McMaster University | ENGINEERING

McMaster Engineering
Graduate Programs
2021

BRIGHTER WORLD

eng.mcmaster.ca/graduate

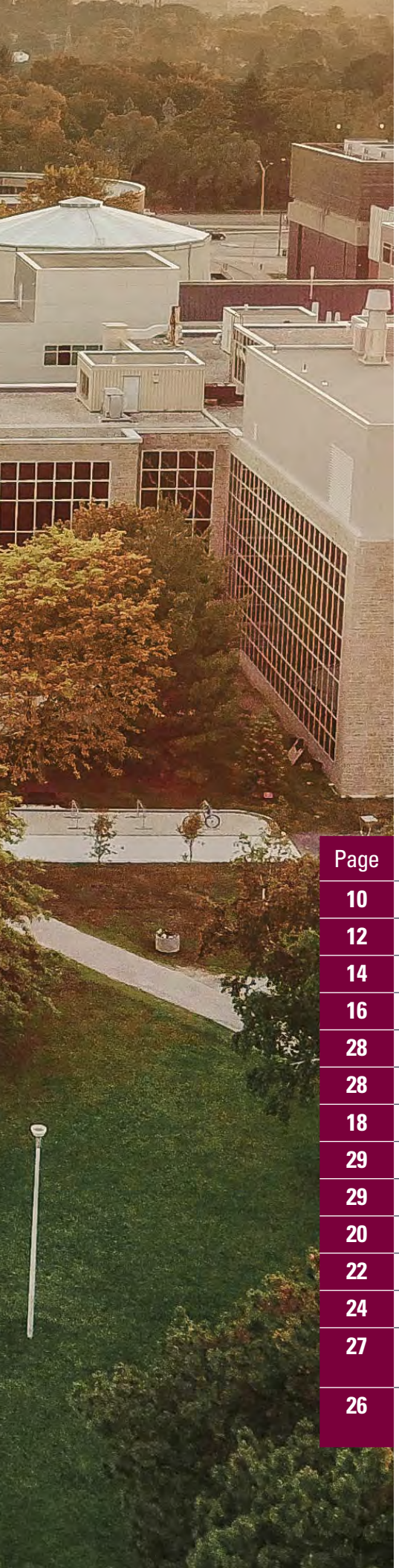
Ranked as one of the world's top engineering schools, the Faculty of Engineering plays a significant role in helping McMaster University earn its reputation as one of Canada's most innovative universities.

Our focus on experiential, problem-based learning and our interdisciplinary approach to collaboration results in smarter insights, groundbreaking ideas, and greater optimism. This approach is helping us create a brighter world.

#1
MOST RESEARCH INTENSIVE
University in Canada

#2
IN THE WORLD FOR GLOBAL IMPACT
Times Higher Education Impact ranking

$41.8M
in external research funding awarded to engineering students



"McMaster Engineering is ranked among the top programs in the world. We foster a love of learning and sense of personal dedication to excellence within a broader societal context of engineering. Our students are motivated and inspired to become engaged citizen scholars who will transform the world."

Ishwar K. Puri
Dean, Faculty of Engineering

"At McMaster Engineering, we value our strong sense of community that bring together graduate students and professors to find solutions to many pressing global challenges."

Michael Thompson
Associate Dean, Graduate Studies
Faculty of Engineering

Page	PROGRAM LIST	M.Eng.	M.A.Sc./M.Sc.	Ph.D.
10	Chemical Engineering		●	●
12	Civil Engineering	●	●	●
14	Computing & Software	●	●	●
16	Electrical & Computer Engineering	●	●	●
28	Engineering Design	●		
28	Entrepreneurship & Innovation	●		
18	Engineering Physics	●	●	●
29	Engineering Public Policy	●		
29	Manufacturing Engineering	●		
20	Materials Science & Engineering		●	●
22	Mechanical Engineering		●	●
24	School of Biomedical Engineering		●	●
27	Master of Engineering in Systems &Technology	●		
26	W Booth School of Engineering Practice & Technology	●		

McMaster teaching method

McMaster wins Global Teaching Excellence Award

McMaster has won the prestigious Global Teaching Excellence Award based on the strength of its experiential learning opportunities, a commitment to global engagement and the work of the Paul R. MacPherson Institute for Leadership, Innovation and Excellence in Teaching.

Award-Winning Faculty

McMaster is dedicated to teaching, learning and service. In the 1960s, we pioneered the "problem-based" approach to learning that came to be known around the world as "the McMaster model". Through this active, problem based learning style students become proactive thinkers with excellent critical thinking, problem solving and self-directed learning skills.

"I work for my students. They don't work for us," says Emadi. "We have a really good support system and we help one another create new knowledge every day. Together, we apply practical, multi-disciplinary research."

Emadi and his research group have successfully transferred their research to industry with several corporate-sponsored projects including, The Leadership in Automotive Powertrain (LEAP) project. Sponsored by Fiat Chrysler Automobiles (FCA) and NSERC Automotive Partnership Canada, more than 100 researchers are working closely with engineers and managers at FCA to build more environmentally friendly electrified vehicles.

Ali Emadi, Professor
Canada Research Chair in Transportation Electrification and
Smart Mobility and NSERC Industrial Research Chair in Electrified Powertrains

World-Class Facilities

The Faculty of Engineering is home to 20 major research centres and institutes that house world-class equipment, which are operated by leading experts in their fields. Our students are trained in these facilities, which enables them to enter the workforce with expertise in the latest technologies. In keeping with our collaborative approach, our facilities are also used by faculty members across the University, by government, and the private sector. Our researchers and students also have access to other research centres and institutes across the University, such as the Nuclear Reactor, Brockhouse Institute for Materials Research, and the Brain-Body Institute.

Fostering Engineering Innovation

The Government of Canada and the Province of Ontario invested $43M, the single largest government investment in laboratories and research capacity expansion in McMaster's history. The funding is part of a massive $75M project that supported the renovation and retrofit of existing labs in the Arthur Bourns Building, and the construction of a new innovation tower.

