Senate Research and Innovation Council

Open Session

October 16, 2025

1:00 p.m. - 2:30 p.m.

Needles Hall

NH 3318

Waterloo Campus

Think Differently | Act with Purpose | Work Together

UNIVERSITY OF WATERLOO | Senate

2025 10 16 Senate Research and Innovation Council Meeting Book

AGENDA

Governance Resources

Link to Governance Resources

1. Conflict of Interest

Regular Agenda

1:00 p.m.	2. Chair's Remarks [Dean]	Information	
1:05 p.m.	3. Introduction and Orientation [Dean]	Information	
	3.1. Membership and Terms of Reference		
1:15 p.m.	4. Research Strategic Plan [Duncker, de Gomez]		
	4.1. Research Strategic Plan The attached draft will be sent to a professional designer for formatting. Please provide any suggestions for changes at the meeting.	Information	4
1:45 p.m.	5. Items Proposed for 2025/26 [Dean]	Discussion	
2:00 p.m.	6. Report from Senate Graduate Council [de Loë]		
	6.1. Report from Senate Graduate Council	Discussion	33
2:15 p.m.	7. Other Business		
	8. Adjournment		

Excerpt from Senate Bylaw 1

8. Declarations of conflict of interest

8.01	At the beginning of each meeting of Senate or any of Senate's committees or councils, the chair will call for members to declare any conflicts of interest with regard to any agenda item. For agenda items to be discussed in closed session, the chair will call for declarations of conflict of interest at the beginning of the closed portion of the meeting. Members may nonetheless declare conflicts at any time during a meeting.
8.02	A member shall be considered to have an actual, perceived or potential conflict of interest, when the opportunity exists for the member to use confidential information gained as a member of Senate, or any of Senate's committees or councils, for the personal profit or advantage of any person, or use the authority, knowledge or influence of the Senate, or a committee or council thereof, to further her/his personal, familial or corporate interests or the interests of an employee of the university with whom the member has a marital, familial or sexual relationship.
8.03	Members who declare conflicts of interest shall not enter into debate nor vote upon the specified item upon which they have declared a conflict of interest. The chair will determine whether it is appropriate for said member to remove themselves from the meeting for the duration of debate on the specified item(s).
8.04	Where Senate or a committee or council of Senate is of the opinion that a conflict of interest exists that has not been declared, the body may declare by a resolution carried by two-thirds of its members present at the meeting that a conflict of interest exists and a member thus found to be in conflict shall not enter into debate on the specified item upon which they have declared a conflict of interest. The chair will determine whether it is appropriate for said member to remove themselves from the meeting for the duration of debate on the specified item(s).

Toward Our Common Tomorrow

UNIVERSITY OF WATERLOO

RESEARCH STRATEGIC PLAN

TABLE OF CONTENTS

Front cover- Star trails over the Mayall Telescope, which houses the Dark Energy Spectroscopic Instrument (DESI), Kitt Peak National Observatory, Arizona. Faculty members at Waterloo use the collaborative DESI to measure the effects of dark energy on the expansion of the universe.

WHO WE ARE

We are a leading global research-intensive university, renowned for entrepreneurship and innovation, providing co-op and work-integrated learning at scale with impact.

OUR VISION

A community of curious, collaborative, innovative, and entrepreneurial problem-solvers and leaders who seek to understand and identify equitable and sustainable solutions for the future of humanity and our planet.

OUR INSTITUTIONAL VALUES

- Think Differently
- Act with Purpose
- Work Together

MESSAGE FROM THE VICE-PRESIDENT, RESEARCH AND INTERNATIONAL

I am delighted to present the University of Waterloo's 2026–2030 Research Strategic Plan. While highlighting the distinctive capabilities, bold approaches, and diverse research community that have propelled Waterloo as a leader in responding to the considerable challenges and opportunities of today, the plan's development has been guided by the long-term vision of Waterloo@100. This strategic framework challenges us to continually rediscover the unconventional spirit that defined Waterloo's founding, driving impact-oriented research that reaches well beyond traditional boundaries.

Building on Waterloo's strengths in foundational and applied research, the 2026-30 plan aims to foster a better understanding of our world and beyond through the acquisition of fundamental knowledge and the mobilization of our findings in profoundly impactful ways. From health and sustainability innovations to societal, economic, and technological transformation, Waterloo, in collaboration with a rich spectrum of local and global partners, is poised to offer trailblazing solutions to key questions arising from our rapidly changing global landscape. Key to our success is to deliver solutions that are not only innovative but deeply informed by multiple disciplinary perspectives, enriching the research ecosystem, and magnifying societal benefit. This is enabled through our leading-edge research infrastructure, including an array of well-supported Core Facilities accessible to the whole campus community as well as external partners.

Waterloo recognizes that diverse teams generate more creative, robust, and equitable research outcomes. We benefit from a range of voices by ensuring that our work is guided by Indigenous Knowledge Keepers and enriched by a multitude of lived experiences and perspectives. By fostering an inclusive environment we ensure that our research planning, execution, and dissemination is locally grounded and carries global impact.

As we navigate our research trajectories for the coming years, the University of Waterloo is ready to meet both the local and global issues and opportunities that lie ahead. I invite you to learn more about our journey through this 2026–2030 Research Strategic Plan.

RESEARCH STRATEGIC GOALS

Goal 1 | Unearth Foundational Knowledge as the Building Blocks of Impactful Applied and Interdisciplinary Research

OBJECTIVES

- Foster a wide range of foundational and applied research programming that solves complex local and global problems
  - Ensure that a wide range of research themes and approaches are valued on our campuses and beyond.
  - Increase and diversify research funding sources.
  - Increase research capacity across the Institution to gain leadership in new and emerging research areas.

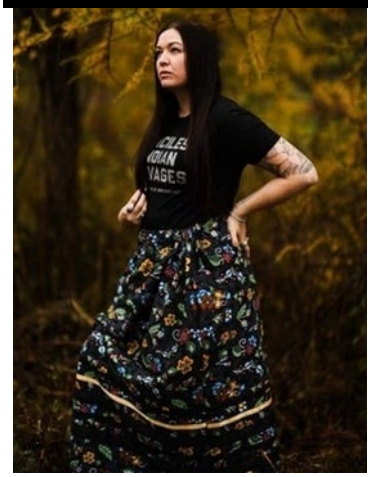
- Support and celebrate interdisciplinary research
  - Promote new connections through networking events and co-located research spaces on campus.
  - Provide developmental seed funding and shared professional staff supports to catalyze novel interdisciplinary initiatives.
  - Support interdiscplinary graduate research programs spanning all Faculties.
  - Create and track measures of success for interdisciplinary research initiatives.

"My work acknowledges that there are no 'experts,' rather we all have knowledge we can share, and in this way, we are decentring colonial interpretation."

- Dr. Talena Atfield, Assistant Professor of History and Canada Research Chair in Tentewatenikonhra'khánion

(We Will Put Our Minds Together)

Dr. Talena Atfield (CRC)



- Value and encourage innovative knowledge exploration and risk taking in research
  - Include unconventional, high-risk approaches in annual performance, tenure, and promotion processes.
  - Foster and support new internal and external partnerships focused on high-risk, high-reward challenges.

Goal 2 | Grow Campus, Community and Global Connections

OBIECTIVES

- Build on existing, and forge new, research partnerships (faculty, students, private and public sector, alumni) within and beyond the University
  - Create, cultivate, and sustain new research partnerships with care and respect to ensure mutual benefit.
  - Seek input from and collaboration with community, industry, not-for-profit, and international partners.
- Foster and enhance communication, engagement, and knowledge sharing between internal and external research partners, Indigenous rights-holders, and all underrepresented groups
  - Support internal and external Communities of Practice (COPs).
  - Strengthen knowledge mobilization across and outside of campus so that our research outcomes are known to wide audiences, maximizing impact.

