DISCOVER ENGINEERING

VIEWBOOK 2017-2018

UNIVERSITY OF TORONTO | Engineering

WELCOME TO U of T ENGINEERING, CANADA'S TOP ENGINEERING SCHOOL

The Green Roof Innovation Testing Laboratory (GRIT Lab) investigates the performance of "green technologies" such as green roofs, green walls and photovoltaic arrays. Pictured here, visiting student Wai Ying Lam works with civil engineering student Gordon Wong to measure the growth of a sedum test bed.

Each of the GRIT Lab's 33 test beds contain thermal and moisture sensors, a rain gauge and an infrared radiometer — all of which helps researchers evaluate different aspects of the City of Toronto's Green Roof Construction Standard. The GRIT Lab is a multidisciplinary collaboration, bringing together landscape architecture, biology, hydrology and engineering.


100+
Study-abroad opportunities for engineering students
250+
Collaborating industrial research partners worldwide
86
Countries our students call home
48,000
Engineering alumni worldwide
1873
Year established
105+
Spinoff companies created from U of T Engineering research from 1970 to 2016

"I love the diverse community U of T Engineering has to offer. I have met so many incredible people who have contributed to my great experience here."

PRANEET BAGGA
CHEMICAL ENGINEERING

"The undergraduate programs at U of T Engineering are challenging. The greater the challenge, the greater the reward. The world needs people who are ready for big challenges."

ERNESTO DÍAZ LOZANO PATIÑO
CIVIL ENGINEERING

"The ever-expanding networks, spirited people and cutting-edge resources available to students make U of T Engineering an exciting place to be. Everything is possible."

ANASTASIA KOROLJ
CHEMICAL ENGINEERING

"From competing on the varsity basketball team, to completing a PEY internship in Switzerland and leading a design team with Peking University in Beijing, my U of T Engineering experience has been extremely rewarding."

KRISTINA MENTON
MECHANICAL ENGINEERING

U of T ENGINEERING: AN EXCEPTIONAL COMMUNITY

No university in Canada—and perhaps the world—is in a better position to offer an education that will help the brightest students meet the grand challenges that humanity now faces.

Here you'll find a global community of innovators and creators. We are at the forefront of engineering education and research—in the groundbreaking areas we explore, the ways we collaborate and the contributions we make to the profession. The *Times Higher Education World Ranking of Universities* and all other international rankings consistently rate U of T Engineering number one in Canada and among the world's best. We're preparing engineers of tomorrow—like you—to unlock our future's boundless potential.

You will study among talented students who bring their own perspectives and passions to the mix. Our student body is the most diverse in our history, with students from every Canadian province and 86 countries. This year, we also celebrate a national record: female students account for nearly 40 per cent of the first-year class.

The U of T Engineering community is known for being especially supportive and closely knit. You'll attend many of your classes with the same group of students, creating strong communities very quickly. We're proud of being the oldest and finest engineering school in Canada and we look forward to introducing you to our revered traditions.

#1

We are Canada's premier engineering school. Globally, the next highest-ranked engineering school in Canada placed 16 spots below U of T Engineering.*

*2015-16 Times Higher Education ranking for engineering and technology.

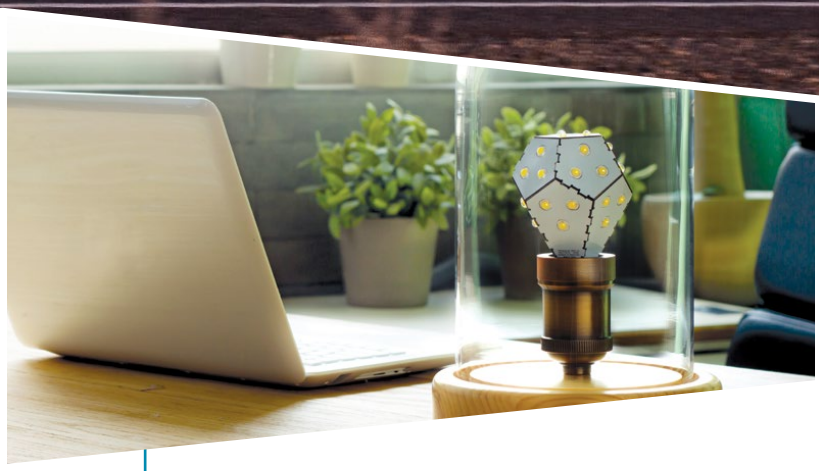
INNOVATION THRIVES HERE

From the world's most energy-efficient light bulb to the world's fastest bike, the U of T Engineering community brings innovative ideas to life through creativity, entrepreneurship and smart design. As a student, you'll have the opportunity to contribute to engineering ingenuity in numerous ways — whether you're collaborating on groundbreaking research or getting your own startup off the ground through The Entrepreneurship Hatchery.

How do U of T Engineering students turn their innovations into businesses? See page 25 and visit uoft.me/startup for details.

HEARTBEAT AUTHENTICATION

Imagine never having to remember passwords, security credentials and even your car keys again. The Nymi Band uses a person's unique heartbeat to authenticate the wearer to achieve password freedom. Alumnus Karl Martin is the company's CEO and co-founder.



ILLUMINATING GREEN TECH

Nanoleaf, founded by alumni Gimmy Chu, Tom Rodinger and Christian Yan, has grown from its days as a crowdfunded venture to a bi-continental, award-winning company that is revolutionizing the lighting industry with energy-efficient LED light bulbs. Pictured above, the Nanoleaf One bulb has a lifespan of 27.5 years.

U of T IS #1 AMONG NORTH AMERICAN UNIVERSITIES IN THE NUMBER OF NEW RESEARCH-BASED STARTUPS*

MEET ETA, THE FASTEST BICYCLE IN THE WORLD

Eta reached a top speed of 139.45 kilometres per hour (86.65 miles per hour) at the World Human Powered Speed Challenge in fall 2015. With help from a team of U of T Engineering students, Eta was designed by alumni Todd Reichert and Cameron Robertson. Todd and Cameron are founders of Aerovelo — a company that specializes in incredible human-powered vehicles.

REINVENTING THE TOILET

U of T Engineering received funding from the Bill & Melinda Gates Foundation to design a waterless, hygienic toilet that is safe and affordable for people in the developing world. Professor Yu-Ling Cheng and her team developed the prototype (pictured above), which placed third worldwide in the Foundation's Reinvent the Toilet Challenge.

ROBOT CAREGIVER

Designed by Professor Goldie Nejat and her team, Tangy is an assistive robot that promotes social interaction and recreational activity among those with degenerative cognitive conditions. Tangy tells jokes and leads games like Bingo, which exercise memory, recognition and fine motor skills in patients.

*Association of University Technology Managers

TORONTO: ONE OF THE WORLD'S GREAT CITIES

U of T Engineering lies in the heart of Toronto—a city unparalleled for its diversity. From unique cultural festivals and concerts to unforgettable attractions and food, Toronto offers exciting activities on a daily basis.

Curious about life in Toronto?
Visit **uoft.me/toronto**

GLOBAL GATEWAY

Pearson International Airport (YYZ) is a hub for world travel. Toronto is 1.5 hours from New York City; 5 hours from L.A.; 13 hours from Dubai; 14 hours from New Delhi; and 15 hours from Hong Kong.

MOST DIVERSE CITY IN THE WORLD

More than 140 cultures and hundreds of friendly neighbourhoods shape this dynamic metropolis. Restaurants and grocery stores reflect the city's rich diversity, giving you every opportunity to indulge in new and familar flavours.

COMMUTER-FRIENDLY

Whether you're walking, cycling or taking public transit, Toronto is easy to navigate. Toronto is home to North America's third-largest mass transit system.

FIRST IN SAFETY

The Economist Intelligence Unit's 2015 Safe Cities Index ranked Toronto as North America's safest city.