37
universities from around the world, as well as industry, perform research in CCEM

The Canadian Centre for Electron Microscopy (CCEM) provides world-class electron microscopy capabilities for materials physics, nanomedicine and metallurgy research.

McMaster Engineering's Graduate Co-op

McMaster Engineering graduate students pursue specialized knowledge, collaborate with industry and research organizations on real-world projects, and gain access to expertise, funding and state-of-the art facilities.

All graduate students participate in professional planning sessions to develop career plans which are followed up on by their faculty advisors, with the option of receiving mentoring from industry partners.

Co-op

Co-op will enable students to establish a network of industry contacts, and develop a range of valuable skills, which will aid them in their graduate studies and future careers. A term of work experience is a great addition to students' master's or doctoral studies. Students benefit by gaining valuable industry experience with leading engineering employers. Employers benefit by having access to a highly qualified talent pool of graduate students eager to put theory into practice.

Research & Co-op

Participating in the co-op option can be a great way to integrate the knowledge students have gained in the lab and apply it in an industrial setting. Alternatively, knowledge acquired while on a co-op work term can inform and enhance a student's research.

Industrial PhD

Earn a Ph.D. while continuing to work full-time

Strategic benefits for companies and research institutes

Applicants must hold a research-based Masters degree in a STEM discipline

"Co-op experience is important because it's a foot in the door within a company. The company may want to hire you afterwards – they wanted to hire me. It's hard, especially in today's market to get a job after graduation. Everyone is always struggling and you can see it in their faces. Having co-op experience makes you much more competitive."

Mike Chatzidakis
Second Year Masters Student
Materials Science & Engineering

600+
local and international partner employers

Employment rate
(within two years)
93%

Career Services

Workshops

Career and professional development workshops are held throughout the year on a variety of topics. Past workshops have included:

- Cover Letter & Resume Writing
- Effective Job Search Strategies
- Creating and Using LinkedIn in a Job Search
- Interview Preparation (including mock interviews with industry)
- How to Negotiate a Job Offer

Industry often participate and/or lead these workshops giving students an opportunity to network with employers.

Coaching

Our Career Development and Relationship Manager establishes strong relationships with top engineering employers, facilitates connections between students and employers, provides career-planning tools and resources, and provides opportunities for graduate students to gain industry experience while pursuing their degrees. Co-op eligibility is dependent on permission from the student's research supervisor.

METRIC

The Engineering Graduate Society (EGS) plans an annual conference which provides an opportunity for graduate students, postdocs, professors and industrial alumni in different engineering fields to engage, share ideas, develop collaboration strategies and share information about resources. Students participate as an attendee, presenter or showcase their research.

Professional Skills Development Portal

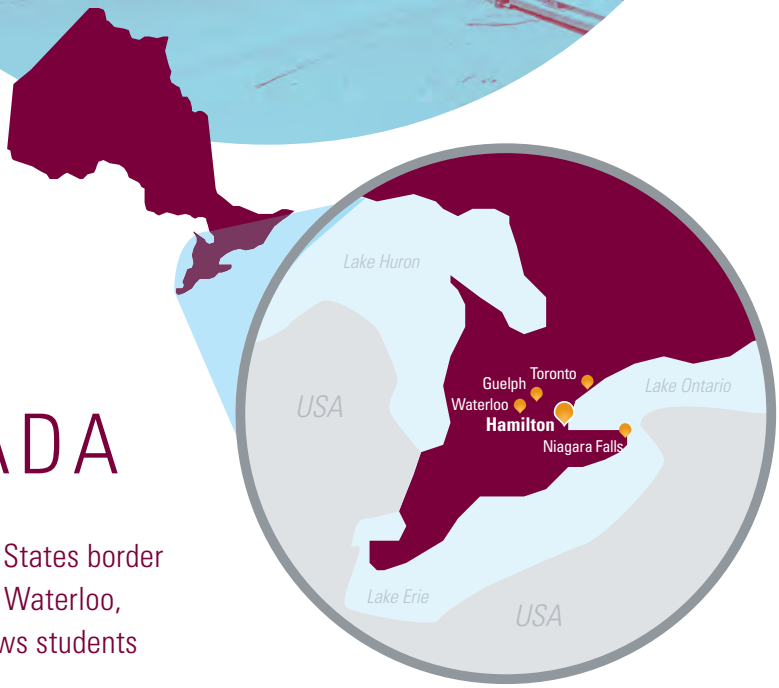
McMaster Engineering graduate students access both online and in-class professional development and career modules that educate them about the job market, facilitate students' readiness to enter these arenas post-graduation, and give them access to Masters/PhD specific job opportunities and events.

"James Street North is percolating with a vibrant art scene, inventive farm-to-table restaurants, edgy start-ups and cool shops."

~ The New York Times (2017)

Hamilton

ONTARIO, CANADA



We are less than an hour's drive from the United States border and only 45 minutes from Toronto, Niagara Falls, Waterloo, and Guelph. An on-campus GO Bus Terminal allows students to commute easily from the Greater Toronto Area.

Hamilton is home to more than 100 waterfalls.

FOOD

From restaurants ranked among the best in Canada to a vibrant food-truck scene, Hamilton's appetite for all things delicious knows no limits. International eateries, unique culinary events, and a growing craft beer scene completes the picture.

MUSIC

No matter your musical taste, Hamilton delivers from local clubs hosting hot bands to classical orchestras.

NATURE

Natural beauty abounds throughout the city, including McMaster University's own backyard, which abuts the Royal Botanical Gardens and includes several hiking trails.

CULTURE

The arts scene is booming in Hamilton from local art galleries and studios to the monthly James Street North Art Crawl and annual Supercrawl event, which attracts thousands of visitors each year.

HISTORY & HERITAGE

Distinctive architecture, world-class museums and 15 National Historic Sites offer a glimpse into the city's past and make Hamilton the fascinating community it is today.

SPORTS

Whether you love to bike, hike, or play organized sports, Hamilton has got it all. The city is also home to the CFL's Hamilton Tiger-Cats and other sports teams.

A 10-minute walk from campus, Westdale Village is the hub for student off campus living.