Chief Joe Miskokomon of Chippewas of the Thames First Nation (COTTFN) and University of Waterloo President Vivek Goel signing Memorandum of Understanding

In 2025, Waterloo signed a Memorandum of Understanding (MOU) with Chippewas of the Thames First Nation (COTTFN) to advance shared research interests addressing social, environmental, and economic challenges faced by COTTFN and other Indigenous communities.

The School of Optometry and Vision Science is establishing a new national centre of excellence in optometric patient care, vision research, and clinical education.

The Waterloo Eye Institute is a $53 million initiative creating 68,000 square feet of new and renovated space that will improve patient experience, modernize our facilities, and create space for new vision research centres and teleoptometry.

It is funded in part by generous donations from several prominent alumni.

New Waterloo Eye Institute under construction

Goal 3 | Inspire Innovation, Entrepreneurship, and Experiential Learning

OBJECTIVES

- Enhance the concept and practice of entrepreneurship in our scholarly activities
  - Maximize the collective impact of Waterloo innovation and commercialization hubs.
  - Enhance co-op~~,~~ capstone,-and commercialization opportunities for our students and faculty members.

- Receive guidance from, and promote partnerships with, Indigenous Knowledge Keepers in fostering different ways of knowing
  - Act on input and recommendations from Indigenous Faculty Council, the Office of Indigenous Relations, and Indigenous supports throughout our Faculties and central administration.
  - Learn from Indigenous Knowledge Keepers and communities to develop relationships that promote traditional ways of knowing.

- Enrich entrepreneurial and research experiential learning opportunities
  - Promote programs such as Up Start that accelerate research commercialization and create new pathways that drive entrepreneurial success through seed funding and advisory meetings with Waterloo commercialization experts.
  - Expand Co-operative Education Research Certificate opportunities, combining three research work-term experiences, a 'research in the workplace' course, and a capstone project.
  - Promote and update our research and entrepreneurial specializations and opportunities to maximize student and faculty participation.

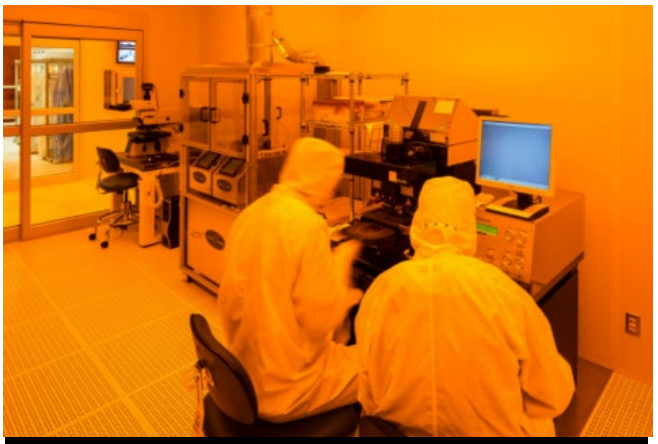
Dr. Trevor Charles (Faculty, Biology and Executive Director- top left), created LiftOff, an entrepreneurship, incubator and accelerator program designed to support black entrepreneurs from the earliest stages of starting a business to innovating, growing, and scaling an existing business. Partners include: the Caribbean Canadian Association of Waterloo Region (CCAWR), University of Waterloo, Conestoga College, Wilfrid Laurier University and the Waterloo Region Small Business Centre.

Goal 4 | Attract, Nurture, Empower, and Recognize Diverse, High-Quality Talent

OBJECTIVES

- Foster an inclusive research community through engaged and continuous learning about cultural sensitivity, safety, and ethics to ensure all research stakeholders, Indigenous rights-holders, and all underrepresented groups feel welcome and appreciated
    - Continue and expand collaboration through cross-campus partners, such as the Research Equity Diversity and Inclusion and Indigenous Research Councils and other equity, diversity and inclusion partners to address systemic barriers.
    - Grow ongoing development and capacity building to support equitable and inclusive research practices, including the expansion of the Building Inclusive Research Capacity (BIRC) program, and decolonizing research offerings.
    - Contribute as strategic advisors to research data management, research security and innovation and partnership initiatives.
    - Re-launch Waterloo's Canada Research Chair Equity Action Plan with new transformative principles and recognized best practices.

- Ensure campus research stakeholders can access a full spectrum of resources and supports to update their skills and build their research programs
    - Facilitate a co-ordinated framework to develop, access, and sustain shared research infrastructure.
    - Foster Communities of Practice for specific research areas and associated facilities.
    - Provide research upskilling opportunities including workshops, courses, and cross-training placements.



Quantum-Nano Fabrication and Characterization Facility (QNFC)

The technical focus of the QNFCF is on fabrication and characterization capabilities relevant to quantum and semiconductor device fabrication.

LONGHOUSE LABS

Longhouse Labs

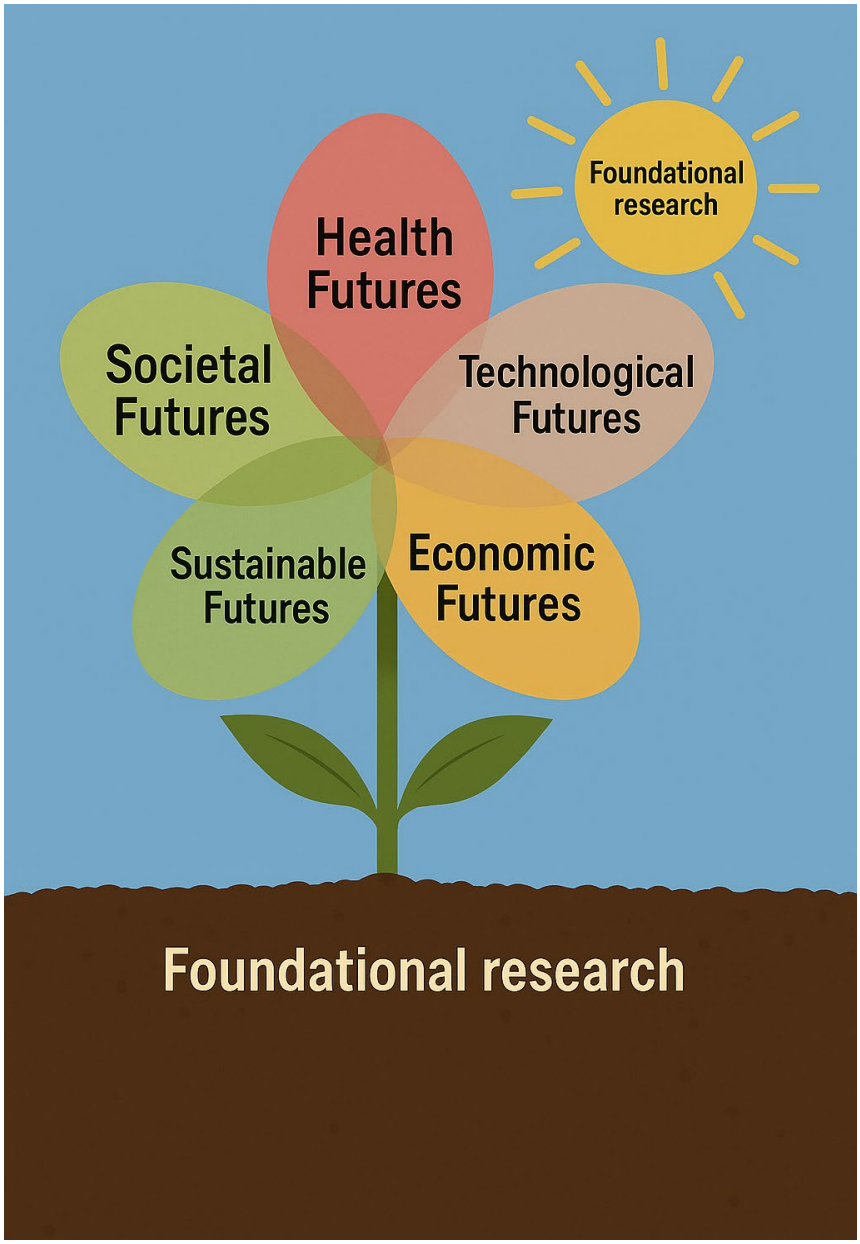
Longhouse Labs Is a dedicated space for Indigenous-led experiences and learning. It supports the creation of new Indigenous artwork and develops meaningful partnerships with Indigenous artists.