SEVEN SPORTS TEAMS

There's never a dull moment with seven Toronto-based professional sports teams, including the Toronto Blue Jays (baseball), Toronto Maple Leafs (hockey), Toronto FC (soccer) and Toronto Raptors (basketball).

SUNNY DAYS

On average, Toronto has 305 days of sunshine. When weather isn't agreeable, explore PATH, the largest underground pedestrian system in North America.

CITY OF FESTIVALS

Every season brims with celebrations of all kinds, from the world's largest Pride festival in the summer to the renowned Toronto International Film Festival in the fall.

CARE FOR A SKATE OR SKI?

There are more than 50 outdoor skating rinks in Toronto during the winter, and plenty of slopes for skiing and snowboarding within an hour of the city.

PEDESTRIAN-ONLY ISLANDS

The Toronto Islands are just a short ferry ride from downtown, and a great place for beach volleyball, picnics and leisure.


UTRA
SUPERCYCLE


TORONTO











800+ clubs and teams at U of T

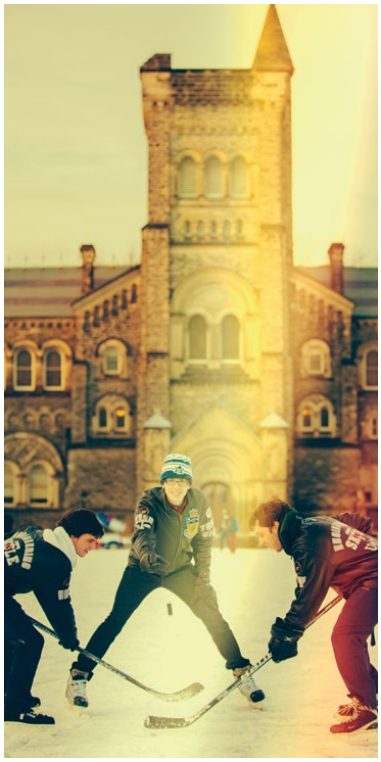
43 varsity teams in 25 sports









VIBRANT STUDENT LIFE

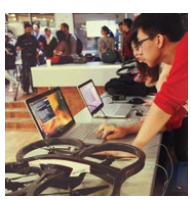
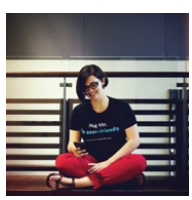
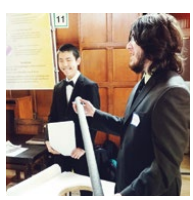
@uoftengineering

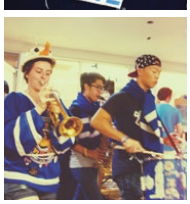
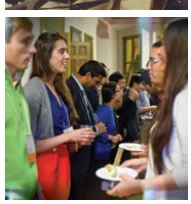
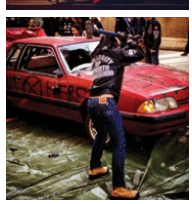
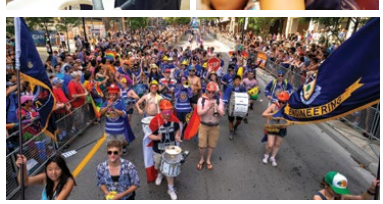
University is much more than lectures and labs. Long before you graduate, you'll be creating your own distinct brand of excellence through the relationships you form and the activities you pursue outside of the classroom.

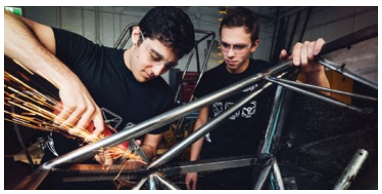
Whatever your interests or hobbies, there is a student group or co-curricular activity for you. From rock climbing and volleyball to solar car design and musical ensembles, U of T offers more opportunities to join clubs and teams than any other university in Canada. And if you can't find a club that suits your interests, start a group of your own.

You can also complement your professional development as a future engineer through co-curricular opportunities like The Entrepreneurship Hatchery and the Institute for Leadership Education in Engineering. See page 25 for details.

Visit **uoft.me/engstudentlife** and follow us on Instagram **(@uoftengineering)** to join the conversation.








Mascot = Ye Olde Mighty Skule™ Cannon

90 engineering student clubs

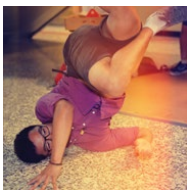
7 residence options for engineering students*

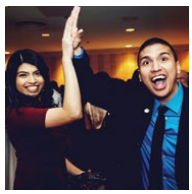
*Read about the residence guarantee on page 26







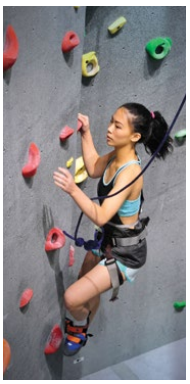
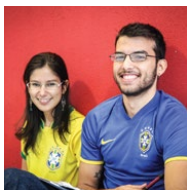




14 engineering design teams

50+ student companies have benefitted from The Entrepreneurship Hatchery




10+ engineering student clubs focus on music, visual arts and dance

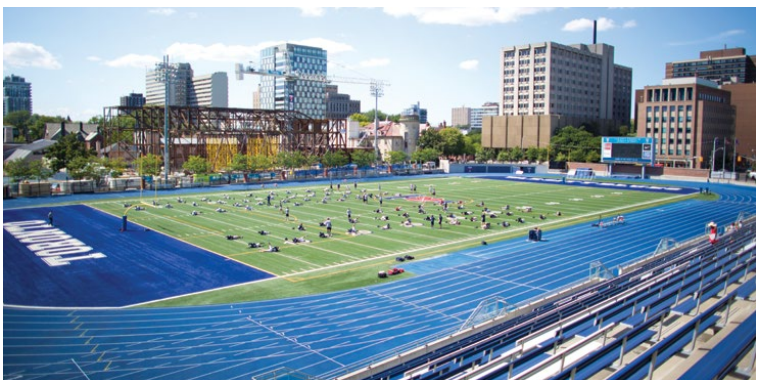








Students and alumni refer to U of T Engineering as Skule™





CAREER MOMENTUM: PROFESSIONAL EXPERIENCE YEAR (PEY) INTERNSHIP

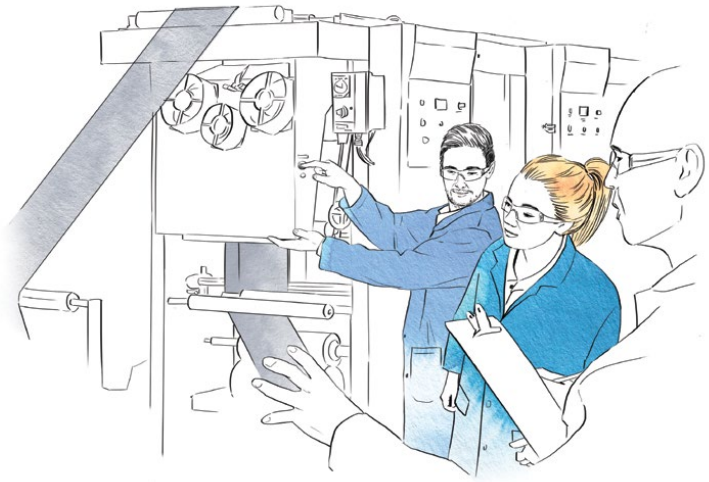
After your second or third year of study, you'll have the option to choose the Professional Experience Year (PEY) internship program. PEY is a full-time engineering job that lasts 12 to 16 months. It is the most highly regarded paid internship program in the country.