"I really like the opportunity to be working on something new and be very independent. If there's one specific area that I'm finding really interesting, there's the option to focus more on that or start a side project, so it's very based on what I find interesting as a researcher."

Oriana Vanderfleet
PhD candidate, Chemical Engineering

Chemical Engineering

Degrees Offered: MASc, PhD
Entry Dates: September, January, May
Admission Requirements: see page 31
Study Options: Full- or part-time for PhD degree.

McMaster houses one of the most distinguished and research-intensive chemical engineering departments in Canada. Four of the 20 chemical engineers selected by the Canadian Society for Chemical Engineering for making the greatest contributions to chemical engineering in Canada in the 20th century were professors at McMaster's Faculty of Engineering.

McMaster is engaged in leading edge chemical engineering research and has concentrated research groups that collaborate with international industrial sponsors including:

- Centre for Advanced Ophthalmic Materials (Insight)
- Centre for Advanced Polymer Processing & Design (CAPPA-D)
- Centre for Pulp and Paper Research
- Interfacial Technologies Group
- McMaster Advanced Control Consortium

Areas of Research

BIOMATERIALS AND BIOPROCESSING

Drug delivery, tissue engineering, biocompatible surfaces, bioseparations, membranes, bioreactors, pharmaceutical processing

POLYMER SCIENCE AND ENGINEERING

Polymer synthesis and characterization, polymer reaction engineering, polymer and particulate processing, paper chemistry, nanotechnology, interfacial engineering

PROCESS SYSTEMS ENGINEERING AND CONTROL

Process systems design, process control, optimization, supply chain planning and scheduling, process fault detection and recovery

MATERIALS AND PROCESS MODELING AND COMPUTATION

Molecular modeling, computational fluid dynamics, energy systems, alternative fuels/energy, wastewater treatment, life cycle analysis

"My students have energy, enthusiasm and they're hungry. They want things to happen."

Heather Sheardown has spent her career developing ocular health technologies and related drugs that will improve the quality of life for millions of people living with ocular conditions and vision loss. She says her research outcomes would not be possible without the contributions from her students. "My students have energy, enthusiasm and they're hungry. They want things to happen."

Heather Sheardown
Canada Research Chair in Ophthalmic Biomaterials and Drug Delivery Systems
Professor, Chemical Engineering

"I want to create job-ready employees for future jobs, not just for jobs that are available now."

Flash floods. Blackouts. Data breaches. How can society better respond to disasters? Wael El-Dakhakhni is currently working on tools that will help a wide range of stakeholders anticipate, and even prevent disasters from happening. He inspires his students to have similar engineering ambitions by helping them link their education to real societal challenges and by encouraging them to develop their interpersonal skills.

Wael El-Dakhakhni
Director, McMaster Institute for Multi-hazard Systemic Risk Studies (INTERFACE)
Professor, Civil Engineering

Civil Engineering

Degrees Offered: MEng, MASc, PhD
Entry Dates: September, January
Admission Requirements: see page 31
Study Options: Full- or part-time for all degrees offered

Ranked as one of the top three civil engineering programs in Canada and top 30 worldwide, we are a vibrant multi-disciplinary research-intensive department focused on building healthier communities to create a brighter world. Our strong linkages with industry are evident by our six research chairs and strong record of successful application-based research funding. Our laboratory facilities allow us to conduct world-class research supported by multiple research centres, networks and institutes.

McMaster is engaged in leading edge research in the field of civil engineering and has concentrated research groups that collaborate with international industrial sponsors including:

- Centre for Effective Design of Structures
- McMaster Interface Institute
- McMaster Institute for Transportation and Logistics
- McMaster Water Network

Areas of Research

RESILIENT INFRASTRUCTURE SYSTEMS

Extreme natural and man-made hazards, risk assessment and performance/resilience based design, large-scale testing and hybrid simulation, multi-hazard hazard simulation and mitigation

SMARTER MOBILITY

Connected and autonomous vehicles; smart cities; cyber-physical systems for transportation; transit design, operation, and management; transportation safety; transportation data analytics

WATER SECURITY AND CLIMATE CHANGE

Flood simulation, prediction and risk under climate change, fate and transport of pathogens and heavy metals in ground water systems and impact on the environment and human health, flow of contaminated water in fractured rock systems, systemic risk of fracking on ground water aquifers

INTELLIGENT ENERGY SYSTEMS

Power grid simulation and optimization, building energy consumption and automation, systemic risk posed by and on energy networks, energy linkage to water systems, renewable energy; energy production resilience and sustainability under climate change

"The people here are just as nice as at home and I really appreciated that because it was my first time really picking up and moving really far from home. I felt very welcomed by all the students and staff."

Bryanna Noade
MASc candidate, Civil Engineering

"It was an "aha" moment. I can use all my passions and leverage them when I program. I can make programs and different applications in software for any number of domains."

Monika Jaskolka
PhD candidate, Software Engineering

Computing & Software

Degrees offered: MEng, MSc, MASc, PhD
Entry Dates: September
Admission Requirements: see page 31
Study Options: Full- or part-time for all degrees offered

McMaster's Department of Computing and Software advances the field of computing through education and research. We focus on computing research problems that involve scientific theory, engineering practice, and the interface between the two. We seek to address society's need for better methods of developing information systems and dependable, safe, secure, high-quality software.

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Areas of Research

COMPUTER SYSTEMS

Operating systems, systems architecture and hardware, data storage and management systems, distributed systems, and computer networks.

HEALTH INFORMATICS AND BIOINFORMATICS

Information technology, health care delivery, biomedicine, biological processes, medical software and devices.

SCIENTIFIC COMPUTING AND OPTIMIZATION

Quantitative modelling and analysis, optimal allocations of resources, scheduling tasks and designing prototypes.

SECURITY, PRIVACY, AND DATA ANALYTICS

Crytographic algorithms and protocols, data cleaning and curation solutions, privacy governance and preserving tools, and anomaly detection techniques.

SOFTWARE QUALITY

Multicore concurrency; Software Engineering approaches to Scientific Computation; Domain Specific Languages; Generative Programming specifically; and Model-Driven Engineering of Cyber-Physical Systems in general; and the Development and Certification of Safety-Critical Systems.

