

Driving the Future with Research Excellence Ontario Tech University Strategic Research Plan Summary 2020-2025

Objectives of the Strategic Research Plan

The 2020-2025 Strategic Research Plan *Driving the Future with Research Excellence* will guide Ontario Tech University to attain a national leadership role in Canada's research community. Ontario Tech is a vibrant, engaged research community of faculty and students, equipped with world-class research facilities, and extensive networks of research partners. The university maintains a fundamental commitment to research excellence in answers to basic scientific questions, applied and technological innovation, and societal challenges. We work with industry in the commercialization of our research, collaborating with not-for-profits and community organizations, and contributing to the Canadian economy as well as to regional economic and social development. As we enter our third decade, Ontario Tech is poised to become a national leader among Canada's smaller research-intensive universities.

Through *Driving the Future with Research Excellence*, Ontario Tech will:

1. Intensify research capacity through partnerships.
2. Strengthen research excellence reputation nationally and internationally.
3. Optimize the matching of research strengths to opportunities.
4. Sharpen the positive impact of our research, regionally and nationally, on economic and social development as well as environmental sustainability.
5. Integrate equity, diversity and inclusion into all of our research activities and practices.

Priority Areas for Research and Training

This Strategic Research Plan identifies six priority areas that will help us to become research leaders by 2025. These priority areas, which build on and extend our current research strengths, reflect major anticipated research funding opportunities – provincially, nationally and internationally – that will be available to our research community over the next five years, and the research and commercialization needs of our diverse set of partners – industry, community organizations, the not-for-profit sector and governments.

1. Data science, artificial intelligence and new technologies

New and original pure research in computational science and computer research drives technological innovation around the globe. This pure research remains a fundamental priority. Novel integrated technological advances that build on this research drive economic prosperity, security, and social fairness. The use of advanced data analytic techniques including machine learning are revolutionizing diverse sectors of the economy ranging from cybersecurity and gaming to public education and health applications to software testing and industry that are creating demands for innovative applications of data science. Enabling technologies such as micro-and nano-electronics, nanotechnology, photonics and immersive technologies such as digital simulations and virtual reality present new opportunities for impactful Tech with a Conscience research.

2. Canada's energy and environmental future

The vision for a zero-carbon economy is one of the most ambitious and disruptive national goals Canada has ever embraced, in large part because it requires new thinking that reaches beyond research silos and integrates advances in the natural sciences and engineering, computer and computational science, business and the digital economy, and the health and social sciences. This vision also requires respectful consultation with Indigenous Peoples. Our immense strength in energy, applied bioscience, environmental sustainability, community wellness, information and communication technology, and business information technology, uniquely positions us to help shape the research agenda on Canada's Energy and Environmental Future and the role of disruptive technology in the realization of that vision.

3. Healthy populations, community well-being and social justice

We're committed to investing in our research capacity in the health and human sciences, including supporting our growing number of national and international collaborations in these fields. We place a special priority on COVID-19-related research, which we know will extend beyond the outbreak and exemplifies our nimble capacity to be responsive to the needs of Canadian society. Recognizing our research directly influences the health and well-being of Canadians, we'll continue to prioritize both pure and applied scientific discovery focused on human health and well-being, and biomedical research. Reflecting our institutional commitment to EDI, this positioning offers the university an opportunity for research synergies that will strengthen further our contributions to global public health, health promotion and improving human performance. These synergies will integrate our faculty members and students, including health scientists, psychologists, social scientists, and data scientists.

4. Autonomous vehicles and systems

Robotics, mechatronics and autonomous systems play an ever-increasing role in the world of tomorrow: from autonomous vehicles, to home assistant robots, to unmanned aerial vehicles. Our research strengths put us at the forefront of this interdisciplinary research area while at the same time contributing to Canada's capacity for advanced and intelligence manufacturing. Building on our unique research capacities at ACE, including the new moving ground plane, our current strengths in Automotive Engineering, Transportation and Electrification Systems, and Digital Technologies, Machine Learning, and Artificial Intelligence have positioned us as a research hub in future-looking autonomous/electric vehicles and systems, while expanding the historic role that the region has had in the automotive sector. This includes embedded software, real-time systems and safety-critical software systems.

5. Intelligent manufacturing and materials innovation

In the current climate of global economic uncertainty, restoring and extending Canada's manufacturing capacity is key to securing the country's economic future. Considering our geographic location and research potential, we prioritize supporting the next generation of manufacturing as a Canadian supercluster in innovation, science and economic development. Our research has always positioned itself as an important contributor to the advanced manufacturing space. Disruptive and emerging technologies create new opportunities to expand these contributions. The integration of intelligent and autonomous technologies that utilize artificial intelligence and machine learning for advanced manufacturing is a research priority, allowing us to build on current research strengths to

establish ourselves as a leader in manufacturing and materials innovation. This is a response to the forecasted demands from the industries to move towards the objectives of Industry 4.0, the latest revolution in industrial manufacturing.

6. Social innovation, disruptive technologies and the new economy

Disruptive technologies have played an important part in the creation of the new economy, characterized by precarious employment, vulnerable populations, growing income inequality, mental health crises, dysfunctions in the criminal justice system and social exclusion. Our research strengths in business and the social sciences have enabled the university to become a hub of social innovation and critical inquiry into this new economy. Volatility and uncertainty in global health security, local communities and economic markets create a pressing need to address the social and EDI impact and dimensions of these changes.

