

The University of Winnipeg CRC/CFI Strategic Research Agenda (2020-2023)

Introduction

The University of Winnipeg is a comprehensive learning institution with a strong history of research and teaching excellence that spans the sciences, social sciences, humanities, and education. Our growth in research is evident in our faculty's attracting external grants and awards exceeding \$12 million in both 2018 and 2019 respectively. Faculty at the University of Winnipeg remain leaders in Canada at integrating students into their research programs. Our strength in training is illustrated by the numbers of students who successfully compete for a variety of external and internal undergraduate and graduate research scholarships and awards and to those who go on to exciting careers in a range of industries. The University is also home to a number of research institutes and centres such as: The Prairie Climate Centre, The Institute for Women's and Gender Studies, Planetary Spectrophotometer Facility (PSF), Centre for Forest Interdisciplinary Research (C-FIR), Centre for Research in Young People's Text and Cultures (CRYTC), the Prairie Research Institute for Materials and Energy and our most recent Access to Information and Justice Centre.

This Strategic Research Plan draws form on two key documents; our Strategic Directions (2015) and our Integrated Academic and Research Plan (2016-2021). Drawing from these documents, we outline how the Canada Research Chair (CRC) and Canada Foundation for Innovation (CFI) programs will continue to be used to enhance our capabilities. The foundation of this plan is built on the following Strategic Directions:

- Academic Excellence and Renewal;
- Student Experience and Success;
- Indigenization;
- Research Excellence, Knowledge Mobilization, and Impact; and
- Financial and Institutional Resilience

Objectives

Expanding our capabilities for interdisciplinary/multidisciplinary and/or collaborative research, along with enhancing our existing research abilities and resources are the primary goals of the University of Winnipeg. The following objectives express how we will work towards these goals. Taken together, the objectives apply to the research thrusts described in this strategic research document:

1. Promoting emerging areas of interdisciplinary/multidisciplinary and/or collaborative research;
2. Fostering research excellence by enhancing the University of Winnipeg's role in the broad exchange of knowledge;
3. Elevating faculty renewal by recruiting high quality researchers;
4. Building and collaborating on sustainable infrastructure to support cutting-edge research; and
5. Strengthening our commitment to Equity, Diversity and Inclusion in pursuit of research excellence.

Assessing Success in Meeting Objectives

The success of the CRC and CFI programs is measured by the progress achieved using the following indicators as the benchmark:

- Enhancing the number of successful interdisciplinary research teams or clusters of scholars drawn from diverse areas of expertise who will work to develop research strategies and applications that improves success rates.
- Increasing the number of scholars who play significant roles in major national and international research programs, conferences and scholarly meetings, grant review panels and editorial boards.
- Building and strengthening relationships with a variety of external organizations (e.g. other universities, NCEs) and other constituencies (e.g. governments, industry, NGOs, community) will be deepened and enhanced.
- Growing our reach in knowledge mobilization and the transfer of intellectual property outside of the university via traditional academic means (enhanced publication records) and to the general public.
- Encouraging and supporting a research environment that is committed to EDI principles that will guide research teams, Chairs and how infrastructure projects are developed and support faculty growth.

Research Thrusts

The University of Winnipeg has identified ten key research thrusts in which to develop or maintain excellence.

1. Applied Health and Medical Research
2. Cultural Studies
3. Environmental Studies and Freshwater Ecology and Hydrology
4. Experimental Physics
5. Advanced Research Computing and Data Analytics
6. Indigenous Development and Studies
7. Materials Science
8. Planetary Science
9. Urban Studies
10. Justice and Information

Research Area Descriptions

1. Applied Health and Medical Research

Applied health and medical research at the University of Winnipeg involves faculty members from the departments of Applied Computer Science, Biology, Chemistry, Geography, Kinesiology, Physics, and Psychology. Since 2004 we have been actively involved in magnetic resonance imaging (MRI) procedures to study a wide variety of physical, chemical, biological, and material properties in order to locate and/or diagnose injury, disease, and human development. We broadened our health research to include biomedical studies such as the analysis of biomarkers for colorectal cancer, and examining DNA including active human endogenous retroviruses in neurons of ALS patients. As well, extensive research has been conducted in the area of mental health. The University of Winnipeg's support of the development of research and research training in this area is evidenced by the active collaborative relationships with scientists at other institutes such as: the Winnipeg Health Sciences Centre (HSC), The University of Manitoba, the Robarts Research Institute, the California Institute of Technology and the Mental Health Commission of Canada. It is also evidenced by the hiring of faculty members who specialize in both applied medical research and health research, and the training of undergraduate, graduate and post-doctoral students.