Students participate in a workshop with Longhouse Lab's first artist in residence, Billy Gauthier, a celebrated Nunatsiavut carver

RESEARCH THEMATIC AREAS

As part of the Waterloo@100 Strategic Visioning process, five interconnected Global Futures thematic areas were developed that align with Waterloo's academic and research strengths. The goal of the five overlapping Futures "Economic, Health, Social, Sustainable, and Technological" is to help focus and co-ordinate work across disciplinary and organizational boundaries.

Underpinning research within and across these Futures is Waterloo's continuous commitment to foundational research and scholarship. Our spirit of curiosity and commitment to excellence in foundational research and scholarship advances our understanding of ourselves, our planet and the cosmos, and enables the ongoing development of technologies, innovations, and applications we cannot even imagine today.



ILLUMINATING THE UNKNOWN

A Milky Way Magnetic Black Hole

Since its beginning as one of Canada's premiere research institutions, the University of Waterloo, has established itself as a powerhouse in foundational investigations leading to knowledge transfer and paradigm-changing applications. At Waterloo, we understand that the life cycle for transformational research starts with foundational discoveries that expand the boundaries of knowledge. New foundational knowledge not only fuels the growth of applied research but pushes the edges of our understanding of myriad areas of fundamental inquiry. Foundational knowledge includes Indigenous ways of knowing which emphasize interconnectedness, reciprocity, and a deep respect for the natural world.

From research topics of study such as foundational math to astronomy and astrophysics, to quantum theory and theoretical computer science, to molecular and evolutionary biology, to epistemology, philosophy and linguistics, foundational research at Waterloo underlines our passion to explore and discover the unconventional.

DISCOVERING THE SHAPE OF THE UNIVERSE

A team of researchers from the University of Waterloo Physics and Astronomy Department and the Perimeter Institute who are members of the global Event Horizon Telescope (EHT) collaboration (left), developed a powerful framework called THEMIS that processes EHT data, generating clear and accurate images that identify what really exists just outside a black hole.

Dr. Travis Craddock (Faculty, Biology)

UNCOVERING THE MYSTERIES OF THE BRAIN

In his lab, Dr Travis Craddock (Canada Research Chair in Quantum Neurobiology) is shedding light on how neuroinflammation affects the neuronal microtubule cytoskeleton to help Canadians suffering from diseases, such as Alzheimer's and Parkinson's.

PROMOTING FUNDAMENTAL TRUST IN SCIENCE AND TECHNOLOGY

Together Drs. Donna Strickland, Dean Mary Wells, and Ashley Mehlenbacher co-direct the Trust in Research Undertaken in Science and Technology (TRuST) network which explores the concept of fundamental public trust in medical, technological, and other scientific research that affects and benefits our everyday lives.

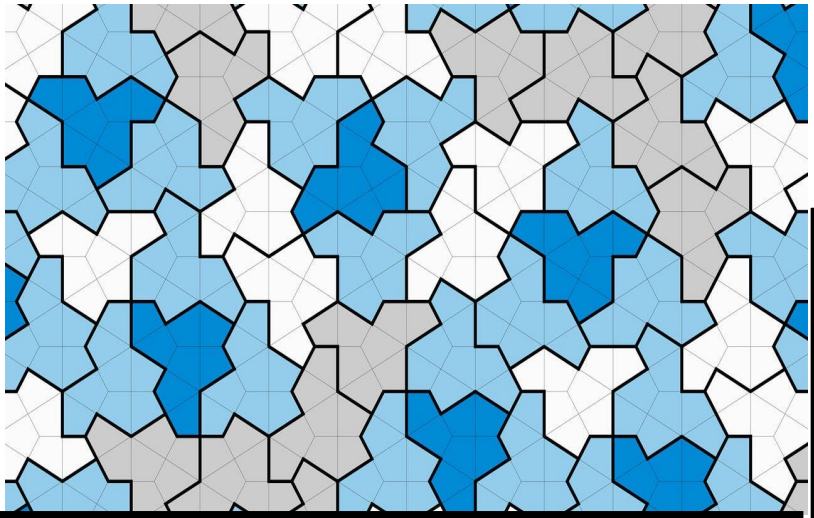
Drs. Donna Strickland (right, Nobel laureate, Physics) Ashley Mehlenbacher (left, Canada Research Chair in Science, Health, and Technology Communication), Dean Mary Wells (centre-Engineering, Craig Norris (CBC moderator)TRuST kick off event.

DISPROVING A LONG-STANDING MATH CONJECTURE

Lucía Martín-Merchán, a recent post-doctoral researcher in Pure Mathematics, has disproved a conjecture that mathematicians have been investigating for almost thirty years. In her article, "Compact holonomy G2 manifolds need not be formal," Martín-Merchán makes an important intervention at the intersection of the pure mathematics fields of differential geometry and algebraic topology.

Dr. Lucía Martín-Merchán

(Post-Doctoral researcher, Pure Mathematics)



The "Einstein" tile

FINDING THE EINSTEIN TILE

Dr. Craig Kaplan from the School of Computer Science is a member of a collaborative team that solved a 60-year-old mathematical problem by discovering a 13-sided shape- "the Einstein Tile" that is able to fill the infinite plane without overlaps or gaps in a pattern that not only never repeats but also never can be made to repeat.

Amy Nahwegahbow in Waterloo's Indigenous Gathering Space

FOSTERING RESPECTFUL RELATIONS

Vanier Scholar and member of the White River First Nation near Manitoulin Island, Amy Nahwegahbow practices foundational community-based research through respectful relationships with First Nation's communities to better understand the impact of urban contaminants on their communities, along with PhD thesis advisor Dr. Brian Laird, School of Public Health Sciences.