THEORY AND METHODOLOGIES OF COMPUTATION

Theoretical computer science, foundations of software engineering, applications to knowledge representation and synthesis of software from mathematical specifications.

"Making connections with industry gives students the opportunity to address industry challenges now."

Fei Chiang is building software tools to automate and improve data quality so that users can spend more time and resources on data analysis and decision-making. Chiang and her research group work with prominent industry partners such as IBM to improve their data quality. "Making connections with industry gives students the opportunity to address industry challenges now."

Fei Chiang
Assistant Professor, Computing and Software

“There has to be a mentor who students can look up to – someone to meet with weekly, to show the little tricks of the profession. Someone who will lean over the equipment to show how it works.”

Natalia Nikolova believes in the power of mentorship. To help her students succeed, she makes sure to devote as much time as possible to each of them. Using radar technology, Nikolova and her team are developing a scanner for early stage breast cancer detection and a fully automated, concealed weapon detection system.

Natalia K. Nikolova
Professor, Electrical and Computer Engineering

Electrical & Computer Engineering

Degrees offered: MEng, MASc, PhD
Entry Dates: September, January, May
Admission Requirements: see page 31
Study Options: Full- or part-time for all degrees offered

McMaster's Electrical and Computer Engineering department is ranked as one of the best departments of electrical and computer engineering both nationally and internationally. Faculty members are regular award winners including the prestigious Premier Research Excellence Award (PREA), OCUFA teaching award, McMaster Students Union Teaching Award, Booker Gold Medal, and the Signal Processing Society Education Award.

McMaster's Department of Electrical & Computer Engineering is home to The Centre for Research in Micro- and Nano-systems, a unique facility in North America offering fabrication, characterization and integration of different materials, components and devices at multiple length scales. For example, Nano-Bonding and –Interconnect System (NBIS) and Nanoimprinting Lithography System (NIL) provide fabrication and integration of nanometer scale structures and devices. Research using MNSL infrastructure spans from fundamental areas such as molecular interactions during bonding to applied relating to miniaturization of emerging systems for health and environmental applications.

Areas of Research

BIOMEDICAL TECHNOLOGIES
Neural prostheses, medical robotics, medical imaging technologies, biomedical sensors, hearing aids, brain-computer interfaces.

COMMUNICATION TECHNOLOGIES, SYSTEMS & NETWORKS
Theory, algorithms and implementations of communication networks: wireline, optical fibre, wireless, mobile and wireless optical; multimedia communications; cloud computing.

ELECTRIFIED & AUTONOMOUS TRANSPORTATION
Hybrid & electric powertrain design & control, estimation & tracking for autonomous control, electric motor drives.

ELECTROMAGNETICS & PHOTONICS
Electromagnetic imaging & detection with applications in biomedicine and security, radar scattering, antennas, semiconductor laser diodes, integration of photonic devices.

INTEGRATED, EMBEDDED AND INTERCONNECTED SYSTEMS
Hardware/software co-synthesis, low power & reliable computing, Internet of Things, telerobotics, smart grid.

MICROELECTRONICS & VLSI
Microelectronic characterization & modelling, nanoelectronics, ultra-low power integrated circuits, computer-aided design of VLSI circuits

OPTIMIZATION, LEARNING & CONTROL
Optimization for engineering design, machine learning, data fusion, aerial robotics, haptic control.

POWER ELECTRONICS & ELECTRIC MACHINES
Power electronic converters, electric machines & energy conversion systems, renewable energy systems.

SIGNAL, IMAGE & VIDEO PROCESSING
Detection and estimation, information and coding theory, video display technologies, multi-media signal processing, data compression, biomedical signal processing.

"There is a wide range of career opportunities, especially for engineers in Ontario. Many of my friends are coming to Ontario to find careers here."

Mahsa Salmani
PhD candidate, Electrical and Computer Engineering

"Every time I achieve a goal and get one step closer to a working device, I get a little motivation boost because I know that this could be a technology that could have real world applications."

Simon McNamee
Alumni

Engineering Physics

Degrees Offered: MEng, MASc, PhD
Entry Dates: September, January, May (not MEng)
Admission Requirements: see page 31
Study Options: Full- or part-time for all degrees offered

Engineering Physics at McMaster is pushing the forefront of modern physics to better the world through technological advancement. We are solving the grand challenges of the future such as sustainable energy supply, human health, digital information and communications technology.

Areas of Research

Engineering Physics at McMaster is engaged in leading edge research in biomedical engineering, nuclear and energy systems engineering, nano- and micro-device engineering, and photonics engineering. Research in Engineering Physics includes:

- Centre for Emerging Device Technologies
- McMaster Nuclear Reactor
- McMaster's Biophotonics Facilities
- Biointerfaces Institute
- Centre for Advanced Nuclear Systems
- McMaster Intense Positron Beam Facility
- University Network of Excellence in Nuclear Engineering (UNENE)

BIOMEDICAL ENGINEERING

Biosensors, biophotonics

NUCLEAR ENGINEERING AND ENERGY SYSTEMS

Small modular reactors, reactor core physics and safety analysis, intense positron beam for materials research, post-irradiation studies of nuclear reactor components, nuclear fuel and waste management, medical radio-isotope research.

NANOTECHNOLOGY, NANO- AND MICRO-DEVICE ENGINEERING

Micro-electro-mechanical systems (MEMS), photovoltaics, organic electronics, optoelectronics, III-V materials and devices

PHOTONICS ENGINEERING

Silicon photonics, displays, laser applications, sensors, ultrafast lasers

SMART SYSTEMS ENGINEERING

Smart systems that integrate various sensors and actuators to analyze and control a process.

"I hope that I can show them that I enjoy what I do and I can give that feeling to them – that this is fun and I'm doing it because I believe in it."

Leyla Soleymani is developing biosensors, miniature devices that can be used at point of care to quickly and accurately diagnose certain types of cancer and infectious diseases. This low-cost technology will help improve healthcare services for people around the world. Soleymani says a key to her success is her passion for her research and she hopes to convey that passion to her students.

