



**Carleton**  
UNIVERSITY

Faculty of  
Graduate and  
Postdoctoral Affairs

# **FACULTY OF ENGINEERING AND DESIGN** **2020 GRADUATE VIEWBOOK**

CARLETON UNIVERSITY, OTTAWA, CANADA



[carleton.ca/engineering-design](https://carleton.ca/engineering-design)





# FACULTY OF ENGINEERING AND DESIGN

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## CONNECTIONS

Sign up for “Connections” — Carleton’s free newsletter for prospective graduate students.

**[graduate.carleton.ca/newsletter](https://graduate.carleton.ca/newsletter)**

# ABOUT US

Carleton University's Faculty of Engineering and Design is recognized as one of Canada's leading institutions in the study and research of engineering, architecture, industrial design and information technology. By offering one of the most extensive ranges of graduate programs in the country, we provide students with the knowledge and skills to design buildings, aircraft, software, telecommunications systems, medical devices, environmental solutions to pollution, and more. Carleton's graduate programs in engineering and design will teach you that if you can envision it, you can make it a reality.

Our graduate programs not only offer excellent research and practical applications related to your field of interest – they also prepare you for rewarding careers in the real world by providing you with the skills that are highly desirable in today's fast-paced, technology-driven society.

Carleton's location in the national capital offers outstanding opportunities for students to engage with government agencies and departments, as well as research institutions and high-tech industry leaders located in the Ottawa region. Our unique partnership with the University of Ottawa also provides our students access to a wider range of courses, expertise, research facilities and libraries.

Carleton University is also known for its collaborative graduate specializations, which bring together experts and students from a variety of disciplines in order to approach critical issues from diverse perspectives. These specializations, along with our many professional development opportunities, are among the many reasons why Carleton University received strong rankings for graduate student experience in the 2016 Canadian Graduate and Professional Student Survey.

All graduate programs at Carleton University fall under the umbrella of the Faculty of Graduate and Postdoctoral Affairs.







## PROFESSIONAL DEVELOPMENT

At Carleton, we are committed to ensuring you succeed in your studies and develop the professional skills needed to set you up for success when you graduate. To help you plot your career course, Carleton offers a range of workshops that are listed on our Grad Navigate website. All graduate students are welcome to attend these workshops.

We always strive to provide you with special opportunities to find inspiration, dialogue and camaraderie as you work towards your writing, research, and professional development goals. More information is available at: [\*\*carleton.ca/gradpd\*\*](http://carleton.ca/gradpd)

## THE CAPITAL ADVANTAGE

One of Carleton's greatest assets is its location in the nation's capital. Ottawa is home to most federal government departments, as well as influential non-governmental organizations. It boasts a vibrant

business sector and has one of Canada's largest concentrations of high-tech industries. Many other institutions and companies are also headquartered here. This "capital advantage" provides numerous

opportunities for work placements, experiential learning and career opportunities.

Nestled at the junction of two picturesque rivers and the Rideau Canal, Ottawa is one of the world's most beautiful capitals. As Canada's fourth-largest city, Ottawa boasts all the benefits of a large urban area, but has still managed to retain a small-town feel. It is rich in vibrant neighbourhoods, wide-open green spaces and parks and wilderness areas, including the 365-square-kilometre Gatineau Park, just 15 minutes from Parliament Hill.

Each September, as new and returning students arrive at Carleton from across Canada and around the world, they begin to explore their adopted capital city, discovering the natural beauty surrounding them. Leaving campus, students can head out on bicycles or on foot as they walk next to the historic Rideau Canal. In less than 20 minutes, they're following a path that takes them to national landmarks. Surrounded by history, art and an incredible natural environment, students get up close and personal with one of the most unique international cities in the world.



# GRADUATE PROGRAMS IN ARCHITECTURE

The Azrieli School of Architecture and Urbanism is committed to preparing future architects for a culturally rich, technologically dynamic and globalized world. All of our graduate programs are full-time.

Carleton's Master of Architecture (MArch) is an accredited professional degree program whose curriculum is organized around design studios that foster thoughtful reflection on society and the contemporary built environment. The curriculum is enriched by graduate seminars and courses in advanced building systems, digital design and by studios abroad. In the winter semester of their penultimate year, students have the unique opportunity to spend a half semester studying abroad under the supervision of renowned architects and academics. In their final year, students undertake a detailed thesis, with the resulting project being pursued either as an independent study or as part of a research group organized under specific faculty interests. The MArch is comprised of two streams (3 year and 2 year). See admission requirements for details.

The Master in Architectural Studies (MAS) and the PhD in Architecture are innovative and comprehensive programs that ask students to engage in critical forms of historical research and architectural practice.

The MAS focuses on in-depth, architectural research and provides a strong foundation for pursuing a PhD.

The PhD culminates in a written dissertation on an original research topic.

The Graduate Diploma in Architectural Conservation consists of four credits focusing specifically on the theory and practice of architectural conservation.

## DEGREES OFFERED

MArch, MAS, PhD, Graduate Diploma in Architectural Conservation

## CAREER OPTIONS

Our master's programs prepare graduates for a career in architecture and related professional fields. Our PhD program prepares graduates for teaching and practice in global academic and professional fields.

## FALL APPLICATION DEADLINE

**January 15**, to be eligible for funding

## ADMISSION REQUIREMENTS

### MASTER OF ARCHITECTURE (MArch) 15.5-credit (3 year)

**stream:** Applicants who hold a four-year undergraduate degree in a discipline other than architecture (with a minimum GPA of B+) must complete a tailored year which includes an intensive series of three studios and courses in architectural history and theory, buildings technologies, visual representation, digital design and professional practice. These students will join the 8-credit stream upon completion of their first year.

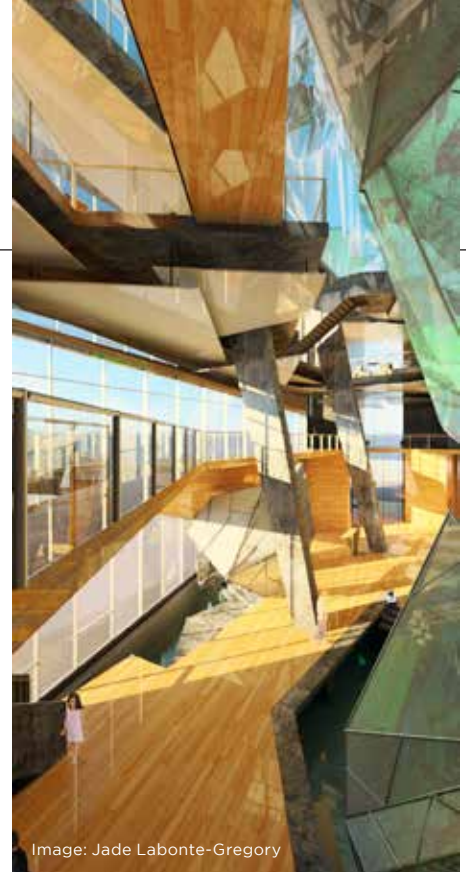


Image: Jade Labonte-Gregory

### 8-credit (2 year) stream:

A four-year undergraduate degree in architecture or architectural studies (with a minimum GPA of B-) with significant studio experience.