Dr. Merrin Macrae with students from her hydrobiogeochemistry research lab

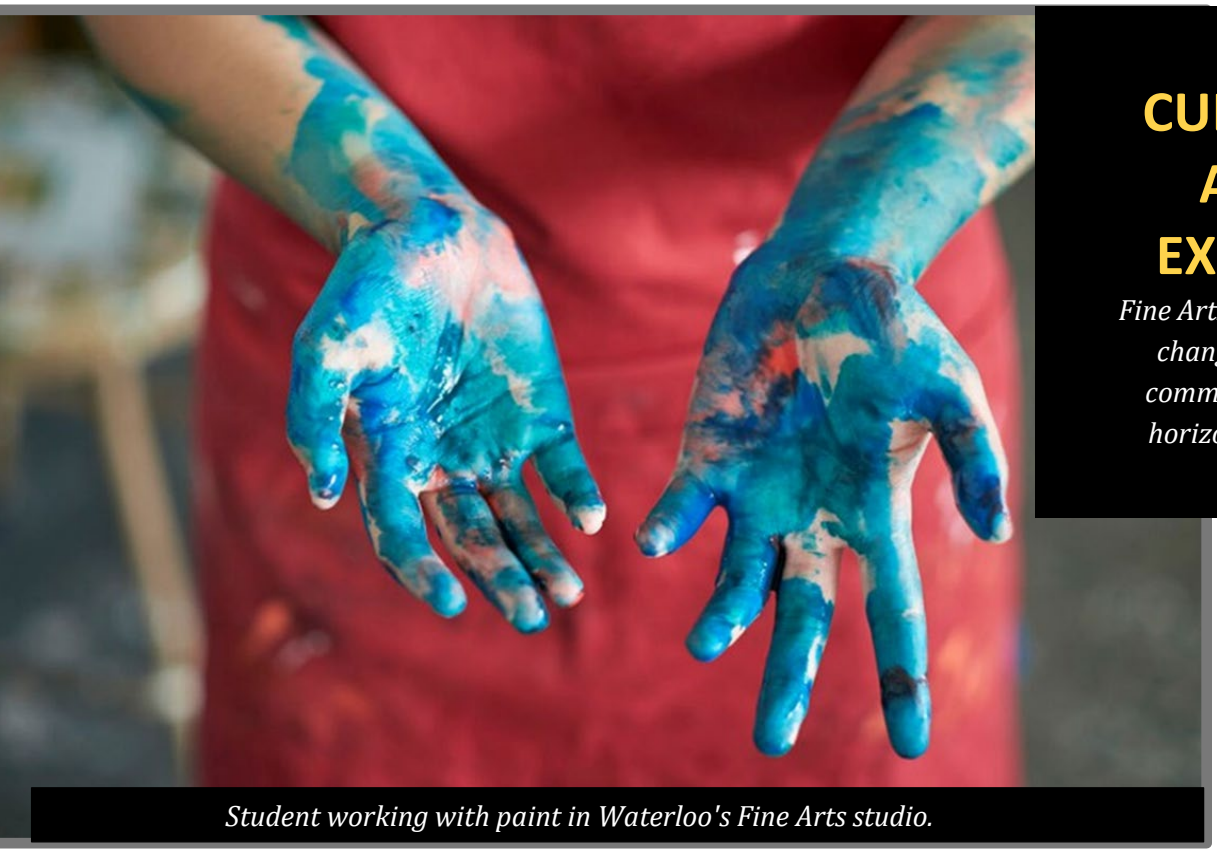
UNDERSTANDING COMPLEX ECOLOGICAL PROCESSES

Dr. Merrin Macrae's (Faculty, Geography and Environmental Management) hydrobiogeochemistry research lab examines fundamental linkages between hydroclimatology and biogeochemistry on the distribution and movement of water and soil-associated nutrients in natural and impacted ecosystems.

SOCIETAL FUTURES

Demographic transformations, increased migration, digitization and automation, shifting geopolitical relations, and declining trust in democratic institutions are among the forces transforming society. While there is a deeper understanding of the global legacies of colonialism and social injustices, our social echo chambers can contribute to polarization and disinformation, stifling constructive dialogue across different points of view and lived experience.

Across the spectrum of our research activities, we are investigating the impacts on society and generating practical solutions that help societies adapt to rapid change and build inclusive communities where everyone can flourish.



Student working with paint in Waterloo's Fine Arts studio.

CULTIVATING ARTISTIC EXPRESSION

Fine Arts research at Waterloo changes minds, connects communities, and expands horizons through creative expression.

Research themes

- Anthropogenic effects on natural systems
- Cities
- Creative expression
- Cultural reconciliation, regeneration, preservation, revitalization
- Developmental, cognitive, clinical, and educational psychology
- Governance, policy, and communications
- Human-Computer interaction
- Recreation and work-life balance
- Responsible and ethical ownership and use of data technology
- Self-determination, sovereignty, and security
- Social determinants of health
- Thriving, resilient, and inclusive communities

EMBODYING TREATY, SURVIVAL, AND JOY

Dr. Logan MacDonald's (Canada Research Chair - Indigenous Art) Longhouse Labs hosted "Treaty Girl" created by Courtney Skye (Mohawk Nation, Turtle Clan) and curated by Alex Jacobs-Blum (Cayuga Nation, Wolf Clan) "Treaty Girl" aims to make visible the many generations of girls who are embodying Treaty, survival, and joy.

ADVANCING RESEARCH IN PRECISION EDUCATION

Hart Lab

Dr. Sara Hart (Canada Excellence Research Chair in Developmental Science), leads a research team that is harnessing advancements in genomics and rich data sources on developing individuals to innovate new approaches to precision education.

BUILDING BLACK STUDIES THROUGH COMMUNITY

Former MPP for Kitchener Centre/ critic for Colleges and Universities and Anti-Racism and Equity, Dr. Laura Mae Lindo, now a Philosophy professor was recently appointed as the new Director of Black Studies.

PRESERVING CULTURE

Undergraduate students in Germanic/Slavic Studies, Culture and Language Studies, Visual Culture, Spanish and Latin American Studies, Music, Religious Studies and Classical Studies present research at the annual University of Waterloo Culture Fest.

Reconstructing History: Intangible Crafting Heritage and Object Recreation by Visual Culture and Medieval Studies double major Ellen Siebel-Achenbach

"UnMarker" successfully destroys watermarks without needing to know the specifics of how they've been encoded. UnMarker is the first practical and universal tool that can remove watermarking in real-world settings.

PROMOTING ETHICS IN TECHNOLOGY

Andre Kassis, a PhD candidate in Computer Science, and his supervisor, Dr. Urs Hengartner, created the "UnMarker" tool that can remove any AI image watermark, highlighting the need for more robust ways of identifying AI generated deepfakes.

BUILDING INCLUSIVE COMMUNITIES

The Tiny Homes project was launched to address housing insecurity in the Region of Waterloo.

This initiative is the result of a partnership between the Schools of Architecture and Planning and the City of Cambridge. It explores how thoughtfully designed tiny homes can help by offering a fast, flexible, cost-effective and dignified emergency housing solution.

School of Architecture students build a Tiny Home prototype in a studio class.

HEALTH FUTURES

Many physical and social determinants of health contribute to our well-being, yet too many individuals and communities do not achieve the best possible health status. Those that are sick or injured navigate complex health systems that are unsustainable, under pressure from escalating costs, and facing shortages of health professionals and an aging population.

Waterloo is taking a unique leadership position in this space by focusing on our strengths at the intersections of health, society, technology and entrepreneurship and engaging partners to co-create solutions that advance population health and support the development of more sustainable community-based health systems.

Dr. Nancy Waite (Faculty, School of Pharmacy and Associate Director of Clinical Education) co-founded "OPEN" the Ontario Pharmacy Evidence Network" a multi-institutional network of researchers and knowledge users, dedicated to improving health and the healthcare system through better medication management. Shown here, Waite helps run the annual OPEN Summit where Pharmacy researchers and trainees collaborate through Knowledge Translation activities to ensure pharmacy professionals remain equipped and supported to deliver the highest quality patient care.