Leyla Soleymani
Canada Research Chair in Miniaturized Biomedical Devices
Associate Professor, Engineering Physics

“I want to showcase that we’re doing exciting research here and I want to show the many avenues you can pursue in a research career.”

Using high-powered microscopes, Kathryn Grandfield looks at how materials for joint replacement and dental implants attach to human tissue to create better quality devices that last longer inside the body. Grandfield credits her professors for helping to shape her future. She strives to do the same for her students.

Kathryn Grandfield
Associate Professor,
Materials Science and Engineering

Materials Science & Engineering

Degrees Offered: MASc, PhD
Entry Dates: September, January, May
Admission Requirements: see page 31
Study Options: Full- or part-time for all degrees offered

Building strategically on our diverse expertise in materials, in collaboration with local and global partners, the Department of Materials Science and Engineering here at McMaster University is internationally recognized as a destination of choice, where students, scholars, alumni and employers partner in a journey of learning, discovery and innovation.

McMaster is engaged in leading edge material science and engineering research and has concentrated research groups that collaborate with international industrial sponsors including:

- Canadian Centre for Electron Microscopy
- Steel Research Centre
- Centre for Automotive Materials and Corrosion

Areas of Research

STRUCTURAL, AUTOMOTIVE AND AEROSPACE MATERIALS

Lightweight alloys, heat treating, thermomechanical processing, mechanical performance, galvanizing/coatings, corrosion performance

FUNCTIONAL MATERIALS AND NANOTECHNOLOGY

Electronic/magnetic materials, electrocatalysts, supercapacitors, energy materials (batteries/fuel cells), nanophotonics, 2-D materials, atomic-scale characterization

BIOMATERIALS

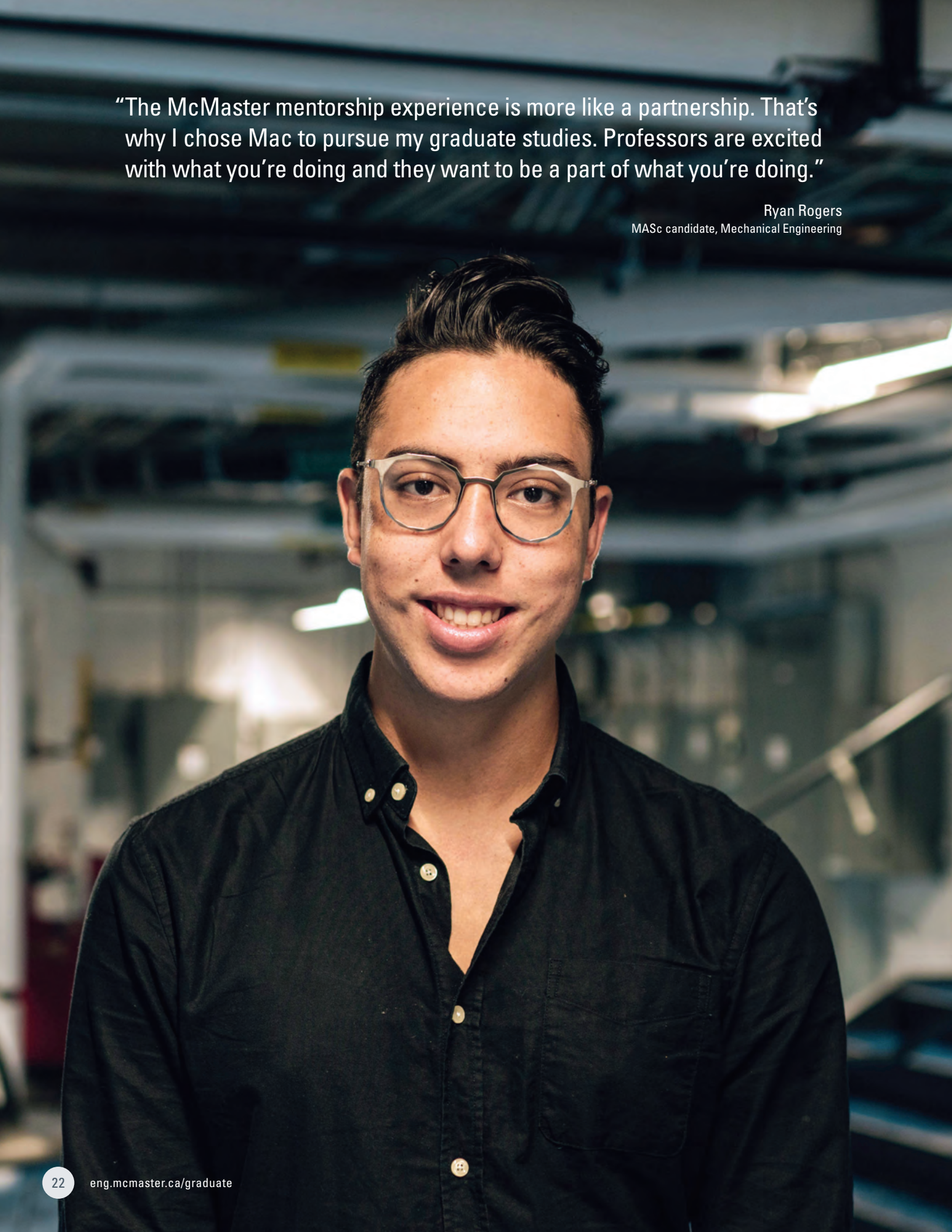
Osseointegration, bone applications in dentistry and orthopaedics, biomineralization

COMPUTATIONAL MATERIALS ENGINEERING/INFORMATICS

Sensors, big data, artificial intelligence, multi-scale modelling, material discovery, image analysis, cluster analysis

"The moment I arrived at the airport, I realized everyone is so friendly and I didn't feel like I was someone from outside. I felt that I belonged here and that this was the place I can live in and progress in my work."

Shooka Mahboubi
PhD candidate, Materials Science and Engineering



"The McMaster mentorship experience is more like a partnership. That's why I chose Mac to pursue my graduate studies. Professors are excited with what you're doing and they want to be a part of what you're doing."