Please note that placement in the 2-year or 3-year curriculum is at the discretion of the faculty admissions committee.

### MASTER IN ARCHITECTURAL STUDIES (MAS):

A four-year undergraduate degree in architecture (or recognized equivalent in a related discipline) with a minimum GPA of B-. Professional experience may be taken into consideration.

**PhD:** A Master of Architecture or recognized equivalent in a related discipline with a minimum average of A-.

### DIPLOMA IN ARCHITECTURAL CONSERVATION:

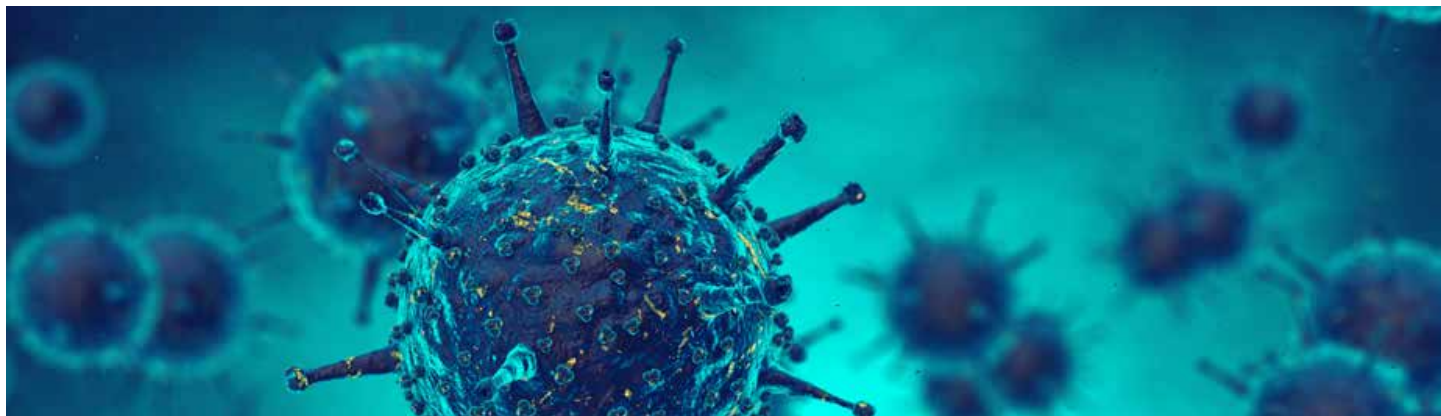
For direct entry, BAS or equivalent degree in Architecture with an average of B+ or higher. Students currently in the MArch program are also eligible.





Master's student Ben Hayward began designing an energy-efficient tiny house as part of a studio course taught by Architecture Prof. Sheryl Boyle. Although Hayward finished all the carpentry by hand, he used the Azrieli School of Architecture and Urbanism's robotic CNC system to digitally fabricate the structural frames of furniture and other elements. Hayward is studying his house's energy efficiency as part of his master's research. He also plans on looking at urban planning and policies that pertain to tiny houses.

# COLLABORATIVE SPECIALIZATION IN **BIOINFORMATICS**



Bioinformatics is an increasingly important scientific discipline answering the fundamental questions about the structure, function and evolution of biological entities through the design and application of computational approaches. Fundamental research in these areas is expected to “increase our understanding of human health and disease, which will lead to innovation in industry.

As a field of research, bioinformatics crosses traditional disciplinary boundaries such as computer science, chemistry, biology, biochemistry, engineering and the medical sciences. Today, bioinformaticians must be able to appreciate significant research in other fields.

Carleton University and the University of Ottawa established the Collaborative Specialization in Bioinformatics to meet this very need.

## **PARTICIPATING PROGRAMS**

Biology, Biomedical Engineering, Computer Science, Mathematics and Statistics.

## **DEGREES OFFERED**

MSc in Biology, MSc in Mathematics and Statistics, MCS (computer science) and MASc in Biomedical Engineering with a specialization in Bioinformatics.

## **CAREER OPTIONS**

Bioinformatics specialists collect, store, analyze, and present complex biological data that can include DNA and genome information, protein sequencing and pathways. They can work in areas such as pharmaceuticals, computer information science and medical technology, designing and manipulating complex databases, creating web-based analytical tools and algorithms and developing new software for project and research needs.

## **FALL APPLICATION DEADLINE**

**March 1**, as per home department application deadline

## **ADMISSION REQUIREMENTS**

The requirements for master’s programs that offer the Collaborative Specialization in Bioinformatics are as follows:

- Prior admission to the master’s program in one of the supporting units participating in the program.
- A letter of recommendation from the participating faculty member of the collaborative program, which both recommends admission and indicates the willingness of the faculty member to supervise the candidate’s research program in Bioinformatics.

## **CONTACT INFO**

Further information can be obtained by writing directly to any of the participating institutes or departments, or the relevant program coordinator.

[graduate.carleton.ca/programs/bioinformatics-collaborative-masters](https://graduate.carleton.ca/programs/bioinformatics-collaborative-masters)



# GRADUATE PROGRAMS IN **BIOMEDICAL ENGINEERING**

There is a rapid increase in the need for new, innovative biomedical and assistive technologies, including smart health homes, wearable technology, biological signal processing, tissue engineering, rehabilitation robotics, orthopaedic biomechanics, patient specific implants and prostheses, real-time biomedical informatics, biomedical image processing, and telehealth. Carleton's master's and PhD programs in Biomedical Engineering provide graduates with the required skills to address this growing demand.

Our degrees are offered through the Ottawa-Carleton Institute for Biomedical Engineering (OCIBME), a multi-disciplinary joint institute with the University of Ottawa.

We offer access to renowned researchers, as well as state-of-the-art labs, equipment and excellent computer facilities. Our location in

Ottawa allows for proximity to, and collaboration with, area hospitals, relevant government departments such as Health Canada, the National Research Council and, through OCIBME, access to resources and faculty at the University of Ottawa. OCIBME also has close ties with local hospitals, including the Children's Hospital of Eastern Ontario and The Ottawa Hospital, which is one of the largest teaching hospitals in Canada, with specialty centres in cancer, heart, kidney, vision care and rehabilitation services.

At the master's level, we also offer a specialization in Data Science and Bioinformatics, as well as a concentration in Clinical Engineering (MEng only).

## **DEGREES OFFERED**

MASc, MEng, PhD

## **CAREER OPTIONS**

Career paths include opportunities in education; the public sector (e.g. health care policy), hospitals and regulatory agencies; or in the private sector working with medical device manufacturers, sports/fitness equipment manufacturers, pharmaceutical companies, or in rehabilitation/orthopaedic engineering. There are also opportunities in the non-profit sector. At the PhD level, careers may be more research-focused, e.g. biomedical data analysis, novel medical devices research and design, and simulation and modeling of diseases and biological systems. Several students interact with clinicians, healthcare organizations, or industrial partners as part of their research project.