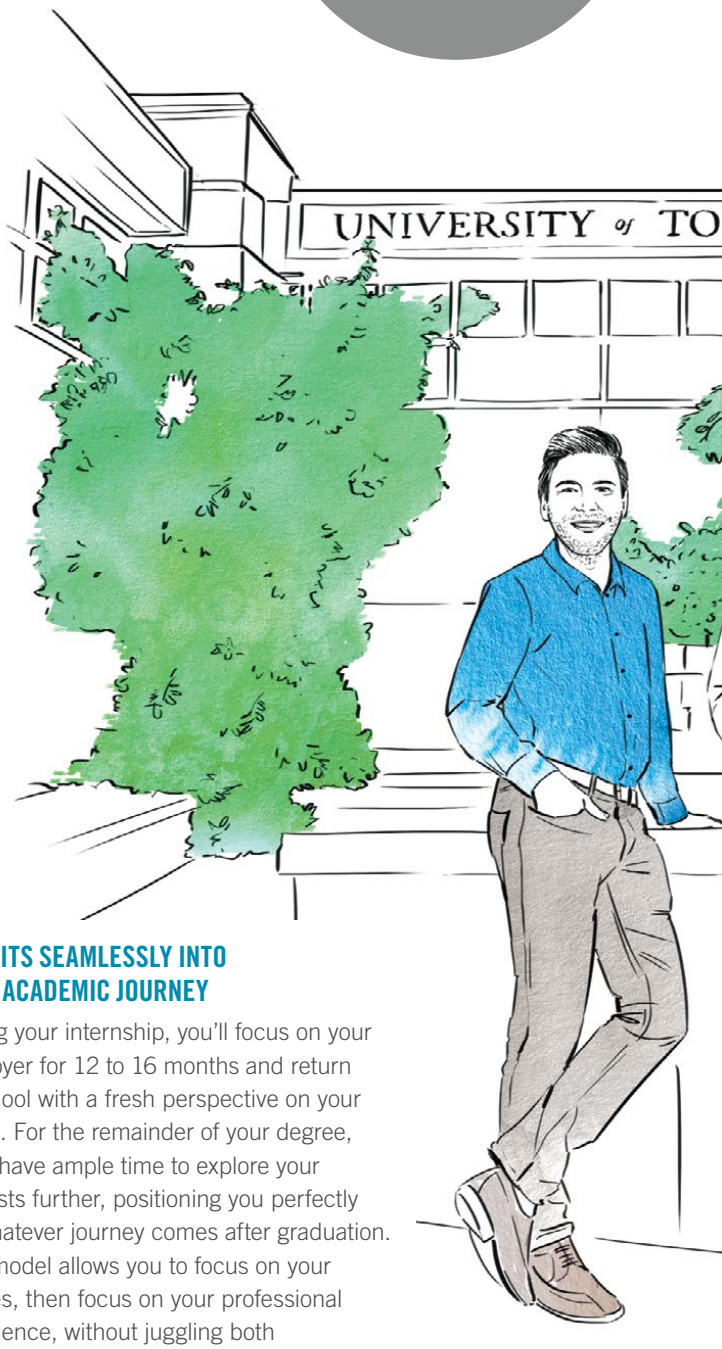
U of T IS RANKED IN THE TOP 10 WORLD UNIVERSITIES FOR GLOBAL EMPLOYABILITY*

Explore all that PEY internships offer:
uoft.me/peyinternship

IT'S MORE THAN JUST A FOOT IN THE DOOR

You'll work for 12 to 16 months, giving you enough time to gain extensive experience applying your engineering competencies to industry challenges while making meaningful contributions. As an intern, you are considered a full-time member of your employer's team. PEY interns sometimes train co-op students from other universities who are working at the same company for shorter periods of time.



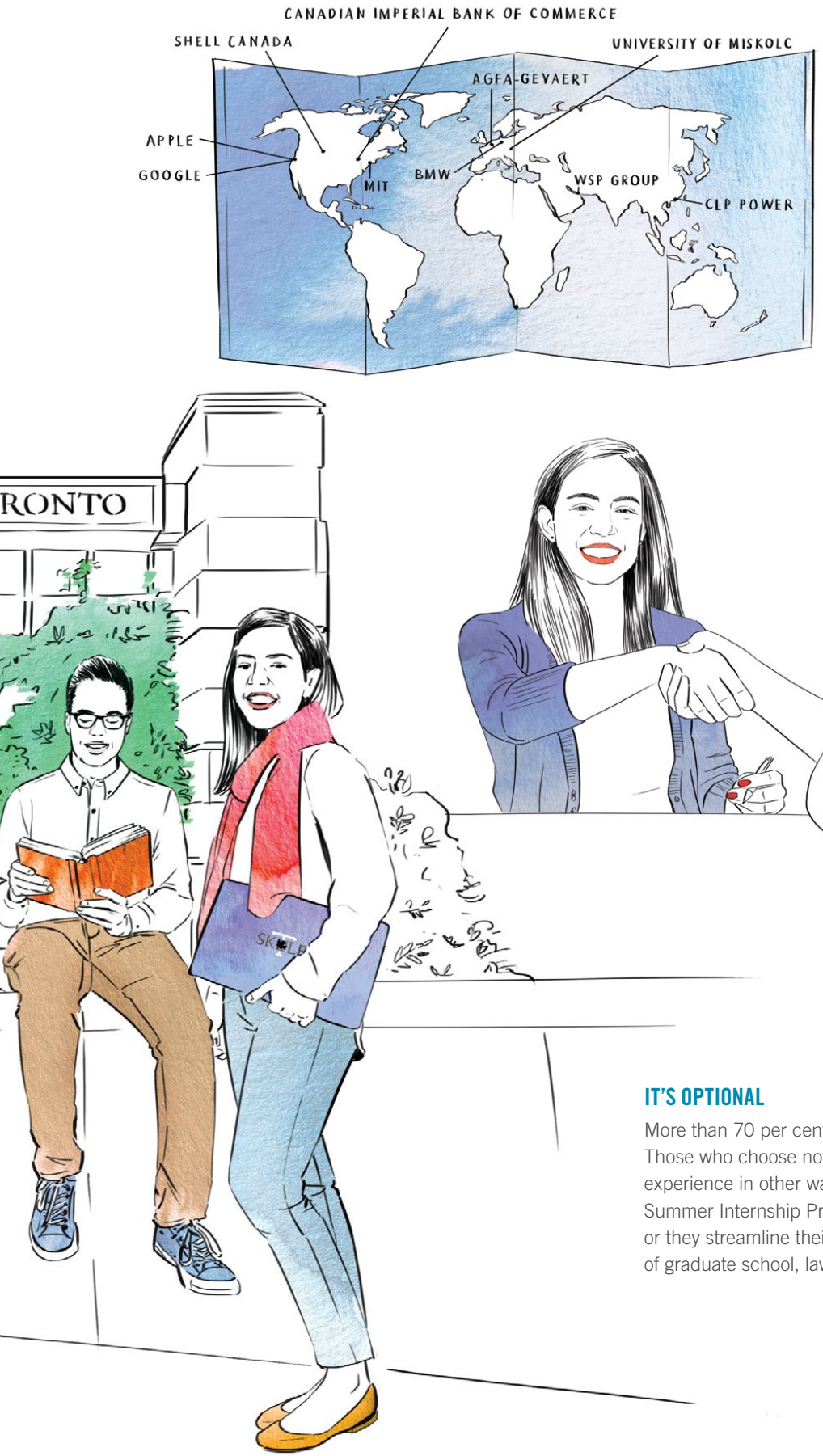


PEY CAN HELP YOU GRADUATE DEBT-FREE

While on PEY, you are a full-time employee with a starting salary to match. You can expect to earn an average annual salary of $50,000. The highest annual salary in 2015 was $104,000. Every PEY position is paid.

PEY FITS SEAMLESSLY INTO YOUR ACADEMIC JOURNEY

During your internship, you'll focus on your employer for 12 to 16 months and return to school with a fresh perspective on your future. For the remainder of your degree, you'll have ample time to explore your interests further, positioning you perfectly for whatever journey comes after graduation. This model allows you to focus on your studies, then focus on your professional experience, without juggling both at regular intervals.