Ryan Rogers
MASc candidate, Mechanical Engineering

Mechanical Engineering

Degrees Offered: MASc, PhD
Entry Dates: September, January, May
Admission Requirements: see page 31
Study Options: Full- or part-time for all degrees offered

The Department of Mechanical Engineering is the second largest department in the Faculty of Engineering at McMaster University. The research funding per faculty member is amongst the highest in the country and the Department benefits from state of the art laboratories with established international reputations.

Our research is heavily supported by industry and is in areas of strategic interest including hybrid vehicles, energy and environment, sustainable energy, biomechanics, materials and manufacturing, MEMS and mechatronics. Our cluster of research groups include:

- Centre for Advanced Micro Electro Fluidics
- Computational Fluid Dynamics laboratory
- Flow-Induced Vibration and Aeroacoustics Laboratory
- Light Metal Casting Research Centre
- Machining Systems Laboratory
- McMaster Automotive Research Centre
- McMaster Manufacturing Research Institute
- McMaster Mechatronics Research Group
- Metal Forming Laboratory
- Micro-Machining Laboratory
- Robotics and Manufacturing Automation Research
- Thermal Management Research Laboratory
- Thermal Processing Laboratory

Areas of Research

BIOMECHANICS

Biomechanics of Musculoskeletal Systems, Bone Adaptation to Mechanical Stimuli & Injury, Surgical Robotics, Bone Fracture Limits & Injury Tolerance, Design of Artificial Joint Replacements, Surrogates for Biomechanical Research, Bio-Functional Interfaces, Biomaterials & Biosensors, Cardiovascular Mechanics, Medical Imaging

MANUFACTURING

Casting, Computer Aided Manufacturing, Electrical Discharge Machining, Grinding, Machining of Advanced Materials, Machining Processes and Systems, Materials Processing and Systems, Manufacturing Automation, Manufacturing Processes and Systems, Metal Forming, Cutting and Removal, Metallic and Non-Metallic Coatings for Advanced Steels, Process Modelling & Simulation, Robotics

MECHANICS & DESIGN

Automotive Applications, Computer aided design, Control Systems, Dynamics and Vibrations, Finite Element Analysis, Flow Induced Vibration and Noise, Hybrid Vehicles, Materials and Microstructural Engineering, Mechatronics, Microelectromechanical (MEMS) Devices, Product Design and Manufacturing, Robotics, Theoretical mechanics

THERMAL FLUID SCIENCES

Aeroacoustics, Combustion, Computational Fluid Dynamics, Flow Control, Turbulence, Heat Transfer, Microfluidics & Micro-fabrication, Modeling in Thermo-Fluid Systems, Multiphase Flow, Reactor Thermal Hydraulics, Thermal Processing of Materials

Stephen Veldhuis
Director, McMaster Manufacturing Research Institute
Professor, Mechanical Engineering
Braley-Orlick Chair in Advanced Manufacturing Engineering

"Being able to apply our knowledge and make improvements in industry is what we strive to do. Engaging students on improving productivity, helping a company earn new business and keeping jobs – this is a nice package of everything coming together."

Having an impact on peoples' lives is what drives Stephen Veldhuis' research. Veldhuis' research is focused on tribology, the study of friction and wear, which contributes to the development of high performance manufacturing solutions.

"Having the opportunity to develop new technologies to solve real world health problems is a rewarding experience. Achieving great things like this becomes possible when integrating engineering and health science principles to address challenges from a more holistic approach."

Sandy Zakaria
MASc candidate, Biomedical Engineering

School of Biomedical Engineering

Degrees Offered: MASc, PhD, MD / PhD
Entry Dates: September, January, May
Admission Requirements: see page 31
Study Options: Full- or part-time for all degrees offered

McMaster's Faculty of Engineering and Faculty of Health Sciences have partnered to create a unique research and training program under the umbrella of the School of Biomedical Engineering.

The School provides a unique collaborative environment that leverages our existing expertise in medical sciences and engineering, and that links current and emerging areas of molecular, medical and bioengineering research. We invite you to join us in pushing the boundaries of discovery and improving the lives of future generations through the seamless merging of the human with the human-made.

Our goal is to leverage McMaster's internationally recognized strengths and resources toward the development of new approaches in biomedical science and technology, through both fundamental and more goal oriented translational research programs.

McMaster's School of Biomedical Engineering is home to various research centres including:

- Antimicrobial Research Centre
- Brockhouse Institute for Materials Research
- Centre for Emerging Device Technologies
- Centre for Minimal Access Surgery
- Juravinski Cancer Centre
- McMaster Institute for Applies Radiation Sciences
- McMaster Manufacturing Research Institute
- Thrombosis and Atherosclerosis Research Institute

Areas of Research

BIOMATERIALS AND DEVICES

Biomaterials and tissue engineering directed towards growth or regeneration of cells, tissues and organs. The technology includes development of biomaterials, implantable devices and sensors and other biologically compatible materials with applications in numerous medical devices and therapies.

IMAGING, SENSING AND DETECTION

Development and application of imaging technologies applicable to cells, tissues, organs and the brain for diagnostic and therapeutic purposes.

THERAPEUTICS

Research toward the development of novel drugs and drug delivery methods, including the development of biodegradable polymers and other materials for tissue engineering of cellular scaffold and release of signaling molecules.

"The students get the opportunity to participate in exciting and interdisciplinary research working at the interface of engineering and health sciences and making an impact on society."

Ravi Selvaganapathy
Professor, McMaster School of Biomedical Engineering
Co-director, McMaster School of Biomedical Engineering

"The faculty are all practitioners and industry people who became academics so they bring this practicality to everything that we're doing."

Christopher Boothe
Master of Engineering and Public Policy candidate,
W Booth School of Engineering
Practice and Technology

W Booth School of Engineering Practice & Technology

Degrees Offered: MEng Design, MEPP, MTEI, MEEI, MEME, MS & T
Entry Dates: Varies by degree
Study Options: Varies by degree

Students become innovative problem solvers and lead creations of sustainable solutions in the connected world. They focus on innovation in the early stages of design, smart systems (automation, robotics, AI, augmented reality), and advanced manufacturing. Students are also intricately involved in entrepreneurship for start-up companies and development of engineering based policy decisions. Our innovative graduate programs combine in-depth technical expertise with project management and communication skills, positioning students to become leaders in their field.