## **FALL APPLICATION DEADLINE**

**March 1**, to be considered for funding

## **ADMISSION REQUIREMENTS**

**MASTER'S:** A four-year bachelor's degree in engineering, science, computer science, or a related discipline, with an average of at least B+.

**PhD:** A master's degree with a thesis in engineering, science, computer science, or a related discipline, with an average of at least B+.



## **CONTACT INFO**

613-520-2600 x5683  
[ocibme.ca/contact.php](http://ocibme.ca/contact.php)

[ocibme.ca](http://ocibme.ca)



# GRADUATE PROGRAMS IN CIVIL ENGINEERING

Carleton University is recognized for its advanced research in civil and environmental engineering, with expertise in structural, materials and earthquake engineering; infrastructure protection; fire safety; transportation engineering; geotechnical engineering; water resources and wastewater; air pollution; hydrogeology and waste management; and heritage and sustainable buildings.

The Department of Civil and Environmental Engineering is home to a high concentration of accomplished and internationally-recognized researchers, including the Jarislowsky Foundation Research Chair in Water and Global Health. Carleton is also home to a wide assortment of world-class research facilities. As a result, our graduate students gain hands-on research experience while developing state-of-the-art theory.

Our degree programs in Civil Engineering are jointly taught with the University of Ottawa through the Ottawa-Carleton Institute for Civil Engineering (OCICE). The MASc and PhD require the completion of a thesis while the MEng is predominately course-based with the option of a research project.

## DEGREES OFFERED

PhD, MASc, MEng

## CAREER OPTIONS

Our location in the nation's capital allows for proximity to and collaboration with the National Research Council Canada, Natural Resources Canada, Environment Canada, Heritage Conservation Directorate, Canada Green Building Council, Parks Canada and many heritage sites including the Parliament Buildings, Rideau Canal, Royal Canadian Mint, etc. Career opportunities are just around the corner.

## FALL APPLICATION DEADLINE

**March 1**, recommended deadline for international students for more funding opportunities

## ADMISSION REQUIREMENTS

**MASTER'S:** An honours bachelor's degree, or academic equivalent, in civil engineering or a related discipline, with an average of B+ or higher in discipline specific courses, and overall average of B- or higher.

**PhD:** A master's degree with a thesis in civil engineering or a related discipline, and at least a B+ average in five graduate courses, with no grade below a B- in any graduate courses.



“During my MASc and PhD in Civil Engineering, I learned advanced engineering techniques, developed and implemented cutting-edge technologies, travelled the world and collaborated with internationally-renowned researchers. Carleton's professors are passionate about teaching and research and continually strive to equip students with state-of-the-art skills and critical thinking.”

— Burak Gunay, PhD/16 and MASc/11

# COLLABORATIVE SPECIALIZATION IN DATA SCIENCE

## Join our hub of data science experts and shape the future.

Carleton's Collaborative Specialization in Data Science is geared at graduate students and high-tech professionals who are interested in understanding how to analyze and use 'big data' sets collected by governments, NGOs and industry for purposes ranging from generating personal recommendations for online shopping to improving the efficiency of health care delivery or predicting national security threats.

Students will earn their degree from a participating master's program with a specialization in Data Science (or an MBA

concentration in Business Analytics) through research, project work or coursework that addresses a data science challenge.

More than 130 researchers are working on 'big data' projects at Carleton ranging from artificial intelligence and sensor data analytics to improving health care delivery.

Depending on availability, students may also gain real-world experience through **internships**.

## PARTICIPATING PROGRAMS

Biology (thesis), Biomedical Engineering (thesis), Business (concentration), Cognitive Science (research project, thesis),

Communication, Computer Science (thesis), Economics (thesis or coursework), Electrical and Computer Engineering, Geography (MSc), Health Sciences, History, Information Technology (Digital Media), Psychology.

## CAREER OPTIONS

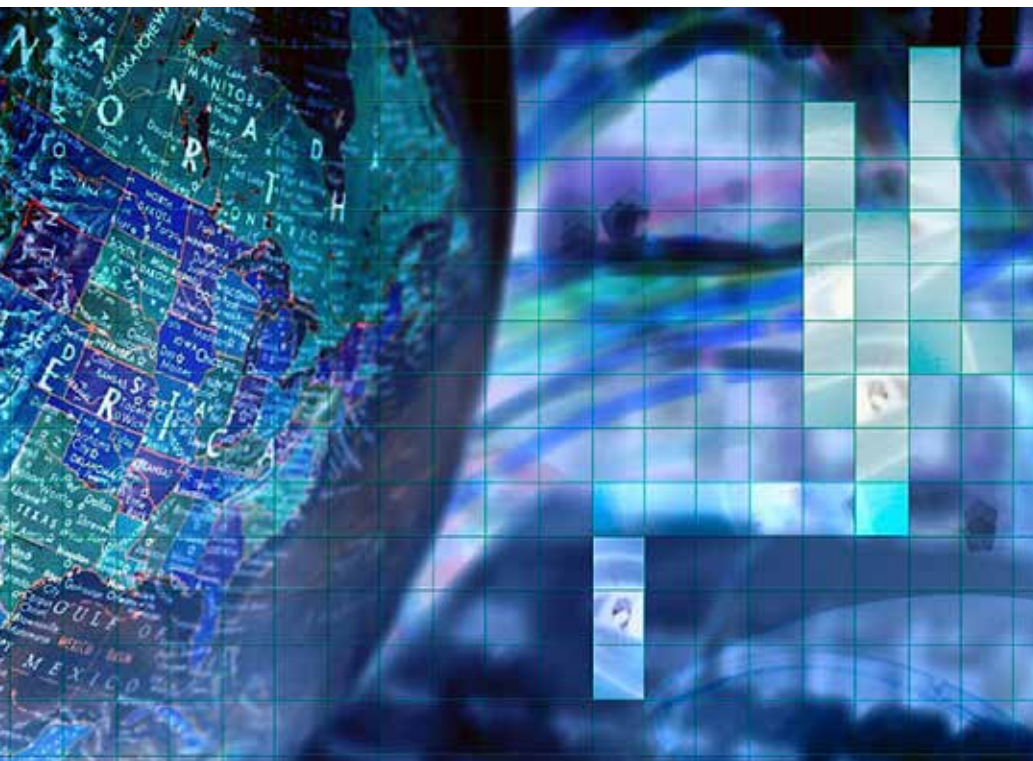
Over the next five years in North America, it is predicted that there will be more than four million jobs involving data science. Working with its partners and Ottawa's tech sector, Carleton is poised to become a national hub for data science research and training, educating a highly skilled workforce for local, national and international communities, and creating the next generation of IT leaders.

## APPLICATION DEADLINE

The deadline dates for applications vary according to the deadline of each participating program. Those wishing to apply for the Collaborative Specialization in Data Science must indicate their intent when applying to their participating program (home degree).