2. Cultural Studies

Cultural Studies at the University of Winnipeg is a strong interdisciplinary/multidisciplinary research area where our researchers seek to explore culture and the arts as part of a social, economic and political environment.

Departments involved in this interdisciplinary/multidisciplinary field of research include: Education, English, (Art) History, Geography, Politics, Rhetoric, Writing and Communications, Sociology, and Women's and Gender Studies. The University of Winnipeg has a solid base of researchers working in this area, including the Canada Research Chair in Culture and Public Memory, and the former Canada Research Chair in Young People's Texts and Cultures. The Cultural Studies Research Group, Centre for Research in Young People's Texts and Cultures (CRYTC), and the Institute of Women's and Gender Studies provides our researchers with a strong support base to begin collaborations with researchers from around the world who are engaged in work in our newly launched and interactive centre. The new research space has served to welcome faculty and community from a range of disciplines.

3. Environmental Studies and Freshwater Ecology and Hydrology

The environment is the fastest growing concern among Canadians today. Global warming, air and water pollution, forest and wildlife management, organic chemical contaminants, and community sustainability are the main focus of this important research thrust. Environmental Research is a highly collaborative and interdisciplinary research thrust which involves faculty members from various departments, including Biology, Chemistry, Economics, Education, Environmental Science, Geography, and Sociology. The University of Winnipeg has a solid base of researchers already working in the area of environmental research, including our previous Canada Research Chairs in Environmental Toxicology and Dendrochronology. We currently have programs in freshwater ecology, environmental chemistry of organic contaminants, and northern community sustainability. The establishment of the Richardson College for the Environment and Science Complex, along with the Centre for Forest Interdisciplinary Research (C-FIR) provides the University with a strong support base in this research area. As well, the Prairie Climate Centre includes a research partnership with the International Institute for Sustainable Development.

4. Experimental Physics

Recognizing the growing importance of basic research in the global scientific community, the University of Winnipeg hired an experimental subatomic physicist in October 2004. Since joining the faculty, the researcher has played an important role in a large number of prestigious research collaborations and in the training of highly qualified personnel. The University has also successfully acquired the needed infrastructure to expand our institution's research capabilities and hired additional researchers to accommodate this growing area. We are now focused on the future of this timely research field. All experimental physics research at the University of Winnipeg is done in close collaboration with Canadian institutions, as well as international groups. The Canadian contingent on most of these projects is represented by groups from the University of Winnipeg, TRIUMF, the University of Manitoba, the University of British Columbia, the University of Northern British Columbia, and Simon Fraser University. The University of Winnipeg is now the lead applicant on a large collaborative experiment involving researchers from Japan by developing a unique and state-of-the-art ultracold neutron source. This infrastructure will be the most advanced of its kind in the world, and will place Canada at the forefront of this research area. The availability of cutting-edge equipment and the proximity of researchers from around the world and across the research spectrum will provide a unique training ground for University of Winnipeg students and would greatly enhance the ability to train HQP. This work also leverages the national infrastructure of TRIUMF, allowing our faculty and students to be at the forefront of research.

5. Advanced Research Computing and Data Analytics

Large-capacity, low-cost storage coupled with inexpensive sensors have led to an enormous growth of data in many fields. Advanced research computing hardware is needed to analyze, visualize, model, extract patterns of interest, and develop algorithms from these large datasets. GPU-based computing, for example, is essential for machine learning and artificial intelligence development and applications. The University of Winnipeg established a GPU teaching centre in 2014, followed by the *Dr. Ezzat A. Ibrahim GPU Educational Lab* in 2018. Researchers in the departments of Applied Computer Science, Biology, Chemistry, Mathematics, and Physics have benefited immensely from such support, leading to many interdisciplinary, collaborative projects. The TerraByte Research Group, established in 2017, develops automated methods for generating and labeling large amounts of image data that are in turn used to develop data-driven decision making and machine learning applications for agriculture. Their data is publicly available via the Digital Research Alliance of Canada's digital object storage system, and the group has taken a lead role in the process of analyzing, curating, and maintaining large datasets that can be accessed by other Canadian researchers and innovators. This is just one example of how research and real-world applications rely more and more on massive data sets. Through its investment in advanced research computing and data analytics, UWinnipeg has positioned itself at the forefront of data-driven research.

