3.5
CHEE 222	Process Dynamics and Numerical Methods	W	3.5
CHEE 223	Fluid Mechanics	W	3.5
ENCH 222	Methods of Structure Determination	W	3.75
ENCH 245	Applied Organic Chemistry I	W	4.5

Third Year		Term	Credits
CHEE 311	Fluid Phase and Reaction Equilibria	F	3.5
CHEE 321	Chemical Reaction Engineering	F	3.5
CHEE 330	Heat and Mass Transfer	F	3.5
CHEE 380	Biochemical Engineering	F	3.5
ENCH 213	Introduction to Chemical Analysis	F	4.5
ENCH 312	Transition Metal Chemistry	F	3.5
CHEE 324	Organic Process Development	W	3.5
CHEE 363	Electrochemical Engineering	W	3.5
CHEE 331	Design of Unit Operations	W	4.5
CHEE 361	Communications, Ethics & Professionalism	W	1.0
ENCH 399	Experimental Chemistry II	W	3.5
Electives (minimum 3 Credits)		F/W	3.0
APSC 221	Economics & Business Practices in Engineering	F/W	3.0

Fourth Year		Term	Credits
CHEE 460	Applied Surface and Colloid Science	F	3.5
ENCH 313	Quantum Mechanics & Mol. Simulation	F	3.5
CHEE 471	Chemical Process Design	F+W	7.0
ENCH 417	Research Project	F+W	9.0
CHEE 415	Engineering Chemistry Laboratory	F/W	4.0
CHEE 463	Electrochemical Energy Systems	W	3.5
Electives (minimum 15 Credits)		F/W	15