## ADMISSION REQUIREMENTS

Applicants must be admitted to one of the participating master's programs. Requirements vary according to which program a student chooses.



## CONTACT INFO

613-520-2600 x8751  
CUIDS@Carleton.ca

[carleton.ca/datascience](http://carleton.ca/datascience)



# MASTER OF DESIGN

The Master of Design, offered by the School of Industrial Design, takes a strong research approach and is normally completed in two years. The School of Industrial Design provides a collaborative graduate studio space, a sensor lab and prototyping labs, and more.

Students examine and incorporate multi-faceted design principles and practices that contribute to the strategic value of design, with a particular research focus on the following key areas:

- Advanced materials and manufacturing processes
- Advanced visualization design and culture
- Design for health and well-being
- Design management
- Extreme environments
- Human-centered design
- Product interaction design
- Sustainable design
- Strategic design research

## DEGREES OFFERED

MDes

## CAREER OPTIONS

Ottawa, as a capital and the hub of high tech industry of Canada, is an ideal place to study industrial design. More than 70,000 people are employed in the region's 1,700 high tech companies, government sectors and world-class government research and development laboratories, many



“The Master of Design program was critical to my transition from design practitioner to design educator.”

— Jed Looker MDes/17, Professor, School of Media and Design, Algonquin College

of whom engage with our MDes students on a regular basis. This includes the Natural Research Council (NRC) Canada, the National Capital Commission (NCC) and IBM, as well as various medical institutions and a multitude of federal and private museums in the national capital region. Many career opportunities are just down the road, positioning our graduates to play a strategic role in championing design in a variety of enterprises, including academic institutions.

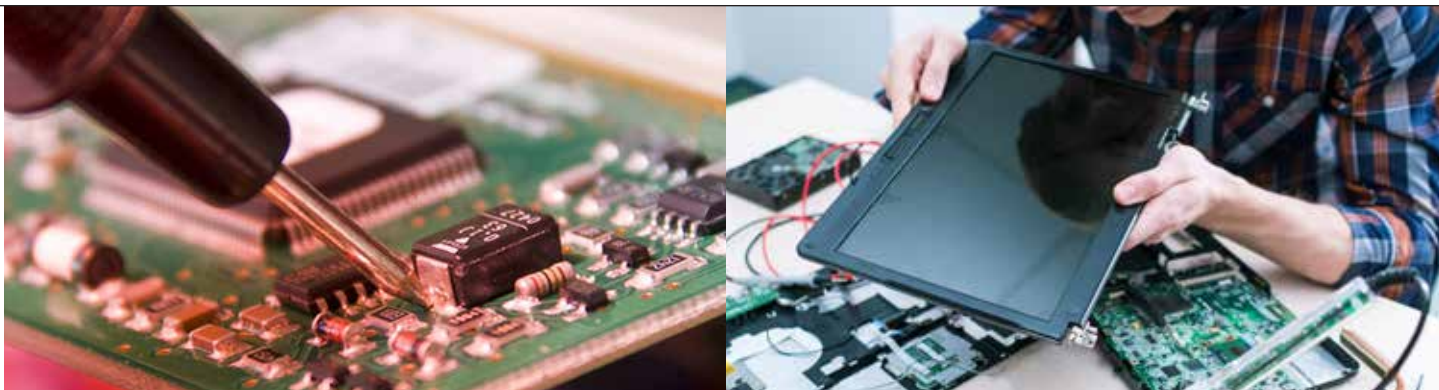
## FALL APPLICATION DEADLINE

**April 1**, to be eligible for funding

## ADMISSION REQUIREMENTS

A bachelor's degree in a design discipline, or the academic equivalent, with at least a B+ standing. Applicants with a design-related background, without a professional degree in design, will be required to demonstrate significant links between their academic background and professional experience working with designers in the design development process.

# ELECTRICAL AND COMPUTER ENGINEERING



Carleton is recognized as a world leader in electrical and computer engineering.

Carleton's renowned researchers work in areas such as:

- Cloud/distributed computing
- Software engineering
- Cyber security
- Speech/signal/image processing and telecommunications
- Modeling and simulation
- Machine learning
- Nanotechnology
- Quantum/optical computing
- Sensor nets
- Robotics
- Artificial intelligence
- And many others

Our graduate electrical and computer engineering programs are offered jointly by the Department of Systems and Computer Engineering ([carleton.ca/sce](http://carleton.ca/sce)) and the Department of Electronics ([doe.carleton.ca](http://doe.carleton.ca)) at Carleton, in conjunction with the University of Ottawa via the Ottawa-Carleton Institute for Electrical and Computer Engineering (OCIECE). This grants our students access to the largest selection of courses in electrical and computer engineering at any Canadian University.

We offer an MASc which requires the completion of a research thesis, an MEng which is coursework-only or coursework plus a project, and a PhD. At the master's level, we also offer a specialization in Data Science.

## DEGREES OFFERED

MASc, MEng, PhD

## CAREER OPTIONS

Our location in the nation's capital allows for collaboration with

relevant government departments, the National Research Council Canada, the Communications Research Centre Canada, and high-tech industries in the aerospace, telecom, automotive, and service industries, for example. Your proximity to these facilities ensures that your potential career is just around the corner.

## FALL APPLICATION DEADLINE

Before **March 1**

## ADMISSION REQUIREMENTS

**MASTER'S:** A bachelor's degree with an average of at least B+ or higher in electrical engineering or a related discipline.

**PhD:** A master's degree with a thesis in electrical engineering, computer science, software engineering, or a closely-related discipline from a recognized university. Your master's thesis topic must be in an appropriate area and of acceptable quality.

### CONTACT INFO

#### Electronics

613-520-2600 x5754  
[info@doe.carleton.ca](mailto:info@doe.carleton.ca)  
[doe.carleton.ca](http://doe.carleton.ca)

#### Systems and Computer Engineering

613-520-2600 x1511  
[gradinfo@sce.carleton.ca](mailto:gradinfo@sce.carleton.ca)  
[carleton.ca/sce](http://carleton.ca/sce)



# GRADUATE PROGRAMS IN ENVIRONMENTAL ENGINEERING

Carleton University is recognized for its advanced research in environmental engineering, with expertise in water resources, water and wastewater treatment, groundwater management, contaminant transport, air pollution, hydrogeology and mine waste management, heritage and sustainable buildings, and more.

The Department of Civil and Environmental Engineering has a high concentration of accomplished and internationally-recognized researchers, including the Jarislowsky Foundation Research Chair in Water and Global Health. Carleton is also home to a wide assortment of world-class research facilities. As a result, our graduate students gain hands-on research experience while developing state-of-the-art theory.

Our degree programs in Environmental Engineering are jointly taught with the University of Ottawa through the Ottawa-Carleton Institute for Environmental Engineering (OCIEENE). The MASc and PhD require the completion of a thesis while the MEng is predominately course-based with the option of a research project.