YOU'LL HAVE A WIDE SPECTRUM OF OPPORTUNITIES TO CHOOSE FROM IN CANADA AND ABROAD

PEY employers range from local startups to large international companies across a variety of sectors. Last year, 700 PEY students had more than 1,800 positions to choose from, many of which were outside of Canada. You will apply and interview for the positions you're most interested in, and accept the PEY offer that best aligns with your goals.

TOP EMPLOYERS AND RECRUITERS COME TO YOU

Some employers ONLY hire interns through PEY because it's their best return on investment. PEY is also an excellent way for employers to assess and recruit talent: 70 per cent of PEY students receive a confirmed or tentative job offer before they graduate at a salary that is, on average, 15 per cent higher than their non-PEY counterparts.

IT'S OPTIONAL

More than 70 per cent of our students opt for PEY. Those who choose not to participate often gain experience in other ways, through the Engineering Summer Internship Program and research positions, or they streamline their path to graduation in pursuit of graduate school, law or medicine.

* 2015 Global Employability University Ranking, Times Higher Education

CUSTOMIZE YOUR ACADEMIC EXPERIENCE

U of T Engineering offers you the most interdisciplinary engineering education in Canada and world-class professors. You can tailor your degree through academic options, experiential learning opportunities, minors and certificates, adding breadth and depth to your studies.

Academic flexibility combined with a wide range of leadership, entrepreneurship, career development and extracurricular opportunities means that you achieve a comprehensive engineering education. You will graduate equipped with strong fundamentals, practical engineering knowledge and perspectives to tackle any challenge. All of our programs are fully accredited and our degrees are recognized worldwide. Upon graduation, you will be eligible to become a registered Professional Engineer (PEng), which is your license to practice within the profession.

21%

of all major international and national awards received by Canadian engineering faculty were won by U of T Engineering professors in 2015*

*Engineers Canada

Above: Professor Angela Schoellig and her students test drones in the Dynamic Systems Lab at U of T's Institute for Aerospace Studies.

Below: Civil engineering students work with Professor Mason Ghafgazi on a design project.

OUR PROGRAMS

YOU CAN START YOUR FIRST YEAR IN THREE WAYS:
1. General First Year
2. Core Programs
3. Engineering Science

GENERAL FIRST YEAR / CORE PROGRAMS

GENERAL FIRST YEAR is for those who are unsure of what specific area of engineering to pursue. After your first year, you'll continue in a Core Program of your choice.

OR

If you know what you want to study, apply directly to one of the following **CORE PROGRAMS**: Chemical; Civil; Computer; Electrical; Industrial; Materials; Mechanical; or Mineral.

ENGINEERING SCIENCE

ENGINEERING SCIENCE (EngSci) is an enriched program that prepares students for a wide range of fields. Your first two years will build a broad and deep engineering foundation while your last two years focus on one of eight specialized majors. See page 22 for details.

FIRST YEAR

Establish your foundation in engineering through courses in math, science, programming and a team-based design course, Engineering Strategies & Practice.

Start EngSci with classical mechanics, math and circuits. You'll also work with a team to solve a real issue in the Greater Toronto Area through your engineering design course, Praxis.

SECOND YEAR

Expand your knowledge with more courses in your discipline. Gain a greater depth of understanding through enhanced lab experiences and design opportunities.

Apply your knowledge through more foundational courses and prepare to select a major for the last two years of your studies. Consider opportunities to study or work aboard, participate in entrepreneurship activities or conduct summer research.

Choose to complement your program with **minors** and **certificates**, **study abroad** opportunities and **summer research** positions (see pages 24 and 25).

THIRD YEAR

Focus your studies further towards your developing interests and think about how the Professional Experience Year internship program (page 10) might fit into your journey.

Delve into your major (page 23) and consider the Professional Experience Year internship program (page 10).

PROFESSIONAL EXPERIENCE YEAR (PEY)
OPTIONAL PAID INTERNSHIP

If you choose to participate in a **Professional Experience Year** internship, you'll take a break from your studies for 12 to 16 months to work in a full-time engineering position. This is an opportunity to put your education to practice while adding invaluable experience to your resume and earning a great salary. See page 10 for more information.

FOURTH YEAR

Apply the competencies and knowledge you've developed with the opportunity to complete a team-based design or research project.

Apply your knowledge, competencies and talents through a team design project and an individual research thesis.

UPON GRADUATION

The Core Programs lead to a Bachelor of Applied Science (BASc), and Engineering Science leads to a BASc in Engineering Science.

BASc DEGREE

BASc in ENGINEERING SCIENCE DEGREE

SKOLL PROGRAM (BASc/MBA)

If an MBA is in your future, consider the Jeffrey Skoll program after third year of your engineering studies. This program allows you to combine your engineering education with an MBA from U of T's prestigious Rotman School of Management and graduate with BASc and MBA degrees. **uoft.me/skollprogram**

Visit **uoft.me/engprograms** for additional information about your academic journey.

Megha Jain (left), a General First Year student, works with Civil Engineering student Gordon Dri on a rooftop garden project for Engineering Strategies & Practice, a design course that addresses client challenges.

GENERAL FIRST YEAR

General First Year (also know as Track One) is designed for students interested in exploring all fields of engineering before choosing to join a Core Program in second year.

Students who choose this program spend their first year taking a wide range of engineering courses. This approach helps you discover your interests within U of T Engineering while you develop a strong foundation in key engineering principles. **After you've successfully completed your first year, you are guaranteed* a spot in the Core Program of your choice** (Chemical, Civil, Computer, Electrical, Industrial, Materials, Mechanical or Mineral) for the remaining three years of your four-year Bachelor of Applied Science degree. Your courses will be similar to those taken by first-year students in the Core Programs, so the transition to second year will be smooth. This program will challenge you to think about engineering from many different points of view.

The General First Year is ideal for students who are interested in conquering this century's major challenges through engineering, but are unsure of the careers available to graduates from each field, or want more knowledge before selecting their engineering program. Through your *Introduction to Engineering* course, you'll learn how each engineering field contributes to society. Your professors will show you the connections between all the engineering disciplines so you'll feel engaged and inspired to learn more. Support from your academic advisor will help you with your choice at the end of first year.

FIRST-YEAR COURSES

- Calculus I and II
- Computer Fundamentals or Fundamentals of Computer Programming
- Dynamics
- Electrical Fundamentals
- Engineering Chemistry & Materials Science
- Engineering Strategies & Practice I and II
- Introduction to Engineering
- Linear Algebra
- Mechanics
- Seminar: Orientation to Engineering

* General First Year students who achieve a minimum average of 60 per cent in both semesters are guaranteed entry to the Core Program of their choice in second year.

Chemical Engineering students Brittany Green and Ashrith Domun conduct an experiment in the Unit Operations Lab.

CHEMICAL

Chemical engineers combine chemistry, biology, math and engineering to solve urgent challenges and create innovative processes and products.

As a Chemical Engineering student, you will learn to address issues with a large impact on society: the need to decrease our environmental footprint, create sustainable processes and improve human health. Our professors are at the forefront of research to develop renewable fuels and materials, use biotechnology to clean up pollution, manufacture products sustainably, create artificial organs, and fortify foods to address malnutrition.

U of T Chemical Engineering offers one of the top programs in Canada. In the first two years, you will gain a solid foundation in chemistry, physics, math and engineering principles. In your upper years, you can explore any of the Faculty's minors and certificates (see page 24) and choose courses in areas like **Bioprocess Engineering**; **Biomedical Engineering**; **Sustainable Energy**; **Water & Waste Water Treatment**; and **Environmental Engineering**. You are also eligible to do a research project as part of the program.

Your program will teach you to design, build and improve products, systems and processes. You'll put theory into practice in our innovative courses and laboratories, including the unique Unit Operations Lab, filled with large-scale industrial equipment and a two-storey distillation column. In your fourth year, you'll be part of a student team that will design an industrial processing plant from concept to implementation in just 10 weeks.