DRIVING COMMUNITY HEALTH

Waterloo's health researchers are continually innovating to provide a wide variety of outreach and more equitable access to health products and services for local and global communities

Research themes

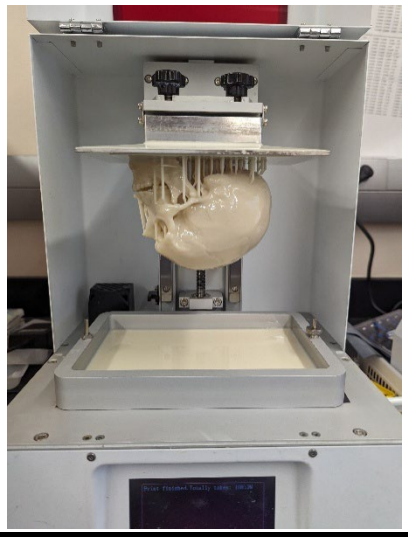
- Biomathematics and biostatistics
- Biomedical sciences and engineering
- Community-driven health
- Digital health
- Drug discovery
- Molecular and physiological determinants of health
- Healthy development and aging
- Health care practice and systems
- Medical imaging, sensing and diagnostic technologies
- Nutrition and food security
- Personalized and precision medical technologies
- Preventative health and mobility

IMPROVING PATIENT OUTCOMES

In the Nutrition and Aging Lab, overseen by Kinesiology and Health Sciences Professor Dr. Heather Keller, researchers work towards improving the standard of nutrition care in hospitals to improve patient and healthcare outcomes.

MOVING BIOMEDICAL RESEARCH FORWARD

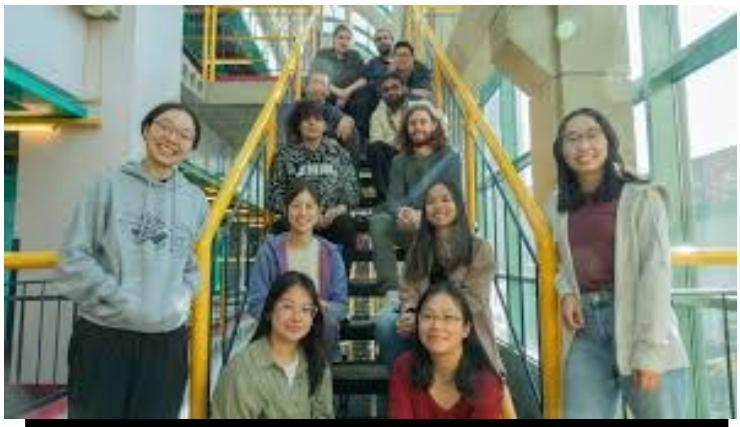
In the Composite Biomaterial Systems Lab, Dr. Thomas Willett, (Faculty, Biomedical Engineering) explores the mechanics and engineering of skeletal biomaterials and tissues towards the interdisciplinary investigation and innovation for improved bone health and repair.



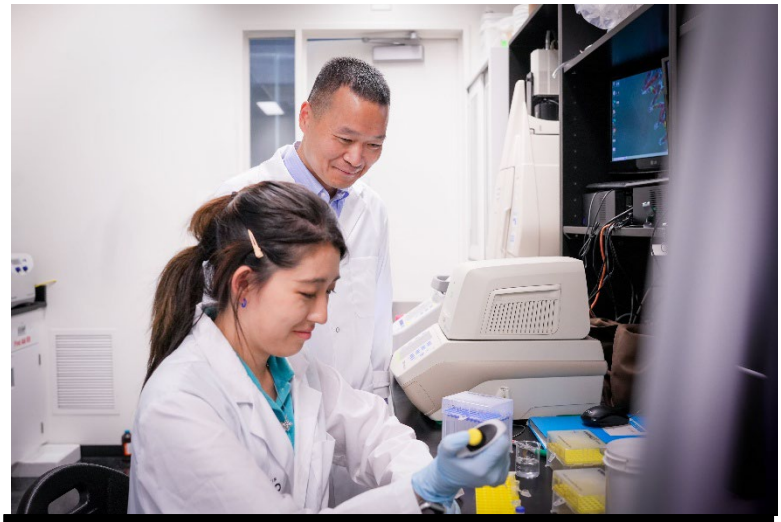
An anatomically accurate skull model 3D printed in the Composite Biomaterial Systems Lab

PARTNERING FOR HEALTHCARE INITATIVES

Computer Science Professor Dr. Edith Law's newcomer app, designed in collaboration with KW4 Ontario Health Teams helps newcomers, immigrants, refugees, and international students navigate their transition to Canada, addressing key social determinants of health.



Edith Law (front right) with students in the Augmented Intelligence Laboratory



Dr. Juewen Liu (Faculty, Chemistry) and student (?) in the Bionanotechnology and Interfaces Laboratory

CREATING NEW BIOSENSORS

In his Bionanotechnology and Interfaces Laboratory, Dr. Juewen Liu (Canada Research Chair in Biosensors and Bionanotechnology) researches how DNA molecules can be altered to serve as highly selective biosensors and reaction catalysts to help detect heavy metals in water and targeted drug delivery.

Dr. Lora Giangregorio (Faculty, Kinesiology)- front with participants in the Bone Health and Exercise Science Laboratory

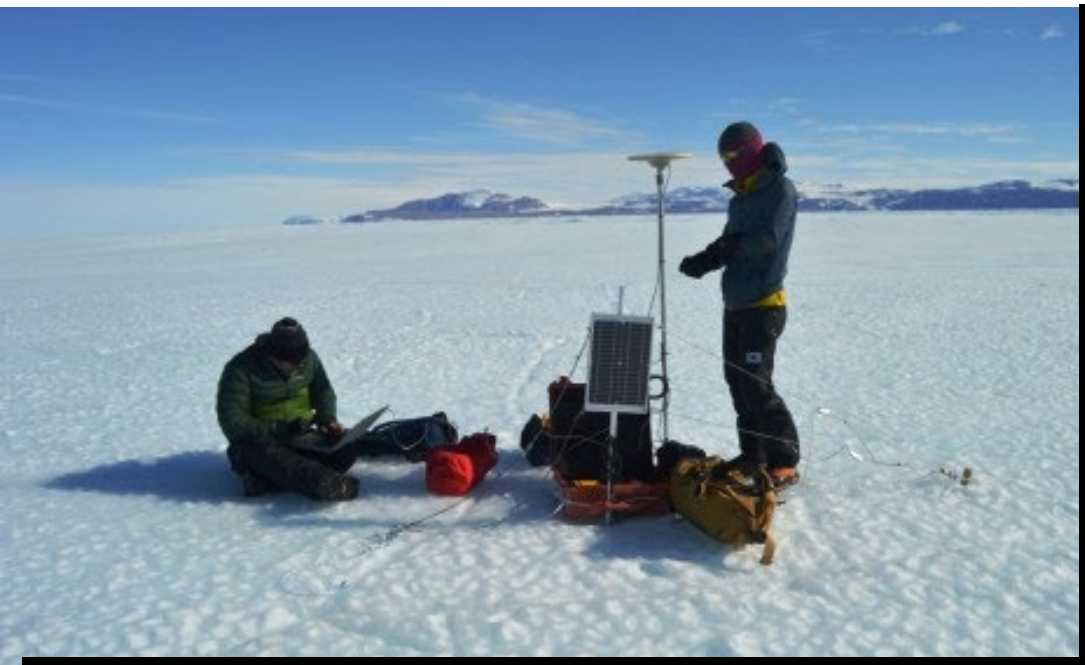
DELIVERING PERSONALIZED HEALTHCARE

Dr. Lora Giangregorio (Canada Research Chair in Bone Health and Exercise Science) conducts research in her Bone Health and Exercise Science Laboratory where she partners with Osteoporosis Canada and the Schlegel-University of Waterloo Research Institute for Aging (RIA) to increase physical activity participation and prevent fractures in at-risk-people.

SUSTAINABLE FUTURES

The sustainability of our quality of life is intricately connected to our social, economic, and environmental well-being. While the global climate emergency is one of the greatest threats to our collective future, we are also challenged in preserving biodiversity, ensuring clean water for all and producing enough food for a growing planet.