Applying industry skills in community based projects, internships, and co-op help our students expand their network of contacts.

FIVE MASTER'S DEGREE PROGRAMS AVAILABLE:

- Engineering and Public Policy
- Engineering Design
- Entrepreneurship and Innovation
- Manufacturing Engineering
- Systems and Technology

92% of our alumni are employed in their field within 6 months of graduating

10% of our alumni currently work at the executive level (CIO, CFO, CEO, President, etc.) or are founders of their own companies.

Master of Engineering in Systems & Technology

Want to help guide Industry 4.0 into the future? This master's program is the only one of its kind in Canada that delivers specialized training in the areas of digital manufacturing, automotive and smart, connected systems.

If you want to create solutions that combine automation, robotics, sensors, computing systems and software to enhance people's lives, consider this practice-based master's program a doorway to an exciting profession.

Specialize in the following areas:

- Automotive
- Automation and Smart Systems
- Digital Manufacturing

Admission	Start Date	FT Length	PT Length
STEM degree, minimum B average in last 10 technical courses	September or January	24 months 12 months (accelerated option)	40 months

Master of Engineering Design

Design is a holistic process that pursues value-added solutions to the needs of industry, individuals and society at large. Through your Master's degree, you will develop competencies to design solutions that consider users, customers, economies and ecosystems alike.

We specialize in blending design thinking concepts with prototyping and testing – whether using physical objects or advanced technologies like virtual reality and smart systems.

Through coursework and applied design projects you will build your experience leading design projects from conception to completion while managing relationships with colleagues and stakeholders. You will graduate and launch the next stage of your career with a portfolio of design work.

Specialize in the following areas:

- Digital Reality
- Product Design

Admission	Start Date	FT Length	PT Length
STEM Degree, B- average in last 10 technical courses	September	24 months 12 months (accelerated option)	40 months

Applicants who did not attain the required standing in their undergraduate degree, but who have at least four years of relevant work experience may be considered.

30% continue the venture they started in the program and go on to continue to develop it as a business

Master of Engineering Entrepreneurship and Innovation / Master of Technology Entrepreneurship and Innovation

70% are hired by established companies and advance into leadership roles.

Visionary innovators recognize that they can develop their skills in identifying "pain points" in life and guide their teams towards solving them with new products and services, while some others think you must be born with innovative genius.

Whether your ambition is to forge your own path as a startup founder or launch innovative ventures in an established company, this award-winning graduate degree provides you the skills for success.

Our program will build your expertise in developing products or services which help people lead better lives and make you a successful entrepreneur.

Degree	Admission	Start Date	FT Length
Engineering Entrepreneurship and Innovation	STEM Degree, B- average in last 10 technical courses	September	20 months
Technology Entrepreneurship and Innovation	Degree from any discipline, with evidence of ability to successfully complete technical courses, B- average in final year	September	20 months

While students in the Master of Technology program are not expected to have any engineering or scientific background, they must embrace creativity and innovation. Familiarity with technology is expected, but the required technological depth will depend on the student's chosen project.

Master of Engineering and Public Policy

Students in the Engineering and Public Policy program become integrative problem solvers, armed with the interdisciplinary skills to find solutions that can balance competing societal needs.

- As researchers and policy makers, graduates work in both the public and private sectors to drive decision-making.
- Using the skills learned through interdisciplinary course work, as well as real-world experience gained while working with community partners to complete your research, you'll be ready to make a difference in your chosen career.

Admission	Start Date	FT Length	PT Length
STEM Degree, B- average in last 10 technical courses	September or January	24 months 12 months (accelerated option)	40 months

Applicants who did not attain the required standing in their undergraduate degree, but who have at least four years of relevant work experience may be considered.

Master of Engineering – Manufacturing Engineering

Manufacturing is fundamental for making people's lives better and creating value for society. In the Manufacturing Engineering program you will acquire capabilities to make manufacturing processes more efficient and sustainable.

The manufacturing sector offers many career opportunities for engineers in discrete manufacturing (e.g. from consumer products to aircraft) and process industries (e.g. from petrochemicals to food production). Our program builds on Ontario's deep history of high-quality manufacturing.

Develop capabilities to improve operation of any type of manufacturing facility (e.g. statistical analysis of plant data) and augment that by adding courses specializing in process industries or in discrete manufacturing.

Available are either a project-based option (6 courses plus project) or course-based option (8 courses).

Admission	Start Date	FT Length	PT Length
Engineering Degree, B average in Degree	September or January (limited enrolment)	24 months 12 months (accelerated option)	40 months

Applicants who did not attain the required standing in their undergraduate degree, but who have at least four years of relevant work experience may be considered.

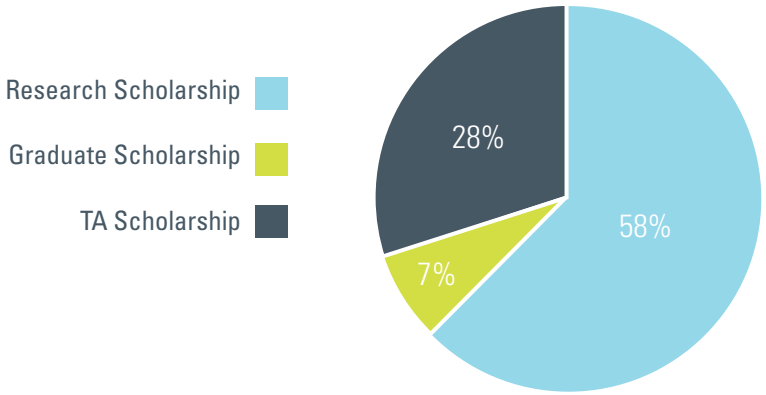
Funding and Awards

Many graduate students at McMaster are eligible for financial support, such as teaching assistantships, research funds, University graduate scholarships, external scholarships, and bursaries.