## DEGREES OFFERED

PhD, MASc, MEng



## CAREER OPTIONS

Our location in the nation's capital allows for proximity to and collaboration with the National Research Council Canada, Natural Resources Canada, Environment Canada, Heritage Conservation Directorate, Canada Green Building Council, Parks Canada, as well as public works and consulting at the municipal, provincial and federal levels. Career opportunities are just around the corner.

## FALL APPLICATION DEADLINE

**March 1**, recommended deadline for international students for more funding opportunities

## ADMISSION REQUIREMENTS

**MASTER'S:** An honours bachelor's degree, or academic equivalent, in civil or environmental engineering, or a related discipline, with an average of B+ or higher in discipline specific courses, and overall average of B- or higher.

**PhD:** A master's degree with a thesis in environmental engineering, or a related discipline, and at least a B+ average in five graduate courses, with no grade below a B- in any graduate courses.

“What I like most about my time at Carleton is the larger skill set I've been able to develop over the years. I came in a bright and enthusiastic student who was able to master coursework and now leave a capable leader able to take on some of the larger environmental challenges we are facing today.”

— Natalie Linklater, PhD/17, MASc/10, BEng/08

# HUMAN-COMPUTER INTERACTION

There is no other program like it in Canada.

The Human-Computer Interaction (HCI) program helps students from a variety of backgrounds make sense out of the rapidly changing world of technology. It focuses on ways computer systems support people at work, at home and at play. What makes this Carleton program distinctive is that it is so unique in its interdisciplinarity, which allows students to tailor their program based on a common core. Students can specialize in one of three programs: a Master of Arts (MA) for emphasis on human factors, a Master of Applied Science (MASc) for emphasis on new media technology and design, or a Master of Computer Science (MCS) for emphasis on software design. Students in all of these programs collaborate across all disciplines.

Our research laboratories are outfitted with the most advanced high-tech equipment. Here, you will be able to collaborate with close to 30 researchers on projects as diverse as:

- HCI for crime simulation
- Interactive video games that can be used for exercise or adapted for occupational therapy
- Interactive facial animation
- Teamwork and situational awareness in complex and extreme circumstances
- Biochemical exploration and simulation environments

## DEGREES OFFERED

MA, MASc, MCS

## CAREER OPTIONS

Students graduating from this program can pursue jobs in diverse fields. From designing cockpits for aircraft, to working on video games or designing cell phone interfaces — all the way to exploring e-commerce purchasing — if you can dream it, this degree can help prepare you for a job in that area. No technology is off limits.

Students who have studied HCI at Carleton have found jobs at places like Google, Microsoft, Amazon, RIM, IBM, CNR, Charles Schwab and various federal government departments.

High quality students completing a master's in HCI may also be qualified to pursue a PhD in their respective fields of study.

## FALL APPLICATION DEADLINE

**March 1**, to be eligible for funding

## ADMISSION REQUIREMENTS

**MA:** An honours undergraduate degree, or equivalent, in arts, social sciences, business or related areas with at least a B+ average.

**MASc:** An honours undergraduate degree in engineering, architecture,



design or related areas with at least a B+ average.

**MCS:** An honours undergraduate degree in computer science with at least a B+ average.

Applicants with a background in cognitive science will be considered for whichever of the three programs is appropriate to their academic background. Applicants may be asked to complete additional coursework in addition to the program requirements. All applications will be considered by the HCI Graduate Committee.

## CONTACT INFO

613-520-2600 x8751  
hci@carleton.ca

[carleton.ca/hci](http://carleton.ca/hci)



# GRADUATE PROGRAMS IN INFORMATION TECHNOLOGY

Carleton's master's and PhD degrees in Information Technology provide students with the skills they will need to succeed in what has become an ever-evolving industry.

The master's degree consists of two programs: Network Technology (NET) and Digital Media (DM). Those pursuing the NET program will cover the design, management and operation of computer networks. The NET program offers a research-based option, where students will produce a research thesis, or a project-based option, where students will develop skills mainly through courses and a project framework. DM students will focus on areas dealing with the development of content and technology for areas such as entertainment, education and communication. The DM program is research-based and students will produce a thesis as a requirement of the program. DM students can also pursue a specialization in Data Science.

The PhD program focuses on advanced interdisciplinary research in Information Technology and related applications and topics.

## DEGREES OFFERED

MIT (Digital Media, Network Technology), PhD

## RESEARCH & CAREER OPTIONS

Research opportunities in the school have direct application to the industry and can lead to many fascinating careers in areas such as:

**DIGITAL MEDIA:** Media production (movies and commercials), new educational technologies, the gaming industry, natural human-computer interaction methods, digital media for healthcare, and exhibitions for national museums and government or organizations requiring digital media content and technologies.

**NETWORK TECHNOLOGY:** Network security and privacy, cellular mobile networks, cloud computing, the Internet of Things and Apple iPhone networking subsystems.

## FALL APPLICATION DEADLINE

**March 1**, to be eligible for funding

## ADMISSION REQUIREMENTS

**NETWORKING (MASTER'S):** An undergraduate degree in network technology, electrical engineering, computer science, engineering, or a closely-related discipline.

**DIGITAL MEDIA (MASTER'S):** An undergraduate degree in one of the related three primary

disciplines of Technology (e.g. computer science/engineering and information technology), Content (e.g. design, arts and humanities), and People (e.g. psychology, communication and business). Intermediate undergraduate-level computer programming skills are required as proper technical background. Applicants who have gained these skills through relevant professional experience will also be considered but may be required to take additional courses (stipulated on a case-by-case basis).

**PhD:** A master's degree in one of the three related disciplines (Technology, Content, and People). Applicants not holding a master's degree in a related discipline will also be considered, but all applicants will be required to demonstrate that they have some general technology (digital media) background, as well as the ability to work in multi-disciplinary groups.

**ALL PROGRAMS:** An average of B or higher is expected for admission to the master's and PhD programs.



## GRADUATE PROGRAMS IN

# INFRASTRUCTURE PROTECTION AND INTERNATIONAL SECURITY

### Ottawa offers strategic resources and facilities for our IPIS students.

Our Infrastructure Protection and International Security (IPIS) programs combine the unique resources of The Faculty of Engineering and Design and the Norman Paterson School of International Affairs. IPIS students are trained to understand critical infrastructure systems and their interconnections and to assess risks from natural and human hazards.

Graduates are prepared for working in multidisciplinary teams to develop

and evaluate cost-effective and socially responsible strategies for improving the resilience of critical infrastructure systems using both engineering design and policy alternatives and to assess options for the management and recovery of critical infrastructure assets.

The MIPIS and MEng (IPIS) programs offer a **co-op option** for eligible students, which can provide invaluable professional experience and bridging opportunities.

We also offer two graduate diplomas in this area – one is for professionals and another is for students who are currently enrolled in graduate programs at Carleton.

### DEGREES OFFERED

MIPIS, MEng, Graduate Diplomas

### CAREER OPTIONS

Graduates are prepared for careers in government agencies and departments. They are also equipped for strategic opportunities within Canada's private sector in fields such as engineering, energy, information technology, telecommunications and transportation.