Canada Research Chair Gender Equity and Diversity

Achieving a more equitable, diverse and inclusive Canadian research enterprise is essential to creating the excellent, innovative and impactful research necessary to seize opportunities and realize positive local and global impact. Ontario Tech University is an advocate for equity and is committed to ensuring representation of qualified persons in underrepresented groups within the Canada Research Chairs (CRC) Program. We have met, and are conscientiously working to exceed the current EDI requirements and diversity targets of the Canada Research Chair Secretariat. We were among the first Canadian universities to endorse the Tri-Agency Dimensions Charter on EDI in 2019 and are among the first recipients of a major institutional Natural Sciences and Engineering Research Council of Canada (NSERC) EDI Capacity Building Grant.

Ontario Tech University will support greater equity, diversity and inclusion (EDI) in the Canada Research Chairs (CRC) Program by committing to:

- **Embed the values of EDI into our academic and research culture at all levels, starting at the top.** This begins with an institutional equity statement that is reflected in all policies and procedures, as well as in the everyday actions of senior leaders, administrators, faculty and students.
- **Ongoing rigorous self-assessment to keep appraised of our community's composition and needs.** We commit to pan-university data collection to gather baseline data and analyze it through an intersectional EDI lens in order to better inform our institutional EDI strategy by identifying barriers to EDI in the CRC Program and in the research culture at large.
- **Attract and retain diverse talent to the CRC Program, and to the university at large.** We will proactively consider EDI in the recruitment process to diversify our pool of CRC applicants. We will create an inclusive workplace that offers equitable access to resources and opportunities by providing suitable support and mentorship to faculty members in the four designated groups—women, persons with disabilities, Indigenous peoples and members of visible minorities.

University Deployment of Canada Research Chairs

Ontario Tech allocates CRCs through a Base Chair allocation and a Competitive Chair allocation process. Each Faculty receives a Base Chair allocation of one CRC. CRC vacancies above the Base Chair allocation are distributed utilizing an internal competitive review process. Vacant CRCs are allocation within the institution to ensure the equity, diversity and inclusiveness targets, and strategic research priorities of the university can be achieved. The University recognizes that the Canada Foundation for Innovation is a key source of funding required to establish the necessary infrastructure essential to the success of our Chairs. CRCs, entering the first term, have a predetermined infrastructure envelope for the Canada Foundation for Innovation (CFI) partnered to the Canada Research Chairs Program.

The following table situates Ontario Tech’s 11 CRCs (both occupied and nominations submitted) in their primary SRP thematic area, however, all of Ontario Tech’s CRCs are interdisciplinary researchers.

Thematic Area	NSERC		SSHRC		CIHR	
	Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
<i>Data science, artificial intelligence and new technologies</i>		3				
<i>Canada’s energy and environmental future</i>		2				
<i>Healthy populations, community well-being and social justice</i>					1	1
<i>Autonomous vehicles and systems</i>	1	1				
<i>Intelligent manufacturing and materials innovation</i>						
<i>Social innovation, disruptive technologies and the new economy</i>				2		

Support for Research and Training

We have a strong commitment to providing the research infrastructure and services that are necessary for all members of our research community to achieve excellence in their research programs. Key components of this commitment include:

- Having high-tech research facilities and increasing investments in Core Facilities.
- Strengthening the internal information technology supports for research.
- Integrating our researchers into regional and national high-performance computing and data networks.
- Enabling access to student research assistants.
- Offering research leave and research chair opportunities.
- Providing research services that guide and support researchers with the submission of funding applications, compliance with research ethics and financial accountability.

Collaborations

Research at Ontario Tech is strengthened through its research centres and institutes, industry and community partnerships. We help industry, community, government and academic partners be more

effective by bringing them together with students and researchers to uncover innovative solutions for our partners' most pressing problems. Through partnership, we expand the scope of our teaching and research. This enables us to make a positive impact on the social, health and economic well-being of people worldwide such as ensuring safe drinking water for those living in developing countries or using Big Data to develop a 'wellness ecosystem' that supports advanced clinical decision-making for premature infants facing life-threatening complications.

Performance Metrics

The success of Ontario Tech's SRP will be measured by its five objectives as follows:

- 1. Research Partnerships** – Increase the number of multidisciplinary partnerships and broaden research commercialization opportunities.
- 2. Reputation for Research Excellence** – Rank among the top 35 research universities in Canada and among the top 25 universities in terms of research-intensity. Increase the major awards and honours received by researchers in recognition of their contributions to research and scholarship.
- 3. Research Capacity and Training Opportunities** – Establish new core facilities, research centres, institutes and chairs in our areas of strength. Expand our graduate and postdoctoral complement and increase research opportunities for undergraduates.
- 4. Regional and National Impact** – Make economic, social and environmental contributions to Durham Region and across Canada. Engage students in research opportunities with local and national partners.
- 5. EDI Practices** – Emerge as a leader among Canada's smaller research-intensive universities in the integration of EDI in research and scholarship.

Annually, the Vice-President, Research and Innovation will provide a report card to Academic Council and the Board of Governors on the progress we have made in meeting the five SRP objectives as well as our successes in the current research strengths and the strategic research priorities. This report card will integrate fully traditional research assessment metrics with newer ways to assess research excellence so that this reporting exercise is a reflection of our strong commitment to equity, diversity and inclusion. It will also identify areas of concern that require improvement.

Planning and Approval Process

The development of the Strategic Research Plan involved extensive engagement and consultation with the campus research community and partners. This included surveys of core faculty members, presentations to the Research Board and Faculty Councils, and several town halls. The SRP was reviewed by Research Board, Academic Council and approved by the Board of Governors.