FIRST-YEAR COURSES

- Calculus I and II
- Concepts in Chemical Engineering
- Engineering Strategies & Practice I and II
- Fundamentals of Computer Programming
- Introduction to Materials Science
- Linear Algebra
- Mechanics
- Physical Chemistry
- Seminar: Orientation to Engineering

Civil Engineering students examine traffic patterns in the Intelligent Transportation Centre and Testbed with Professor Baher Abdulhai.

CIVIL

Civil engineering focuses on the design, infrastructure and sustainability of the structures and systems that support our daily lives, from the deepest tunnels to the tallest buildings.

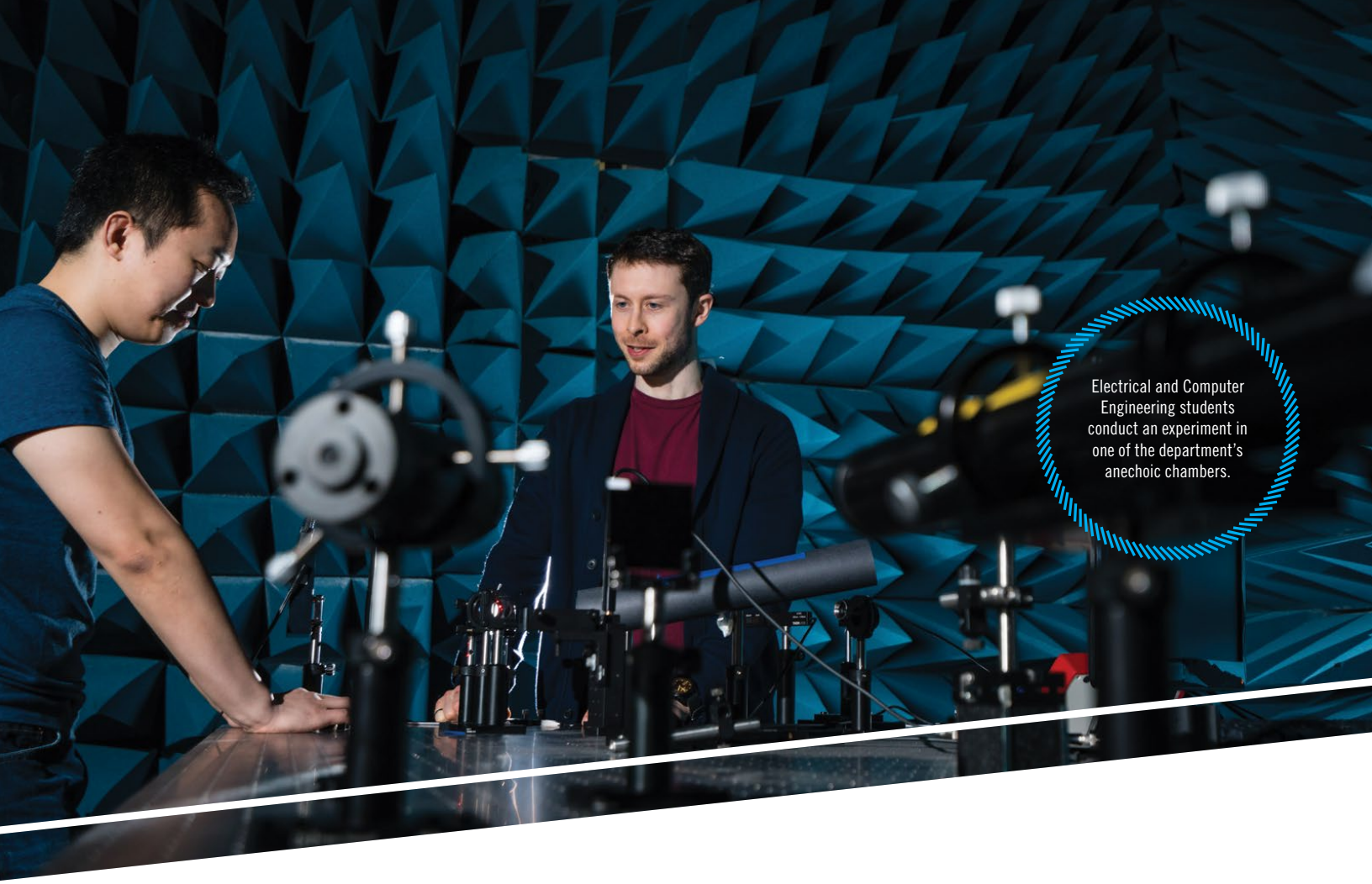
Students in the Civil Engineering program choose courses in areas like **Structural Engineering**; **Transportation Engineering & Planning**; **Construction Management**; **Building Science**; **Mining & Geomechanics**; and **Environmental Engineering**. In each of these areas, Toronto becomes your living lab.

Your work here will prepare you to create solutions that will directly impact quality of life everywhere: rebuilding deteriorating urban infrastructure; designing disaster-resistant structures; developing advanced technologies for complex transportation networks; supplying clean water and disposing of waste water; and building alternative, efficient energy systems.

You will learn in some of the world's most advanced facilities. Your program includes courses in applied structural mechanics, fluid mechanics, hydraulics, materials, surveying, geology, computer graphics and engineering ecology. Upper-year courses take an experiential approach to learning, like our one-of-a-kind **Civil and Minerals Practicals Camp** north of Toronto. You'll complete your program with a comprehensive design project that solves a challenging engineering problem. U of T's Department of Civil Engineering is consistently ranked number one in Canada.

FIRST-YEAR COURSES

- Calculus I and II
- Earth Systems Science
- Engineering Strategies & Practice I and II
- Fundamentals of Computer Programming
- Introduction to Materials Science
- Linear Algebra
- Mechanics
- Physical Chemistry
- Seminar: Orientation to Engineering



Electrical and Computer Engineering students conduct an experiment in one of the department's anechoic chambers.

ELECTRICAL & COMPUTER

Electrical and computer engineers deal with many key issues of our time, including: the communication and control of digital information, and the creation and distribution of energy.

Your professors are conducting leading-edge research on the most rapidly developing technology the world has ever seen: making it safer and faster to store your data in the cloud; developing apps that could become the next smartphone must-haves; building groundbreaking biomedical devices that will improve quality of life; and harnessing natural energy from the sun, wind, earth and sea. Multi-touch sensing is just one of the pioneering technologies developed here. When you choose Electrical or Computer Engineering, you'll have the opportunity to shape the future of technology.

In the first two years of both programs, you'll study engineering design and communication, math, digital systems, electronics, communication systems, computer architecture and software. In upper years, you'll focus on one of six general areas: **Photonics & Semiconductor Physics**; **Software**; **Electromagnetics & Energy Systems**; **Analog & Digital Electronics**; **Communications**, **Signal Processing & Control**; and **Computer Hardware & Networks**.

At U of T, the Electrical and Computer Engineering programs are housed within the same department. We have a critical mass of researchers who are world-leading experts in both electrical and computer engineering. Our program is the highest-ranked and one of the largest in Canada, with 79 professors.

FIRST-YEAR COURSES

- Calculus I and II
- Computer Fundamentals
- Dynamics
- Electrical Fundamentals
- Engineering Strategies & Practice I and II
- Engineering Chemistry & Materials Science
- Linear Algebra
- Mechanics
- Seminar: Introduction to Electrical & Computer Engineering
- Seminar: Orientation to Engineering

Industrial Engineering student Areeba Zakir tests the driving simulator in the Human Factors & Applied Statistics Lab where she does summer research.

INDUSTRIAL

Industrial engineers improve the way people interact with technologies and systems. They help organizations run safely, efficiently and profitably.

Our Industrial Engineering program is the finest of its kind in Canada. Professors bring their research into the classroom, which allows you to take part in groundbreaking work that has practical implications.