Waterloo is already a leader in sustainability research and education. We will build on this strength by mobilizing interdisciplinary teams to generate practical and transformative approaches to sustainability, thereby shaping pathways toward a just, low-carbon and prosperous future.



Dr. Chrisine Dow (Faculty, Geography and Environmental Management) and NASA researcher Ryan Walker download GPS data on the Nansen Ice Shelf, East Antarctica

TRACKING SEA ICE MELT

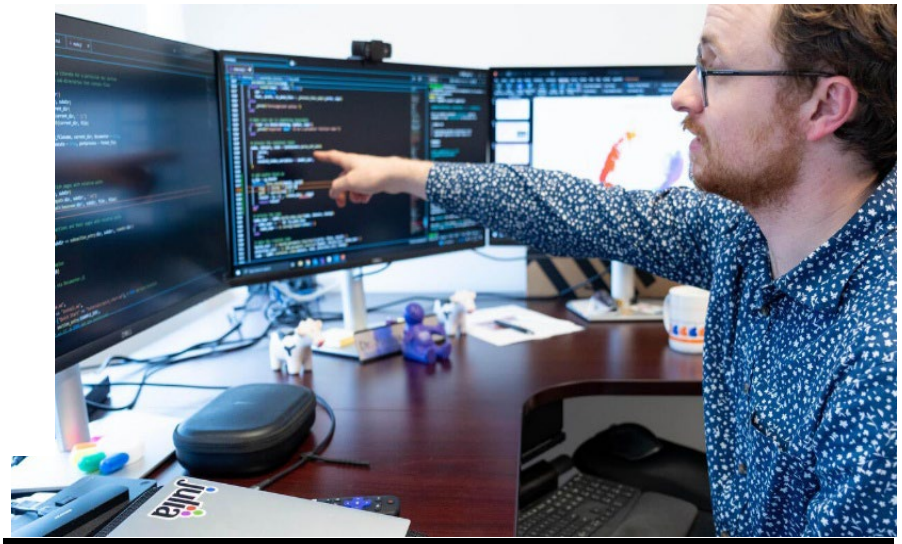
Dr. Christine Dow (Canada Research Chair in Glacier Hydrology and Ice Dynamics) investigates sea ice melt to measure climate change by using remote sensing techniques, the Canadian Seasonal to Interannual Prediction System (CanSIPS) and Canadian Earth-System Model 2 (CanESM2)

Research themes

- Biodiversity conservation
- Circular design, manufacturing, and implementation
- Climate systems
- Data studies for applied environmental science
- Earth observation
- Food production and quality
- Northern environments
- Renewable energy sources and storage technologies
- Sustainable computing
- Sustainable transportation
- Water science and technologies

UTILIZING TECHNOLOGY FOR BIODIVERSITY CONSERVATION AND PREDICTION

Waterloo uses its specialized technology excellence to engage in critical research that ensures the long-term health of our natural world.



Dr. Joshua Pulsipher (Faculty, Chemical Engineering) forecasts and tracks wildfires and flooding with advanced Artificial Intelligence and Machine Learning

Biology Professor, Dr. Rebecca Rooney's (left) research demonstrates that a single, targeted herbicide application from a remotely piloted aircraft system (RPAS) drone is effective in suppressing reed invasiveness

Pipistrel Velis Electro, the world's first type-certified electric aircraft, at the Region of Waterloo International Airport (YKF)

CERTIFYING ELECTRIC PLANES

Drs. Suzanne Kearns (Founding Director, WISA and Faculty, Aviation) and Mehrdad Pirnia (Faculty, Management Science and Engineering) work through the University of Waterloo's Institute for Sustainable Aeronautics on human-computer interaction, math modeling and ergonomics research to ensure that electric planes flying in Canada meet Canadian specific conditions.

LEARNING ABOUT WATER MANAGEMENT

Dr. Bryan Tolson (Faculty, Civil and Environmental Engineering), and Carissa MacKenzie (PhD candidate, Geography and Environmental Management) take graduate students to the headwaters near Luther Marsh, ON to Six Nations of the Grand River, to explore how water connects communities, ecosystems, and economies, and to grapple with the complex trade-offs inherent in water management.

Graduate students In the Collaborative Water Management Program course: Water 602: Integrated Water Management

IMPLEMENTING RENEWABLE ENERGY RESEARCH

Waterloo is a leader in renewable energy research. Faculty members like Juan Moreno-Cruz (Canada Research Chair in Energy Transitions) investigate large scale energy transitions and the interplay between energy, urban and industrial systems and how they shape economies of the past and future.

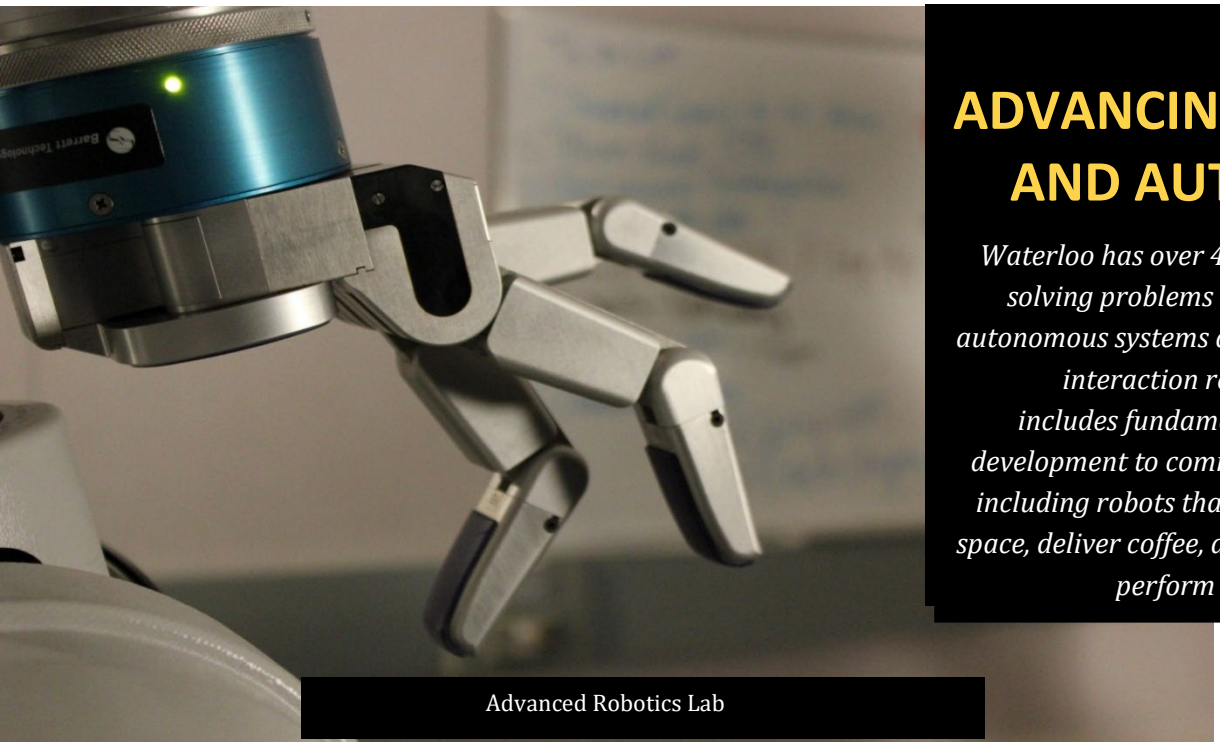
Faculty of Environment EV3 is the first LEED (Leadership in Energy and Environmental Design) Platinum Certified higher education building in Ontario with solar panels that produce enough power to run seven homes

TECHNOLOGICAL FUTURES

Technology continues to accelerate at an exponential pace, bringing both benefits and new challenges. Emerging technologies are often adopted before the full impact on culture and human behaviour is understood.

