Department/Academic Unit: Chemical Engineering Degree Program: MASc

Degree Level Expectations, Learning Outcomes, Indicators of Achievement and the Program Requirements that Support the Learning Outcomes

Expectations	Learning Outcomes	Indicators of Achievement	Relevant Courses and academic requirements
Depth and breadth of knowledge	A thorough understanding of their area of specialization in chemical engineering and cognate disciplines, including: a. A systematic understanding of one of the following: - Biomaterials - Bioremediation - Green Chemistry - Electrochemical Power Sources - Macromolecular Science & Technology - Microfluidics, Colloids, Biosensors - Process Analytics, Optimization & Control - Transport Phenomena b. A critical awareness of problems and/or new insights in the immediate area of research and cognate areas, which is at the forefront of the discipline. c. Development of specialized knowledge, intellectual autonomy, critical thinking and analytical skills beyond the B.Sc.-ENCH or B.Sc.-CHEE degree. d. Development of scientific communication skills.	Performance in courses, satisfactory presentation of thesis work for a research seminar, regular meetings with supervisor, composition and defense of a thesis based on the student's research. Satisfactory performance as a teaching assistant in an undergraduate course at least once per year.	a. Four (4) term-length lecture courses selected by the student and supervisor or equivalent in modules. b. CHEM 801 – Laboratory Safety. c. Regular participation in CHEE 897 – Seminar Course. Students in the Collaborative Biomedical Engineering specialization must take the CBME 802 - Seminar course. Students taking the Collaborative Masters for Applied Sustainability must take the CMAS 897 Seminar course. d. Composition and defense of a thesis based on the student's research. e. For those in the Collaborative Biomedical Engineering specialization, CBME 801 – Special Topics in Biomedical Engineering must make up one of the total 4 term-length courses required for the degree. f. For those in the Collaborative Masters for Applied Sustainability, CMAS 801 – Topics in Applied Sustainability must make up one of the total 4 term-length courses required for the degree.

Research and scholarship	Development of a conceptual understanding and methodological competence in the student's area of chemical engineering research that enables: a. A working comprehension of how established techniques of inquiry and investigation are used to create and interpret information and knowledge. b. The review, analysis and critical evaluation of research carried out in the laboratory or with computer simulation. c. The ability to critically process information from primary and secondary literature sources and to distinguish opinions from facts.	Completion of a research-based thesis project and composition of a thesis, which demonstrates: a. Competency in research. b. An understanding of the theoretical basis for the research and associated methodology. c. The scope of the research field.	All students undertake an MASc research project, and write and defend a thesis based on that research.
Application of Knowledge	Competence in the research process needed to: a. Apply knowledge and understanding acquired on the basis of research to analogous problems viewed from broader perspectives. b. Review, interpret, and present quantitative and qualitative information. c. Make sound judgments in accordance with the major theories, concepts and methods of the subject. d. Evaluate the appropriateness of different approaches to solving problems in their area of study.	Completion of a research-based thesis project and composition of a thesis, which demonstrates: a. The integration of learning and application of ideas and theories to old and new questions in chemical engineering. b. The ability to perform research at an advanced level. c. Development of academic or professional skills, techniques, tools, practices, ideas, theories, approaches and/or materials.	All students undertake an MASc research project and write and defend a thesis based on that research. Students also complete four (4) term-length lecture courses (or modular equivalents) to broaden their knowledge of the discipline. Performance in these courses requires the application of knowledge in the form of tests, presentations, and reports as the instructor sees fit.
Professional capacity/autonomy	Students have the qualities and transferable skills needed to:	Critical thinking skills, independent inquiry, rational argumentation and ethical behaviour consistent with	All students undertake an MASc research project, which involves professional

	a. Undertake further study, employment, community involvement and other activities requiring personal responsibility, decision making, and the ability to interact with others. b. Enter employment in a variety of industries and to teach at the secondary and college levels. c. Exhibit academic integrity and social responsibility.	academic integrity and appropriate for the responsible conduct of research.	interactions with the research supervisor, undergraduate students, and lab-mates.
Communication Skills	Students develop competency in oral and written scientific communication.	Scientific Communication is demonstrated by: a. Satisfactory performance of a teaching assistantship in the undergraduate program. b. Ability to write a research thesis and describe the work contained therein. c. Communication components to coursework. d. Publication of scientific articles and participation in research conferences.	All students are required to present a seminar based on their research thesis work. All students write and defend a scientific thesis. All students attend weekly department seminars as part of CHEE 897.
Awareness of limits of knowledge	Students gain an awareness of the limits of their knowledge with respect to their specific research area, the broader field of chemical engineering and related disciplines. Students also appreciate how the limits of their knowledge may influence their abilities to interpret and analyze experimental and theoretical data.	Exposure to various areas of chemical engineering provides an awareness of the complexity of knowledge and other interpretations, methods, and disciplines. Recognition of the limits of various experimental and theoretical methods.	Students are required to complete four (4) term-length lecture courses (or modular equivalents), which can span several sub-disciplines of chemical engineering. Students regularly attend seminars, which provide exposure to other interpretations and areas of research.

		Awareness of the limitations of the student's work and how it contributes to the broader field.	