



Division of Engineering Science UNIVERSITY OF TORONTO

Engineering Science Year 1 Program Information

Engineering Science at the University of Toronto is arguably the most rigorous Engineering program in Canada, and one of the best in the world. Our instructors are distinguished researchers and teachers, our curriculum is unique, challenging and innovative, our students are outstanding, and the student experience and sense of community is second to none.

The first two years of the program provide students with a strong foundation in science, mathematics, technology, and design. The breadth and depth offered by the first two years are unique and provide excellent preparation for the diverse fields of specialization from which students select their Major at the completion of second year.

Engineering Science includes innovative features, such as our overture lectures conducted by renowned educators, scientists and engineers; academic and administrative staff dedicated to the quality of your education; special opportunities outside the classroom to improve your academic skills; and a diverse set of co-curricular and extra-curricular opportunities for addressing 21st-century engineering challenges.

The curriculum in each semester of the first two years is designed to provide an interconnected, integrated educational experience. What follows is a brief summary of the curriculum in Year 1.

Fall Session

Structures and Materials
Engineering Science Praxis I
Classical Mechanics
Engineering Mathematics and Computation
Calculus I
Computer Programming

Structures and Materials introduces students to the properties of engineering structures and materials, with a focus on their practical use and design. Theoretical concepts are made real through a series of physical demonstrations and experiments, and the highlight of the course is the destructive testing of cardboard models that the students design and build by integrating the principles they have learned.

Praxis I provides another opportunity for students to begin their exploration of engineering design and practice. Students develop individual and team design understanding and skills through hands-on activities that range from dismantling consumer products, improving Toronto's pedestrian bridges, and designing ways to improve the U of T campus. Oral, written, and graphical communication skills are integrated throughout the course, as every student presents their designs to instructors and peers.

Classical Mechanics serves to provide students with an understanding of Newtonian mechanics and the interactions that influence motion in terms of force, momentum and energy. Through the course's laboratory experience, there is an opportunity to explore the physical phenomena studied in this course.



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Mathematics is the language of science and within our program mathematics is used to build a deeper understanding of engineering and science phenomena. An introductory course in **Engineering Mathematics and Computation** provides students with a bridge between high school and university mathematics and makes connections to the “engineering point of view.” **Calculus I** is the first course in a series of calculus courses found in the first two years, and includes theory and application of differential and integral calculus.

Finally, a course in **Computer Programming**, offered at both an introductory and advanced level, provides a technology component to the first semester. Both courses are designed to give students a well-rounded understanding of programming theory and application with a focus on computational problem-solving.

Winter Session

Linear Algebra
Calculus II
Electric Circuits
Computer Programming or Free Elective
Molecules and Materials
Engineering Science Praxis II

Students will again find a strong mathematics presence in this semester. **Linear Algebra** provides students with an understanding of linear systems and matrix algebra and their applications in engineering. **Calculus II** is a continuation of the study of calculus from first semester and provides students with more advanced exploration, including complex functions and partial derivatives.

Technology in the curriculum is evident through **Electric Circuits**, which focuses on the theory and application of electric circuits through both lecture and laboratory teaching. Depending on the level of programming completed in first semester, students will continue with another course in **Computer Programming** or with a **free elective**.

Science is represented with **Molecules and Materials**, a course that provides students with the fundamentals of molecular chemistry and its applications to the properties of materials.

Praxis II provides students with another engineering design and communication experience. The course contains a single design project in which the students are tasked with improving one aspect of the City of Toronto. Teams of students first identify and frame a design problem, after which solutions to the most promising challenges are designed and prototyped. Praxis II culminates in a public Showcase to provide a platform for students to present their ideas to the public, their peers and instructors, and representatives from City Hall.