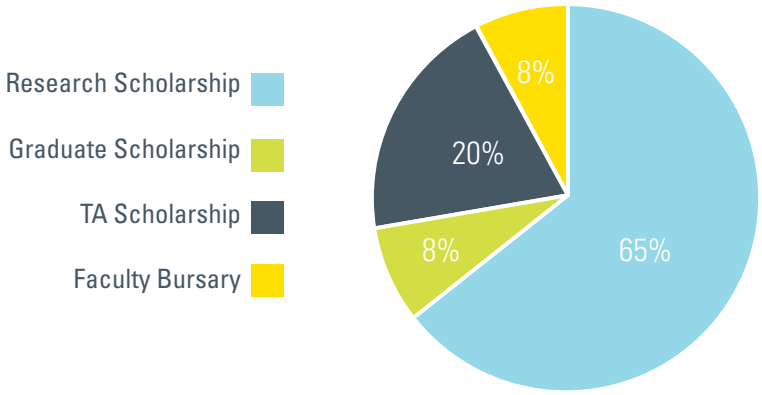
Funding and awards breakdown is represented in dollars.

**breakdown is represented in CAD dollars*

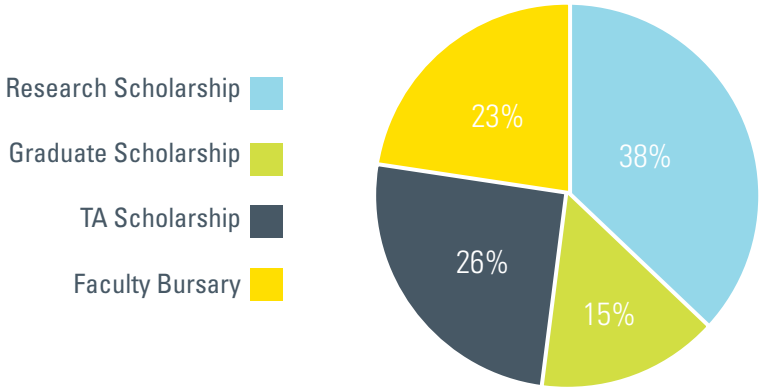
DOMESTIC Masters



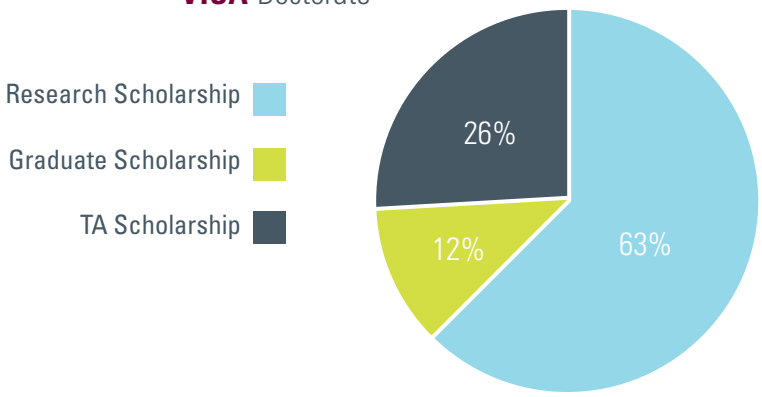
VISA Masters



DOMESTIC Doctorate



VISA Doctorate



With the exception of the Industrial PhD and M.Eng. programs

Earn $10-20K NET income after tuition and incidentals

EXTERNAL FUNDING

Many gradudate students at McMaster are eligible for financial support through external scholarships and bursaries.

Visit our website to learn more eng.mcmaster.ca/graduate

Admission Requirements

Degree Program	Minimum Requirements: Degree	Minimum Requirements: Grades
Master of Applied Science (M.A.Sc.)/Master of Science (M.Sc.)	Honours Bachelor's Degree (4 year) in Engineering, Sciences, or equivalent	
Biomedical Engineering Chemical Engineering Computer Science Materials Engineering Software Engineering		**B+** (77-79%)
Engineering Physics		**B** (73-76%)
Civil Engineering		**B** (75%)
Electrical and Computer Engineering Mechanical Engineering		**B+** (77-79%)
Master of Engineering (M.Eng) / Technology (M.Tech)		
Computing and Software Engineering		**B-** (70-72%)
Engineering Physics		**B** (73-76%)
Civil Engineering		**B** (75%)
Electrical and Computer Engineering		**B+** (77-79%)
Master of Engineering Design (M.Eng. Design)		**B-** (70-72%) in last 10 STEM and relevant courses
Master of Engineering Entrepreneurship & Innovation (M.E.E.I./M.T.E.I)		**B-** (70-72%) in last 10 STEM and relevant courses for M.E.E.I **B-** average in final year*
Master of Engineering and Public Policy (M.E.P.P.)		**B-** (70-72%) in last 10 STEM and relevant courses
Master of Engineering in Manufacturing Engineering (M.E.M.E.)		**B** (73-76%) in last 20 STEM and relevant course
Master of Engineering in Systems and Technology (MS&T)	Honours Bachelor's Degree (4 year)	**B** (72-76%) in last 20 STEM and relevant course
Doctor of Philosophy (Ph.D.)	Master's Degree (MASc, MSc, or equivalent	
Civil Engineering		**A-** (80-84%) *** B (73-76%) in the last two years of Bachelor's degree
Biomedical Engineering Chemical Engineering Computer Science Materials Engineering Materials Science Mechanical Engineering Software Engineering		**B+** (77-79%)
Engineering Physics		**B** (73-76%)
Electrical and Computer Engineering		**B+** (77-79%)
Computing & Software Engineering		**B+** (77-79%)
MD / Ph.D.		
Biomedical Engineering		**B+** (77-79%) and acceptance into McMaster MD Program

Averages are calculated over the last two years of study

*Please see page 28 for more details
**Please see www.unene.ca for more details
***B (73-76%) in the last two years of Bachelor's degree

Contact us

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This issue was produced September, 2020.
For the most current information please download this document from the Faculty of Engineering website or refer to the Graduate Academic Calendar.

ENGINEERING

McMaster University