### APPLICATION DEADLINE

Applications received before **January 31** will be reviewed and considered for admission and funding. Applications received after January 31 will only be considered if space still remains.

### ADMISSION REQUIREMENTS

**MIPIS:** A four-year bachelor's degree (or equivalent) with an overall average of B+ or higher.

**MEng (IPIS):** A bachelor of engineering with an overall average of B+ or higher.

#### GRADUATE DIPLOMAS:

A bachelor's degree (or equivalent) with a minimum average of B+. Applicants who do not meet these requirements but who have significant academic or professional qualifications and experience may also be considered.



### CONTACT INFO

613-520-2600 x6651  
ipis@carleton.ca

[carleton.ca/ipis](http://carleton.ca/ipis)



# MECHANICAL AND AEROSPACE ENGINEERING



All of our graduate programs in mechanical and aerospace engineering are offered through the Ottawa-Carleton Institute for Mechanical and Aerospace Engineering (OCIMAE), which combines the research strengths and resources of Carleton University and the University of Ottawa.

Our researchers are leaders in advancing aerodynamics; vehicle dynamics and simulation technologies; biomedical engineering and design of devices, health monitoring and management systems; design optimization of advanced materials and structures; convective heat transfer characteristics in super critical fluids with application to nuclear-reactor cooling; robotics; navigation; combustion; and the

development of sustainable energy sources. Our graduate students are an essential part of our research enterprise.

We offer a thesis program (MASc) which typically takes two years to complete and coursework or project options (MEng) which can be completed in one year, as well as a PhD degree.

## DEGREES OFFERED

MASc, MEng, PhD

## CAREER OPTIONS

Our research benefits from strong relationships with external research centres locally and globally. These strong relationships offer our students diverse research and career opportunities.

Research collaborations and funding arrangements exist with several institutes of the National Research Council Canada, Environment Canada, Natural Resources Canada, National Defence, the Ottawa Hospital and the Canadian Space Agency. Major industry partners include Pratt & Whitney Canada Inc., United Technologies, Siemens Corp., Deloro-Stellite, Indal Technologies, Liburdi Engineering, Magellan Aerospace, Augusta SpA., Atomic Energy of Canada Ltd., Rolls-Royce Canada and the Petroleum Technology Alliance of Canada, among many others.

## FALL APPLICATION DEADLINE

Applications may be submitted at any time. However, for fall admission, the deadline is **August 31**, to be considered for admission and funding if space and funds remain. We also offer summer and winter admissions to the MASc and PhD programs, as well as winter admission to the MEng program.

## ADMISSION REQUIREMENTS

**MASTER'S:** A bachelor's degree with at least a B+ in mechanical or aerospace engineering or a related discipline; B- or higher overall.

**PhD:** A master's degree in mechanical or aerospace engineering or a related discipline.



Flaring — the burning off of a flammable gas — is standard procedure at tens of thousands of oil and gas sites around the world. Yet, according to Prof. Matthew Johnson, Director of the Energy and Emissions Research Lab, we can't accurately predict the emissions released by flaring, nor do we have accurate techniques to measure flare emissions in the field. This lack of knowledge is a major obstacle in the effort to efficient operations, better regulations, and a cleaner environment. Johnson is leading the NSERC FlareNet strategic network, a national collaboration that focuses on flare emissions from unconventional oil and gas processing.



## GRADUATE PROGRAMS IN

# SUSTAINABLE ENERGY ENGINEERING AND POLICY

Sustainable energy is critical to Canada's economic future.

Carleton University has well established strengths in the sustainable energy field in regards to both engineering and policy. Our master's program in sustainable energy addresses crucial challenges related to sustainable energy production and use in a unique interdisciplinary fashion that involves both engineering and public policy.

The program involves learning across two distinct disciplines, with students specializing in either engineering or public policy before graduating with either an engineering degree (MAsc or MEng in Sustainable Energy) or a public policy degree (MA in Sustainable Energy). Once a specialization is chosen, students take courses that engage with the program's disciplinary component: public policy for those specializing in sustainable energy engineering; and engineering for those specializing in sustainable energy policy.

The MA degree advances the understanding of what constitutes sustainable energy policy, how sustainable energy policy is developed and implemented and what challenges and barriers it faces. A **co-op option** is available in the MA program. Both the MAsc and MEng degrees in Mechanical Energy Conversion provide broad, in-depth exposure to the design, development, implementation and improvement of energy conversion

methods and systems. The MAsc and MEng degrees in Efficient Electrical Energy Systems focus on the design, optimization and realization of electricity distribution systems.

## DEGREES OFFERED

MA, MAsc, MEng

## CAREER OPTIONS

The program prepares students for career opportunities related to sustainable energy in government, business, and the civil society sector, and/or to serve as a foundation for further graduate education at the doctoral level.

## FALL APPLICATION DEADLINE

**February 1** (MA); **April 1** (International MAsc and MEng applicants); **August 15** (Domestic MAsc and MEng applicants).

## ADMISSION REQUIREMENTS

**MAsc and MEng:** A bachelor's degree, or equivalent, in a discipline relevant to engineering disciplinary foundations. Typically, an average of B+ or higher is required for admission.

**MA:** A bachelor's degree, or equivalent, with at least a B+ average. Students are accepted from a wide variety of backgrounds in the social



sciences, humanities, sciences and engineering. Mid-career applicants who do not have a bachelor's degree, but who have demonstrated professional excellence over a number of years in the public sector will also be considered.

Applicants must have completed a university course in micro- and macroeconomic theory and at least a second-year political science course dealing with institutions and processes by which governments legitimize and exercise power, ideally in a Canadian setting. A working knowledge of algebra is also expected. In some cases, applicants may be admitted to the program without having completed one of the prerequisite courses in economics or political science on the condition that the course be completed with a grade of B- or higher in the first year of the program. However, it is strongly recommended that students complete the prerequisites before starting the program to ensure that their progress through the core courses is unimpeded.

“The Sustainable Energy program has given me both knowledge and practical experience.”

— Sarah Gibb, MA/12

## CONTACT INFO

MAsc, MEng:

613-520-2600 x6009

MA: 613-520-2600 x2548

sustainableenergy@carleton.ca

# TECHNOLOGY INNOVATION MANAGEMENT

The Technology Innovation Management (TIM) program, a joint initiative of the Sprott School of Business and the Faculty of Engineering and Design, offers three different degrees in Technology Innovation Management.

- The Master of Applied Science (MAsc) degree is thesis-based — students undertake original research under the supervision of an experienced faculty member.
- The Master of Engineering (MEng) degree is project-based — students employ applied research to solve a client problem.
- The Master of Entrepreneurship (MEnt) degree is also project-based — students employ applied research to improve the health of the business ecosystems that deliver specialized services to founders of new companies or new lines of business at existing companies.

All of our students undertake the majority of their coursework in an informal face-to-face university setting. Occasional group study sessions and lectures use our **BigBlueButton** conferencing system. All TIM courses take place in the evening, making the TIM program ideal for busy people.