You will begin by learning industrial engineering basics: statistics, operations research and human-centred systems design. In your upper years, you'll take courses in engineering psychology and human performance, scheduling and healthcare systems. After second year, you can choose to take courses in the following areas: **Human Factors**; **Operations Research**; and **Information Engineering**. In your fourth year, you'll tackle a year-long project aimed at solving a client's challenge. Through your courses and experiential learning opportunities, you'll develop strong problem-solving skills and become proficient at leading teams.

After you graduate, your ability to see 'the big picture' can be used to streamline an operating room, distribute products worldwide, improve customer relations online, or analyze trades on the stock market. Industrial engineering is closely tied to business, and many of our grads go on to MBA programs, become management consultants, or pursue careers in hospital administration.

FIRST-YEAR COURSES

- Calculus I and II
- Dynamics
- Electrical Fundamentals
- Engineering Strategies & Practice I and II
- Fundamentals of Computer Programming
- Introduction to Materials Science
- Linear Algebra
- Mechanics
- Seminar: Intro to Mechanical & Industrial Engineering
- Seminar: Orientation to Engineering

Materials Engineering students prepare educational kits for nanOntario – a youth outreach program that showcases bio-inspired nanotechnology.

MATERIALS

Materials engineers focus on improving what things are made of and how they are made. New materials enable better performance and sustainable technologies.

You will learn from professors who create advanced materials for high-efficiency energy storage and conversion technologies, lower the cost of solar cells using silicon extracted from rice husk, and develop lightweight and high-performance materials for aerospace and automotive applications.

This is where advanced engineering and cutting-edge science meet. You'll study how to design and manipulate the structure and properties of materials at a molecular and atomic level. With a foundation in chemistry, physics and math, you'll then add specialized engineering knowledge in nanotechnology, biomaterials, adaptive polymers, advanced semiconductors, photovoltaics, forensics, and many more exciting fields. Your upper years will allow you to focus on: **Nanomaterials & Nanotechnology**; **Biomaterials & Bioengineering**; **Materials in Manufacturing**; and **Materials Processing & Sustainable Development**.

U of T is ranked first in Canada for materials science. Upon graduation, you will join a network of alumni who are leaders in creating global and sustainable solutions.

FIRST-YEAR COURSES

- Calculus I and II
- Electrical Fundamentals
- Engineering Strategies & Practice I and II
- Fundamentals of Computer Programming
- Introduction to Materials Science
- Linear Algebra
- Mechanics
- Physical Chemistry
- Seminar: Orientation to Engineering

As part of their capstone project, Mechanical Engineering students Evan Boyce, Emma Bowman, Greg Pollieri and Austin McLean designed an inexpensive windmill to help farmers in Nicaragua.

MECHANICAL

Mechanical engineers focus on how things work. Most technological objects—from cars to medical devices—are designed using mechanical engineering principles.

Our program is world-renowned for an applied, practical curriculum. Theory is put into practice with experiential learning in labs and in the field. You'll take courses in physics, risk assessment, thermodynamics, biomechanics and sustainable energy. You will also learn about the physical principles of an object's design: its appearance; how the individual components work; and how to manufacture it and make it safe, economical, efficient, easy to use and environmentally responsible. After second year, you'll specialize in one of the following areas: **Mechatronics**; **Manufacturing**; **Solid Mechanics & Design**; **Energy & Environment**; or **Bioengineering**.

In fourth year, you'll be part of a student team working with an industry client to solve a problem facing their company.

Mechanical engineers understand the world as parts in motion, and they're always in demand in the marketplace. Our graduates pursue careers in a vast number of areas like designing communication systems, computers, assistive medical devices, low-carbon technologies, automotive design, power generation, nanotechnology, and composite materials.

FIRST-YEAR COURSES

- Calculus I and II
- Dynamics
- Electrical Funda mentals
- Engineering Strategies & Practice I and II
- Fundamentals of Computer Programming
- Introduction to Materials Science
- Linear Algebra
- Mechanics
- Seminar: Intro to Mechanical & Industrial Engineering
- Seminar: Orientation to Engineering

Mineral Engineering students examine a sample during a site visit to Vale, an international mining company with facilities in the Greater Toronto Area.

MINERAL

Everything that humans use is either caught, grown or mined. Mineral engineering is the applied science of our interaction with the planet.

What sets the Lassonde Mineral Engineering program apart is our broad approach to the discipline: here, you learn mineral exploration, mine design and management, mineral processing and mining finance. Your courses will cover topics in chemical, civil, materials, mechanical and computer engineering, as well as math, physics and geology. You'll be taught by researchers and engineering professionals working in industry and the Lassonde Institute of Mining, an international centre of excellence right here at U of T. Your degree will provide you with the expertise to lead the way in making mining more sustainable, safe and productive.

After first year, the class sizes are small, allowing for a strong sense of community. Various site visits, national competitions and guest speakers enrich your time at U of T. In fourth year, you'll be part of a team of students and industry engineers tasked with finding a solution to a practical engineering challenge.

Toronto is the mining finance capital of the world. It's also home to the largest group of mining company headquarters. Through the program, you'll be able to focus on areas like: **Mining & Geomechanics**; **Geological Engineering**; **Geotechnical**; and **Applied Geology**.

You'll find alumni of this program all over the globe, deep underground and in the skyscraper boardrooms of the world's most powerful companies. They locate diamond deposits, find oil reservoirs, build massive tunnels, crunch the numbers for multi-billion-dollar projects and design underground structures.

FIRST-YEAR COURSES

- Calculus I and II
- Earth Systems Science
- Engineering Strategies & Practice I and II
- Fundamentals of Computer Programming
- Introduction to Materials Science
- Linear Algebra
- Mechanics
- Physical Chemistry
- Seminar: Orientation to Engineering

ENGINEERING SCIENCE

One of the most distinguished engineering programs in the world, Engineering Science attracts top students who are looking for an academic challenge. This enriched program is widely regarded as an innovator in engineering education.

During your first two years, you'll be immersed in a fast-paced, high-level study of fundamental engineering, math, science, computing and the humanities, along with a breadth of engineering topics. This multidisciplinary foundation of competencies and knowledge is followed by two years of accelerated, discipline-specific learning. In the third and fourth years, you'll choose one of eight majors.

As an Engineering Science student, you'll join a close-knit community of academically talented, hard-working, creative and highly motivated individuals. Together, you will be part of one of the most intellectually stimulating learning environments available worldwide.

Upon graduation, about half of our students pursue graduate studies at internationally renowned universities, including schools like Caltech, Harvard, MIT and Stanford. Approximately five per cent pursue professional degrees in areas such as law and medicine. Many enter the workforce after graduation in a wide range of fields and are eligible to become licensed professional engineers. Our graduates are in high demand with employers, who find Engineering Science students confident in pursuing any challenge.

FIRST-YEAR COURSES

- Calculus I & II
- Classical Mechanics
- Computer Algorithms and Data Structures
- Engineering Mathematics and Computation
- Fundamentals of Electric Circuits
- Introduction to Computer Programming
- Linear Algebra
- Molecules and Materials
- Praxis I & II
- Structures and Materials - An Introduction to Engineering Design

SECOND-YEAR COURSES

- Biomolecules and Cells
- Complementary Studies Elective
- Digital and Computer Systems
- Electromagnetism
- Engineering Design
- Engineering and Society
- Ordinary Differential Equations
- Probability and Statistics
- Quantum and Thermal Physics
- Thermodynamics and Heat Transfer
- Vector Calculus & Fluid Mechanics
- Waves and Modern Physics

Engineering Science students conduct research at BioZone on campus during the summer. Summer research opportunities are available worldwide.

ENGINEERING SCIENCE MAJORS

AEROSPACE ENGINEERING

Professors from the internationally recognized University of Toronto Institute for Aerospace Studies (UTIAS) will teach you all aspects of aircraft and spacecraft engineering—from flight dynamics and aerospace propulsion to advanced materials and design.