We have seen that big data can be harnessed to help governments and organizations make informed decisions and address equity and equality concerns. But this has also led to a loss of privacy and inequitable distribution of wealth. Cybersecurity and gaps in data literacy are ongoing risks. The world is now demanding that innovators develop technology with greater responsibility and accountability.

As Waterloo continues to lead in technology and innovation in critical areas, we have an opportunity to shape technology to serve society, rather than letting technology shape us.



Advanced Robotics Lab

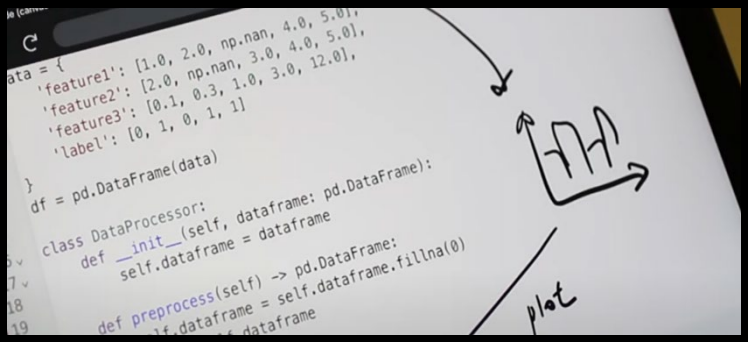
ADVANCING ROBOTICS AND AUTOMATION

Waterloo has over 45 Faculty members solving problems through robotics, autonomous systems and human-computer interaction research. This includes fundamental design and development to commercial applications including robots that build cars, explore space, deliver coffee, defuse land mines and perform surgery.

Research themes

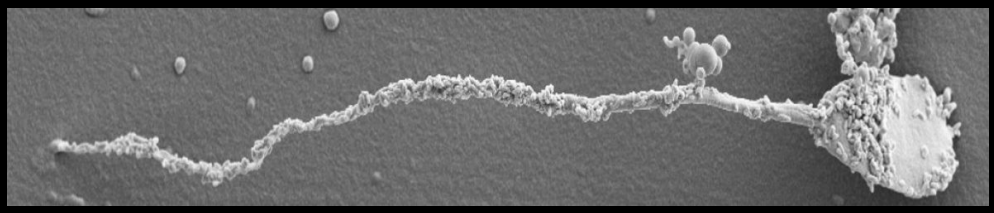
- Artificial Intelligence tools
- Aerospace, aviation, and defense sector applications
- Autonomous systems
- Biotechnology
- Cybersecurity and threat detection
- Data science
- Digital infrastructure
- Multi-scale and advanced manufacturing and construction
- Nanomaterials
- Process systems engineering
- Quantum technologies
- Robotics
- Sensor technologies and applications

INNOVATING SOFTWARE



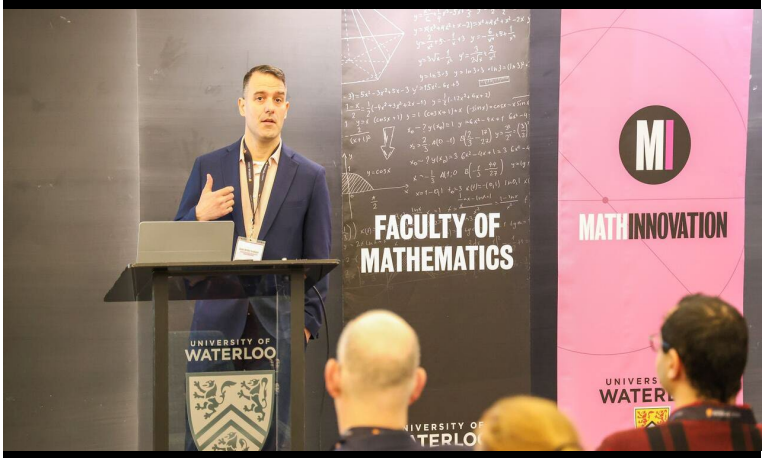
Code Shaping, developed by Computer Science graduate student Ryan Yen and his advisors, Dr. Jian Zhao and Dr. Daniel Vogel, allows users to shape code by drawing out ideas.

USING MICROROBOTS FOR DRUG DELIVERY



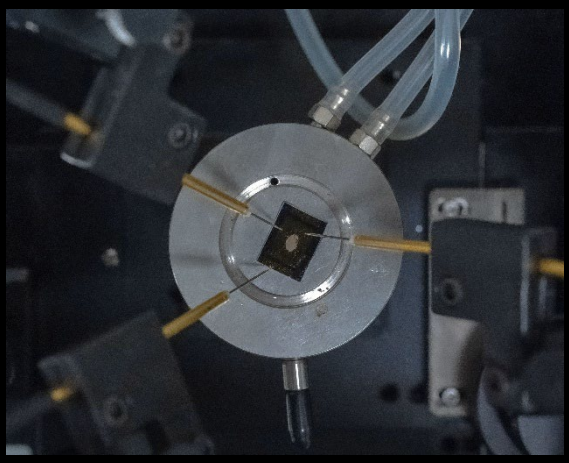
Dr. Veronika Magdanz (Faculty, Systems Design Engineering) develops microrobots that can be controlled magnetically for various medical, environmental, and manufacturing applications. IRONSperm microrobots have magnetite nanoparticles attached to the head, midpiece, principal piece, and distal end of a sperm cell and are localized by ultrasound to guide targeted drug delivery.

PIONEERING THE FUTURE OF AEROSPACE AI



Dr. David Del Rey Fernández (Faculty, Applied Mathematics and Pratt & Whitney Canada's Industry-Sponsored Research Chair in Industrial Artificial Intelligence) develops machine learning-driven simulation techniques that will revolutionize the way we design, test and optimize gas turbine engines.

IMPROVING BIOSENSORS



In the Nano and Micro Systems lab, Graphene Field-Effect Transistor (FET) Biosensors with graphene-nanomaterial structures are created by PhD student Inna Novodchuk under the supervision of Drs. Mustafa Yavuz (Faculty, Mechanical and Mechatronic Engineering) and Michal Bajcsy (Faculty, Electrical and Computer Engineering)

CREATING NEW MATERIALS

Using the latest techniques and technologies, Waterloo helps industries improve high value-added products and the processes used to design and fabricate them in the Multi-Scale and Additive Manufacturing Lab (MSAM)

Directors Drs. Ehsan Toyserkani (Canada Research Chair in Intelligent Additive Manufacturing) and Mihaela Vlasea (Canada Research Chair in Sustainable Additive Manufacturing) (front right) run the Multi-Scale Additive Manufacturing Laboratory where students, researchers, and industry partners foster innovation through advanced manufacturing technology and interdisciplinary collaboration.

ECONOMIC FUTURES

Technology is transforming the economy and the world of employment with the rise of hybrid workers, increased automation, and artificial intelligence. New technology can increase efficiency and flexibility, but the workforce must keep up with new systems.

Labour shortages, disruptions to supply chains, and geopolitical and digital threats have shown us the vulnerabilities and risks inherent in our economy. Canada faces serious challenges with productivity growth, and without a significant change in course we will not have the resources necessary to advance these futures and the challenges ahead.

Waterloo has the foundation to shape innovative ecosystems and develop talent to help create more e quitable, resili ent, and future-proofed economies.