At Carleton, we actively practise entrepreneurship with the TIM program serving as an important component of Carleton's entrepreneurial focus. We offer several opportunities for advanced learning, including **internships** with other TIM-based businesses, involvement with Carleton-based projects that build new platforms and systems, and in-depth access to the flagship TIM Review online journal ([timreview.ca](http://timreview.ca)) and TIM Lecture Series.

We also provide our students and graduates with access to unique resources in Canada's capital

region including Lead To Win ([leadtowin.ca](http://leadtowin.ca)), ranked by UBI Global as one of the top 10 university business incubators in North America, the Carleton-led Accelerator for student entrepreneurs and the VENUS Cybersecurity Corporation ([venuscyber.com](http://venuscyber.com)).

## DEGREES OFFERED

MAsc, MEng, MEnt

## CAREER OPTIONS

More than one third of our graduates leave with both a degree and a brand new technology company. Our graduates are also equipped to follow career paths in a variety of business settings.

## FALL APPLICATION DEADLINE

**March 1**, to be eligible for funding. Applicants may apply for the fall or winter terms.

## ADMISSION REQUIREMENTS

A bachelor's degree in engineering, business, or science, with at least a B+ average. Candidates are typically required to have two years of technical work experience prior to admission. Candidates applying for admission with degrees in other areas will also be considered by the admissions committee that is responsible for establishing criteria for degree equivalencies.



### CONTACT INFO

613-520-2600 x8659  
[timprogram@carleton.ca](mailto:timprogram@carleton.ca)

[timprogram.ca](http://timprogram.ca)



# RESEARCH

Graduate students at Carleton work alongside faculty, and industry, government and other community leaders who are recognized for their research excellence.



Information Technology master's student Daniella Briotto Faustino placed second in the Ontario Three Minute Thesis competition talking about her research on bend passwords on flexible devices for people with vision impairment. Civil Engineering master's student Brandon Robinson placed second in NSERC's Science Action competition. Approaching his research project from an interdisciplinary perspective, he seeks to improve the safe operation of structures under wind loads through better-informed decision-making, using computer models, streaming sensor data and statistical algorithms.

## CONTACT INFO

To find out about other graduate student research at Carleton University, go to [gradstudents.carleton.ca/grad-research](https://gradstudents.carleton.ca/grad-research)

For more information about faculty research at Carleton, go to [research.carleton.ca](https://research.carleton.ca)

# APPLY NOW FOR GRADUATE STUDIES AT CARLETON!

Carleton offers more than 100 graduate programs, pathways and initiatives. In the Faculty of Engineering and Design, we offer the following degrees:

- Master of Applied Science (MASc)
- Master of Architecture (MArch)
- Master of Architectural Studies (MAS)
- Master of Design (MDes)
- Master of Engineering (MEng)
- Master of Entrepreneurship (MEnt)
- Master of Information Technology (MIT)
- Master of Infrastructure Protection and International Security (MIPIS)
- Graduate Diplomas
- Collaborative Specializations
- PhD

## FEES AND FINANCIAL ASSISTANCE

Tuition fees are based on your program, your status as a full- or part-time student and your status as a domestic or international student. Fees are paid to the Student Accounts Receivable department after you have been admitted to Carleton and have registered for classes. For more information visit: [carleton.ca/fees](http://carleton.ca/fees)

## CONNECTIONS

Sign up for our free newsletter for prospective grad students. [graduate.carleton.ca/newsletter](http://graduate.carleton.ca/newsletter)

Generous funding is available in the form of teaching assistantships, research assistantships, and/or scholarships based on academic excellence. Applicants who apply after the stated deadline may be considered for admission and funding, if funding is still available.

You may also qualify for awards from various donor-funded scholarships provided by Carleton's generous alumni and sponsors.

You should also consider applying for an external financial award.

More information on financial assistance is available at: [graduate.carleton.ca/financial-assistance](http://graduate.carleton.ca/financial-assistance)

## DEADLINES

Deadlines for applications vary according to the program. Some programs have several deadlines depending on their intake process. Deadlines for the fall term normally occur between December and March, to be guaranteed consideration for admission and funding.

## ADMISSION REQUIREMENTS

While each program has its own minimum requirements, our master's programs typically require a four-year honours bachelor's degree, with a B+ or higher in your major subjects and B- or higher overall. Our PhD programs typically require a master's degree, with a B+ or higher in your courses (including your thesis) and no grade below a B. Please note that meeting the minimum requirements does not guarantee admission into a graduate program.



## ADMISSION PROCESS

In addition to meeting the grade and prerequisite requirements of the program in which you are interested, you will need to submit several required documents with your application. Typically, these include a copy of transcripts from all of the post-secondary institutions you have attended, a Statement of Intent, emails for two or more references (typically academic) and, if applicable, a copy of your English-language test results. Only after you are accepted into one of our programs will you be required to submit official copies of your transcripts and test scores (if applicable). International students who have received an Offer of Admission are required to submit a Course-by-Course evaluation (WES ICAP) from World Education Services. [graduate.carleton.ca/apply-online](http://graduate.carleton.ca/apply-online)

## GRADUATE CALENDAR

For more information about general regulations for Carleton's graduate school, go to: [calendar.carleton.ca/grad/gradregulations](http://calendar.carleton.ca/grad/gradregulations)

[graduate.studies@carleton.ca](mailto:graduate.studies@carleton.ca)



# WITH OVER 100 GRADUATE PROGRAMS, YOU'LL FIND YOURS AT CARLETON

## MASTER'S

### Master of Accounting (MAcc)

### Master of Applied Science (MASc)

- Aerospace Engineering\*
- Biomedical Engineering\*
- Civil Engineering\*
- Electrical and Computer Engineering\*
- Environmental Engineering\*
- Human-Computer Interaction
- Mechanical Engineering\*
- Sustainable Energy Engineering and Policy
- Technology Innovation Management

### Master of Architecture (MArch)

### Master of Architectural Studies (MAS)

### Master of Arts (MA)

- Anthropology
- Applied Linguistics and Discourse Studies
- Art History
- Canadian Studies
- Communication
- Economics
- English
- European, Russian and Eurasian Studies\*
- Film Studies
- Geography
- History
- Human-Computer Interaction
- International Affairs†
- International Affairs/Juris Doctor\*\*
- Legal Studies
- Music and Culture
- Northern Studies
- Philosophy
- Political Economy
- Political Science†
- Psychology
- Public History
- Religion and Public Life
- Sociology†
- Sustainable Energy†
- Women's and Gender Studies

### Master of Business Administration (MBA)

### Master of Business Administration (MBA) in Shanghai

### Master of Cognitive Science (M.Cog.Sc.)

### Master of Computer Science (MCS)\*\*

- Computer Science
- Human-Computer Interaction

### Master of Design (MDes)

### Master of Entrepreneurship in Technology Innovation Management

### Master of Engineering (MEng)

- Aerospace Engineering\*
- Biomedical Engineering\*
- Civil Engineering\*
- Electrical and Computer Engineering\*
- Environmental Engineering\*
- Infrastructure Protection and International Security†
- Mechanical Engineering\*
- Sustainable Energy Engineering and Policy
- Technology Innovation Management