BIOMEDICAL SYSTEMS ENGINEERING

This interdisciplinary major builds a strong foundation in both engineering and life sciences. Graduates apply their knowledge to the understanding, diagnosis and treatment of diseases and health-related conditions.

ELECTRICAL & COMPUTER ENGINEERING

In our highly connected world, electrical and computer engineering is increasingly linked; this major will give you the background and flexibility to integrate knowledge of both fields in order to develop emerging technologies and invent new ones.

ENERGY SYSTEMS ENGINEERING

The Energy Systems Engineering major addresses the global need for more professionals in this field. Our economy depends on affordable energy. You'll learn to tackle problems we're facing in energy generation, storage and management, and will gain an understanding of energy issues from a public-policy perspective.

ENGINEERING MATHEMATICS, STATISTICS & FINANCE

This first-of-its-kind undergraduate major teaches the financial theory that governs the dynamics of financial instruments and markets. You'll gain a strong understanding of how math and statistics apply to practice in quantitative finance through the use of engineering tools such as optimization.

ENGINEERING PHYSICS

Engineering Physics attracts students who recognize the creative potential of combining physics with engineering. You can customize your studies across a wide spectrum of theoretical and experimental physics courses.

INFRASTRUCTURE ENGINEERING

Physical infrastructure is a defining feature of civilization. In this major you will learn to create safe, sustainable, economical and resilient structures and transportation systems. Your infrastructure designs will profoundly impact the economy, community and quality of life.

ROBOTICS

Drawing on expertise from electrical and computer engineering, computer science, mechanical engineering and aerospace studies, the Robotics major is designed with a focus on perception, reasoning and acting as the three key functions of intelligent robots. You will learn about robotic system integration through a series of design and research opportunities.

ENGINEERING MINORS & CERTIFICATES

Choosing an engineering minor or certificate allows you to specialize within your discipline, explore a new area of interest, and gain an extra set of credentials while earning your BASc. As an engineering student, you can also pursue a minor through the Faculty of Arts & Science.

To obtain a minor or certificate, you complete a specific number of required and elective courses — six for a minor and three for a certificate. For example, if you're interested in the Engineering Business minor, you would take courses in engineering economics, accounting and finance, competitive strategy and people management, plus two courses from a set of electives. When you graduate, your minor or certificate will appear on your transcript.

BIOENGINEERING MINOR

With topics extending across life sciences, from forestry and ecology to biological waste treatment and health care, this minor offers you a breadth of possibilities, from biofuels to pharmaceuticals.

BIOMEDICAL ENGINEERING MINOR

This highly focused minor examines engineering's intersection with medicine and biomedical technology. Courses cover physiological control systems, bioinstrumentation, biomechanics and a choice of lab or design experience.

ENGINEERING BUSINESS MINOR

This minor represents a powerful collaboration between the Faculty of Applied Science & Engineering and the Rotman School of Management. The first of its kind in Canada, it provides knowledge of finance, economics, business management and marketing from an engineering perspective.

ENVIRONMENTAL ENGINEERING MINOR

Delve into topics such as ecological impact, water and wastewater treatment, environmental microbiology, hydrology, preventive engineering, life-cycle analysis, and the social and environmental impact of technology.

NANOENGINEERING MINOR

Reflecting a growing focus on engineering materials and devices at the nano scale, this minor is applicable to many sectors including electronics, communications, energy and medical diagnostics.

ROBOTICS & MECHATRONICS MINOR

Explore technologies that turn robotic and mechatronic systems into viable consumer products. Courses cover topics such as micro-electromechanical systems and new system-level principles underlying embedded systems.

SUSTAINABLE ENERGY MINOR

The need for greener, more sustainable energy resources is critical. Topics in this minor focus on the sustainable use of energy, energy-demand management and public policy related to sustainability.

ENGINEERING CERTIFICATES

- Communication
- Engineering Business
- Engineering Leadership
- Entrepreneurship
- Global Engineering
- Mineral Resources
- Nuclear Engineering
- Renewable Resources Engineering

Visit **uoft.me/academicchoice** to hear students talking about the benefits of minors.

BEYOND THE CLASSROOM

Outside of your primary area of study and the Professional Experience Year (PEY) internship program lies an incredible range of powerful ways to graduate with invaluable experience. U of T Engineering fosters an ecosystem of innovation, leadership and entrepreneurship that will equip you with the professional competencies to excel in a complex global engineering environment.

ENTREPRENEURSHIP

What does a single tool that fixes most bike problems, an app that improves outcomes for physiotherapy patients and a nutritionally complete meal replacement have in common? They are all student-run companies that started at **The Entrepreneurship Hatchery**, our engineering business incubator. The Hatchery provides you with mentorship from seasoned entrepreneurs, design space, prototyping equipment and connections to funders — all to help move your business idea successfully from concept to market. **uoft.me/startup**

LEADERSHIP

Successful engineers understand themselves, inspire their teammates and transform their passions into life-changing opportunities. The first centre of its kind in Canada, our **Institute for Leadership Education in Engineering** (ILead) offers courses, certificates and special events to help you excel as a student and future engineering professional. **uoft.me/engleader**

STUDY ABROAD

Completing engineering courses abroad is an excellent way to gain international experience and cross-cultural competency. You'll have access to more than 100 study-abroad institutions worldwide, including 14 engineering-specific partnerships at exceptional universities like the National University of Singapore, Delft University of Technology, Lund University and Peking University. **uoft.me/engabroad**

SUMMER RESEARCH

Imagine the excitement of working alongside internationally renowned engineering researchers who are shaping the future of the profession. Many U of T Engineering students use their summers to gain experience as a valuable member of a research team on campus or abroad. As you expand your research network, this experiential learning opportunity could land your name on a groundbreaking research paper. **uoft.me/summerresearch**

HOW TO APPLY

When you apply to U of T Engineering, we carefully consider both your academic performance and activities outside of the classroom. Visit **uoft.me/engapply** for details.

1

APPLY ONLINE PRIOR TO JANUARY 13

Submit your application online via the Ontario Universities' Application Centre (OUAC) at **www.ouac.on.ca**, starting in early October. Shortly after you submit your application we will send you an email acknowledgement with instructions on how to access your Engineering Applicant Portal.

2

SUBMIT YOUR ONLINE STUDENT PROFILE AND DOCUMENTS BY FEBRUARY 1

Log in to your Engineering Applicant Portal to complete the six sections of the Online Student Profile and upload transcripts for all studies to date, completed and in progress, from the start of high school[1]. English proficiency test results must be sent electronically directly from the testing service. Your application will be reviewed once it is complete.

3

APPLY FOR RESIDENCE BY MARCH 31

Residence is guaranteed for all new full-time students entering their first year of study. To qualify for the guarantee, complete the University's common residence application (MyRes) by **March 31**. For full details, please visit **uoft.me/engresidence**

4

TRACK THE STATUS OF YOUR APPLICATION

Check your Engineering Applicant Portal regularly to see what documents have been received in support of your application, confirm that your Online Student Profile is complete, and track your admission status. When a decision is made, it will be posted here first!

[1] If you are a current Ontario high school student, your grades will be automatically sent to us from your school.