UW Industrial-Organizational Psychology Graduate students (from left to right): Amy Baron (1st place), Iris Xing (2nd), Allister Grapes (3rd), Pearlyn Ng (EDI winner) dominated poster awards at the Canadian Society for Industrial and Organizational Psychology (CSIOP). First place research topic:

Factors that may bias managers' interpretation of mistreatment claims among employees

UNDERSTANDING ORGANIZATIONAL BEHAVIOUR

The first Masters class in Industrial-Organizational Psychology at Waterloo began in 1966. The program has since expanded to PhD studies and boasts graduate career trajectories in Ontario Hydro, Bell Canada, the Federal Government, the military, Deloitte, KPMG, Ernst and Young and SPG Canada, among others.

Research themes

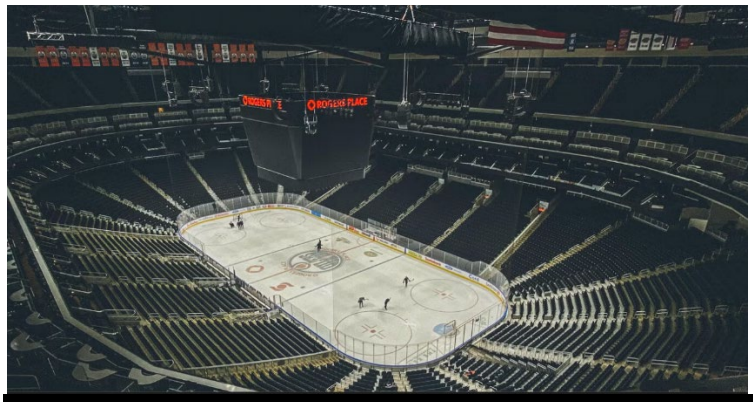
- AI adoption
- Autonomous systems and supply chain resiliency
- Biomanufacturing
- Commercialization activity
- Economic and insurance modeling
- Health system optimization
- Product lifecycle assessment
- Organizational behaviour and operations research
- Risk management theory and strategy
- Sustainable tourism

UNCOVERING CRITICAL MINERAL VALUE CHAINS

Dr. Steven Young (Faculty, School of Environment, Enterprise and Development) works with partners from UBC, Queen's University, the University College London-England, and the British Geological Survey to illuminate the sustainably of metals and minerals along mineral value chains in the Lumet project

COLLABORATING FOR RESEARCH COMMERCIALIZATION

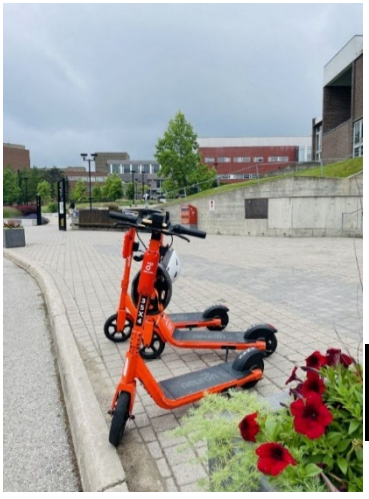
Waterloo's research partnership with Rogers focuses on a wide range of research topics such as 5G architecture and mobile remote healthcare; student engagement and commerical ecosystem development.



Waterloo and Rogers have a unique collaboration to enhance how hockey fans engage with the game and provide teams with valuable insights for data-driven decision making using 5G technology

STUDYING TOURISM

Researchers including Drs. Daniel Scott (Faculty, Geography and Environmental Management), Michelle Rutty (Canada Research Chair Tourism, Environment and Sustainability), Bryan S.R. Grimwood and Heath L. Mair (Faculty, Recreation and Leisure Studies) contribute to tourism research that helps shape local and global sustainable tourism initiatives like the region-wide e-bike and e-scooter rentals through the Neuron Mobility program.



Mobility scooters on campus

QUANTIFYING THE COST OF QUANTUM COMPUTING ATTACKS

Dr. Michele Mosca (below), co-founder of Waterloo's Institute for Quantum Computing (IQC) and softwareQ, and Dr. Vlad Gheorghiu softwareQ's co-founder and CEO, have developed a framework to estimate quantum computing attacks so that industries can be prepared.

Dr. Michele Mosca
(Faculty, Combinatorics and Optimization)

CONTRIBUTING TO INNOVATION

The Innovation Arena (IA) located on Waterloo's Health Sciences Campus empowers researchers, businesses, founders, and community partners to engage researchers and entrepreneurs in solving local, national, and global health challenges.

Together with Velocity (the University's flagship startup incubator) the IA streamlines commercialization pathways for businesses, fast-tracking the delivery of new technologies and helping drive Canada's next wave of economic growth.

Michael Phillips (shown- BASc'17, CEO, Co-founder) and Phillip Cooper (BASc'17, Co-founder) founded Vena Medical in their final year of their BASc. with support from Velocity Science. Their proprietary camera provides doctors with the ability to look from inside of the body in real time and offers greater image quality allowing for improved treatment of patients and ultimately better outcomes. The device has been used at hospitals in London and Ottawa to remove blood clots and restore blood flow as quickly as possible for five patients

REIMAGINING MATERIAL PRODUCTION

Waterloo researchers engage in circular economy research. This includes Chemical Engineering Drs. Elisabeth Prince, whose research creates more degradable and recyclable plastics; Christian Euler who reimagines how waste materials — such as plastics, carbon dioxide emissions, and agricultural residues, can be converted into marketable products; and Tizazu Mekonnen (Canada Research Chair in Sustainable Multiphase Polymers) who studies polymer processing and material design & fabrication to advance the sustainability and functionality of polymer systems.

Appendix A: Research Strategic Plan Consultation Process

Between January 2025 and October 2025, the Office of the Vice-President, Research and International undertook an extensive campus consultation process for the development of the Research Strategic Plan 2025-2030.

This process included meetings with diverse campus stakeholders from our faculty, administrative and student bodies. Targeted engagement invitations were made to ensure the consultations were conducted within an equity, diversity, and inclusion lens.

Existing strategic planning documents such as the Waterloo@100 and faculty and Indigenous strategic plans were used as background information for the development of the goals and objectives and were revisited throughout the process to ensure the efficient use of time and resources.

UNIVERSITY OF WATERLOO

This strategic plan was prepared by
Office of the Vice-President, Research and International

For further information regarding this report, please contact:
Wendy de Gomez by email at:
wdegomez@uwaterloo.ca

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For Discussion **Open Session**

To:	Senate Research and Innovation Council
From:	Rob de Loë Associate Dean, Research
Date of Meeting:	October 16, 2025
Agenda Item:	**6. Report from Senate Graduate Council**

Recommendation/Motion

Members of Senate Research and Innovation Council (SRIC) should indicate which of the potential topics identified by SGC (below) intersect with the mandate of SRIC and should receive attention at a future SGC meeting, and/or a joint meeting of SGC and SRIC.

Summary

SGC members recognized that research-based graduate students are important to the research enterprise at the University of Waterloo. Members identified the following potential topics for future SGC meetings that have implications for research at the University of Waterloo:

- Faculty members' research grants are an important potential source of graduate student funding, but SGC members noted a trend to using funds to support post-doctoral researchers and research staff rather than graduate students. What opportunities exist for enhancing graduate student funding and experience through increasing the use of grant funds?
- Strategic priorities for graduate education, and the role of graduate students in research, should be clarified.
- Strategic priorities for recruiting international graduate students should be clarified. Is an institutional plan for recruiting and supporting international graduate students needed?

Proposal/Rationale

Members of Senate Research and Innovation Council (SRIC) should discuss these topics, indicate their priority, and identify any additional concerns relating to graduate students and research at the University of Waterloo.