### Master of Information Technology

- Network Technology
- Digital Media

### Master of Infrastructure Protection and International Security (MIPIS)†

### Master of Journalism (MJJ)

### Master of Philanthropy and Nonprofit Leadership (MPNL)

### Master of Political Management (MPM)

### Master of Public Policy and Administration (MPPA)†

### Master of Science (MSc)

- Biology\*
- Chemistry\*
- Earth Sciences\*
- Geography (Physical Geography)
- Health Sciences
- Health: Science, Technology and Policy
- Management
- Mathematics and Statistics\*
- Neuroscience
- Northern Studies
- Physics\*

### Master of Social Work (MSW)

## COLLABORATIVE SPECIALIZATIONS

- African Studies (Master's)
- Biochemistry (Master's and PhD)
- Bioinformatics (Master's)
- Biostatistics (Master's)
- Chemical and Environmental Toxicology (Master's, PhD)
- Data Science (Master's)
- Digital Humanities (Master's)
- Political Economy (PhD)

## DOCTOR OF PHILOSOPHY (PHD)

- Aerospace Engineering\*
- Anthropology
- Applied Linguistics and Discourse Studies
- Architecture
- Biology\*
- Biomedical Engineering\*
- Canadian Studies\*\*\*
- Chemistry\*
- Civil Engineering\*
- Cognitive Science
- Communication
- Computer Science\*
- Cultural Mediations
- Earth Sciences\*
- Economics\*
- Electrical and Computer Engineering\*
- English
- Environmental Engineering\*
- Ethics and Public Affairs
- Geography
- Health Sciences
- History
- Information Technology
- International Affairs
- Legal Studies
- Management
- Mathematics and Statistics\*
- Mechanical Engineering\*
- Neuroscience
- Physics\*
- Political Science
- Psychology
- Public Policy
- Social Work
- Sociology

## GRADUATE DIPLOMAS

- Architectural Conservation
- Curatorial Studies
- Ethics and Public Affairs
- European Integration Studies
- Health: Science, Technology and Policy
- Indigenous Policy and Administration
- Infrastructure Protection and International Security (IPIS)
- Northern Studies
- Philanthropy and Nonprofit Leadership
- Public Policy and Program Evaluation (online)

† Co-operative education available

\* Joint program between Carleton University and the University of Ottawa

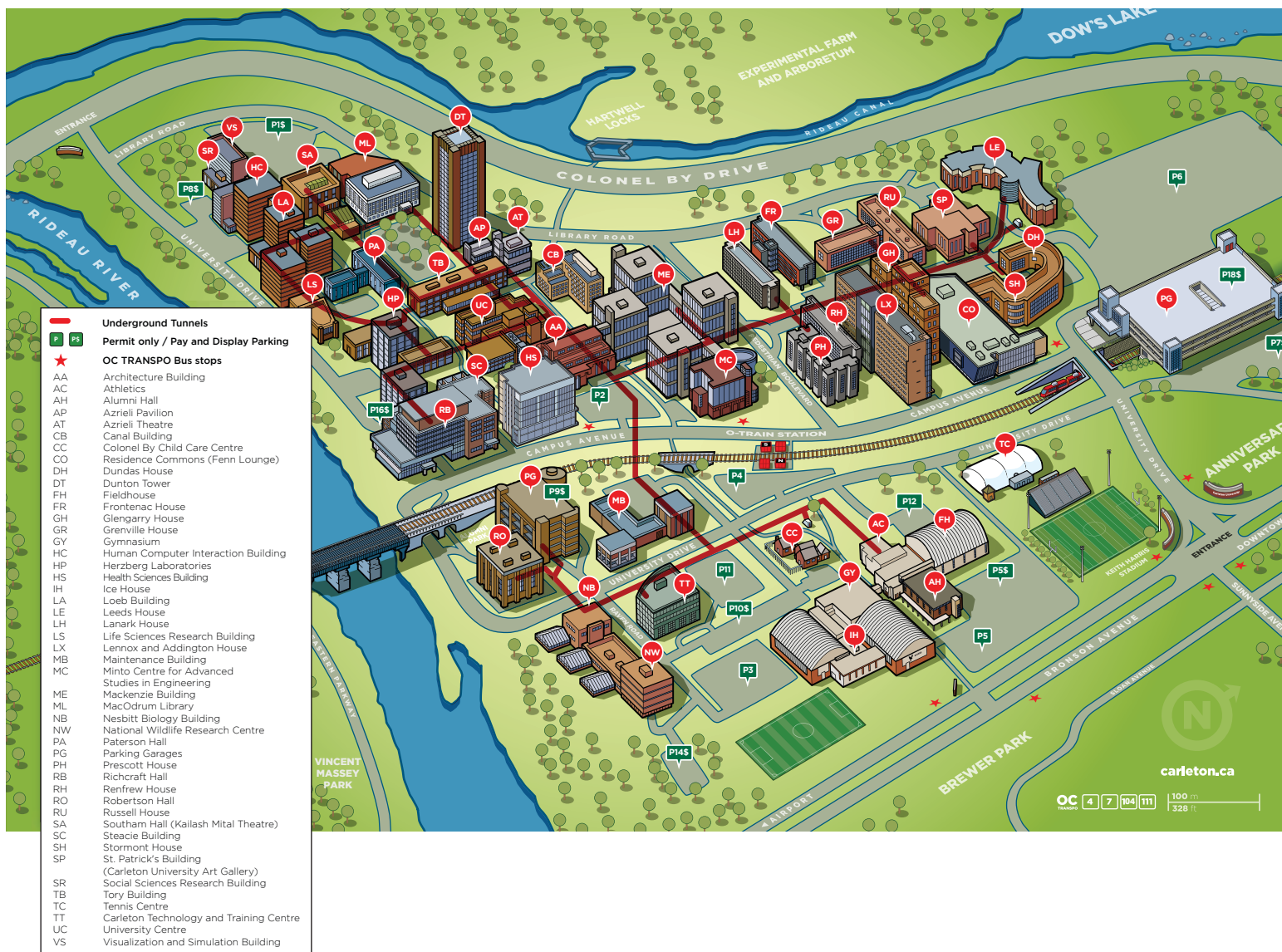
\*\* Program requires application and registration at both Carleton University and the University of Ottawa

\*\*\* Joint program between Carleton University and Trent University



**Carleton**  
UNIVERSITY

Faculty of  
**Graduate and  
Postdoctoral Affairs**



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This document is available in a variety of accessible formats upon request. A request can be made on the Carleton University website at: [carleton.ca/accessibility/request](https://carleton.ca/accessibility/request).

Cover Photo: Several graduate students have been involved in the creation of Carleton's Urbandale Centre for Home Energy Research, a specially-designed solar-powered house which acts as a test bed for innovative concepts that challenge the traditional way houses are designed and built, focusing largely on seasonal thermal storage.

## CONTACT INFO

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