ACADEMIC REQUIREMENTS

Before you apply, make sure you meet the admission requirements. For details visit **uoft.me/engapply**

CANADA

ONTARIO: English (ENG4U); Advanced Functions (MHF4U); Calculus and Vectors (MCV4U); Chemistry (SCH4U); Physics (SPH4U); and an additional U or M course

ALBERTA/NW TERRITORIES/NUNAVUT: Math 30-1; Math 31; Chemistry 30; Physics 30; and English 30 or ELA 30-1

BRITISH COLUMBIA/YUKON: Pre-Calculus 12; Calculus 12 or AP Calculus; Chemistry 12; Physics 12; and English 12

MANITOBA: Pre-Calculus Math 40S; AP Calculus*; Chemistry 40S; Physics 40S; and ELA 40S

NEW BRUNSWICK: Calculus 120; Pre-Calculus B120; Chemistry 121 or 122; Physics 121 or 122; and English 120, 121 or 122

NEWFOUNDLAND/LABRADOR: Math 3200; Math 3208; Chemistry 3202; Physics 3204; and English 3201

NOVA SCOTIA: Pre-Calculus; Grade 12 Calculus/AP Calculus; Chemistry 12; Physics 12; and English 12 (competitive candidates will be considered with Math 12/Advanced Math 12 if Calculus is not offered by your school)

PRINCE EDWARD ISLAND: Mathematics 621A or 621B; Mathematics 611B; Chemistry 611 or 621; Physics 621; and English 621

SASKATCHEWAN: Pre-Calculus 30; Calculus 30; Chemistry 30; Physics 30; and English ELA A30 + B30

QUEBEC CEGEP: 12 academic courses including one course in Algebra, and two courses each in Calculus, Chemistry, Physics and English. 24 courses with prerequisites will be considered for advance standing credit.

* Please contact us if your school does not offer Calculus

MONEY MATTERS

For a more complete picture of financing your U of T Engineering education, please visit **uoft.me/engfinances**

SCHOLARSHIPS & AWARDS

All high school applicants to U of T Engineering are automatically considered for most **admission scholarships** on the basis of their academic achievement and extracurricular involvement (as detailed in the Online Student Profile). Some scholarships and awards, including the **U of T Engineering International Scholar Award** (February 1 deadline), require a separate application. Please visit **uoft.me/engscholarship**

FINANCIAL AID

UNIVERSITY OF TORONTO ADVANCE PLANNING FOR STUDENTS

We are committed to ensuring that no admitted domestic student[1] is unable to enrol in or complete their studies due to lack of financial means. This commitment led to the creation of a unique financial aid program called **University of Toronto Advance Planning for Students (UTAPS)**. Through a non-repayable grant, UTAPS covers unmet financial need after a student has received a maximum amount of support through government assistance (e.g., OSAP for Ontario students).

U.S. STUDENT AID

American students attending the University of Toronto can access funding through the William D. Ford Federal Direct Loan Program. American students can also earn scholarships for their high school achievements; learn more at **www.raise.me/join/toronto**

SPONSORED STUDENTS

As a top-ranked institution, the University of Toronto is an approved destination for most countries' **national mobility scholarship programs**.

COSTS

Fees for full-time studies are in Canadian dollars.

	DOMESTIC	INTERNATIONAL
Tuition	$14,300[2]	$47,020[2]
Incidental Fees	$1,599.60[3]	$1,599.60[3,4]
Residence & Meal Plan	$10,755–$15,686	$10,755–$15,686
Books & Supplies	$1,500–$2,000	$1,500–$2,000

1. International students are not eligible for need-based financial aid
2. 2016–2017 academic fees
3. 2016–2017 incidental fees; 2017–2018 fees are subject to change
4. International students are also required to purchase health insurance through UHIP (approximately $612 per year)

INTERNATIONAL

AMERICAN SYSTEM: Grade 12 at an accredited high school with a high grade point average and high scores on SAT Reasoning/Redesigned SAT (including Essay) or ACT exams (including Writing Test Component). Excellent results in senior level courses, including Math, Chemistry and Physics. Competitive applicants are encouraged to have two years of Chemistry and Physics as well as Calculus completed or in progress by their senior year. AP or SAT Subject Test results in Calculus, Chemistry and Physics are highly recommended, but not required. Applicants who have written AP exams should present minimum scores of at least 4; SAT Subject Tests in Math, Physics or Chemistry should be at least 650. Please note that U of T Engineering does not grant advanced standing credit for AP courses.

BRITISH PATTERNED: Three A-Levels including Mathematics and Physics. Chemistry is strongly recommended as the third A-Level. Applicants are required to present at least AS-Level Chemistry.

INDIAN SYSTEM: Mathematics, Chemistry and Physics at the grade 12 level. Completion of the All India Senior School Certificate awarded by CBSE, or the Indian School Certificate awarded by CISCE, or Year 12 State Board Exams with excellent results.

INTERNATIONAL BACCALAUREATE (IB) DIPLOMA: Mathematics (recommended at higher level); Physics and Chemistry at either level.

ENGLISH FACILITY REQUIREMENTS

If your first language is not English, you must present proof of English facility prior to admission consideration, unless you have completed four years of full-time study in an English language school in a country where the predominant language is English. For applicants who are required to present proof of English facility and are taking grade 12 English (i.e., ENG4U), you must achieve at least 60 per cent in this course. For details on required scores and acceptable tests, please visit **www.adm.utoronto.ca/eft**.

INTERNATIONAL FOUNDATION PROGRAM (IFP)

The IFP is available to academically qualified international students graduating from an international high school with English facility test scores just below the required minimum. For details, visit **uoft.me/engifp**.

FIRST NATION, MÉTIS AND INUIT APPLICANTS

Indigenous students who are applying to U of T Engineering are encouraged to contact us at **Indigenous@ecf.utoronto.ca**.

Please note: U of T Engineering does not grant transfer credit for AP, IB or A-Level exams

NEW ADDITION TO OUR WORLD-CLASS FACILITIES

From the labs where innovation happens everyday to the spaces where students unwind, U of T Engineering's classrooms, services and research span 15 buildings on campus — all within walking distance of each other — and one off campus (U of T's Institute for Aerospace Studies).

In June 2015, we broke ground on U of T Engineering's 17th building, the **Centre for Engineering Innovation & Entrepreneurship (CEIE)**. Slated to open in 2017, you will be among the first students to use these cutting-edge facilities.

The CEIE will set a new standard for collaborative and multidisciplinary engineering education and research. Here, you'll benefit from technology-enhanced learning spaces, designated areas for student clubs to meet and innovate, an interactive auditorium, prototyping and light fabrication facilities, 3D printers, and much more.

For details about the CEIE, please visit uoft.me/CEIE

GET A TASTE OF ENGINEERING THROUGH DEEP SUMMER ACADEMY

Each July, high school students from around the world travel to Toronto for DEEP Summer Academy. Taught by U of T Engineering professors, researchers and PhD students, week-long courses tackle some of today's most interesting topics in everything from robotics and nanotechnology to engineering business and bioengineering. DEEP is also a great way to get to know U of T before you begin your undergraduate studies. **www.deepsummeracademy.com**

U of T Engineering is home to Toronto's longest single graffiti installation: uoft.me/ceiexskam

TAKE A TOUR

The best way to experience U of T Engineering is to visit in person. We invite you and your family to explore our facilities and meet our students on a guided tour. Your tour will start in the **ENGINEERING WELCOME CENTRE**. We are located in the Galbraith Building, 35 St. George Street, in room 173.

Visit **uoft.me/tourengineering** to sign up for a tour.

STATEMENT OF ACKNOWLEDGEMENT OF TRADITIONAL LAND
We wish to acknowledge this land on which the University of Toronto operates. For thousands of years it has been the traditional land of the Huron-Wendat, the Seneca, and most recently, the Mississaugas of the Credit River. Today, this meeting place is still the home to many Indigenous people and we are grateful to have the opportunity to work on this land.

All information is correct at the time of publishing. Please visit **www.discover.engineering.utoronto.ca** for all the latest information and updates. Principle photography by Neil Ta and Roberta Baker. Additional photography by Jacklyn Atlas, Ray Cheah, Chris Crisman, Sara Collaton, John Guatto, Mike Hawkins, Ken Jones, David Moll, Rick Osentoski, Kevin Soobrian, Arnold Yan, iStockphoto and contributing photographers for skule.ca. Illustrations by Iveta Karpathyova. CEIE renderings courtesy of Montgomery Sisam Architects Inc. and Feilden Clegg Bradley Studios.

UNIVERSITY OF TORONTO | Engineering

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