6. Indigenous Development and Studies

The University of Winnipeg is proud to have launched its Indigenous Course Requirement in the fall of 2016 which builds on our Strategic Direction. As well, Winnipeg is home to Canada's largest urban Indigenous population. Indigenous peoples of Canada are diverse with distinct cultures, languages, religious beliefs, political systems, and histories. There is a multitude of research themes that are currently being explored within both an urban and regional context at the University of Winnipeg including mobility to and from urban and rural contexts, self-governance, education, economic and community development, history, social welfare, policy, and health. This research involves faculty from all areas including: Indigenous Studies, Economics, Education, Geography, History, Politics, and Urban and Inner-City Issues. With three recent Canada Research bringing health, history and art together, the University of Winnipeg will launch a collaborative research centre that will be the first of its kind in bringing people together in an innovative space.

7. Materials Science

Modern technologies are becoming increasingly reliant on fundamental research into the magnetic and electronic properties of materials, be it for "green" methods of energy storage, more efficient power grids in inner cities, or the superconducting materials in MRI magnets. The University of Winnipeg's material chemist has established a world class materials institute to address these problems. As a result, PRIME was established (the Prairie Research Institute for Materials and Energy) – a materials center which involves Brandon University, The University of Manitoba, The University of Saskatchewan, and the University of Alberta. The institute has resulted in the training of highly qualified personnel, enhanced collaborations between chemists, physicists and engineers, and increased output of scientific papers. Materials Science research is a highly interdisciplinary and involves large collaborations among many institutions and national laboratories such as the Canadian Light Source and Chalk River National Laboratories. International collaborations have already been established through connections with Oak Ridge National Laboratories (US), the National High Magnetic Field Laboratory (US), and the Institut Max Von Laue – Paul Langevin (France).

8. Planetary Science

Planetary exploration and the adaptation of planetary remote sensing techniques to various terrestrial applications is a strong research area at The University of Winnipeg. Exploration into the solar system, particularly Mars, is now the focus of Canadian and international space agencies. Research performed in our Planetary Spectrophotometer Facility (PSF), and Centre for Scientific and Curatorial Analysis of Painting Elements (C-SCAPE), plays a major role in this exploration. Research conducted within the PSF is supporting analysis of data from a number of existing and future planetary missions. The research in this area being conducted at the University is done in close collaboration with Canadian institutions, international groups and academic institutions, and Canadian companies. The expertise and world-class mix of research instrumentation housed within these research centers has resulted in a number of potentially commercially viable projects being launched. These include work on low-cost, real-time analysis of diamond indicator minerals and oil sand cores.

9. Urban Studies

Research in this area focuses on urban issues facing communities in the coming decades. These include growing disparities of wealth, shrinking household size, urban migration and integration of Indigenous and newcomer populations, housing and community renewal, and the role of community organizations in urban redevelopment planning. As an institution, we are particularly interested in contributing to the development of policies and programs that will address the needs of the Indigenous, refugee, and immigrant communities that make-up the largest proportion of Winnipeg's inner-city neighbourhoods. This is an area which is interdisciplinary and action-based by nature and involves collaboration with community organizations and government departments. As an urban institution we are uniquely positioned as an active community member which gives us the opportunity to conduct research within our surrounding community as well as nationally.

10. Justice and Access to Legal Information

Justice, as a broad area of focus, is well represented at the University of Winnipeg. Our Department of Criminal Justice is home to interdisciplinary research that explores current and historic legal issues in the Canadian criminal justice system. With a new Master's program and the launch of The Access to Information and Justice Centre, our faculty are well positioned to address many complex issues facing the Canadian justice system.

Equity, Diversity and Inclusion (EDI) and CRC Nominations

The University of Winnipeg has a strong EDI commitment in its faculty and staff hires to achieve equitable representation. Within our institutional Employment Equity and Diversity Policy (June 1, 2015) we identify measures for removing barriers to the recruitment, selection, promotion and retention of individuals without regard to ancestry, including colour and perceived race; nationality or national origin, religion or creed or religious belief, religious association or activity; age; sex, including pregnancy; gender identity, sexual orientation, marital and family status, source of income, political belief, physical or mental disability, or social disadvantage. To date the university has appointed 50% of its Canada Research Chairs to females, and 10% of appointments have identified as being a member of a visible minority.

The University of Winnipeg acknowledges that the principles of responsible stewardship, public accountability, and equity, diversity, and inclusion will be respected in decisions made regarding the CRC program and in the allocation of CFI funding. The University of Winnipeg's CRC Equity Plan is a central part of this process: <https://www.uwinnipeg.ca/research/equity,-diversity--inclusion-in-the-canada-research-chairs-program.html>. It is important to acknowledge that the University of Winnipeg is creating a central HUB for Equity information and

Resources that will build on the CRC Equity Plan. The UW is also part of the Dimensions Pilot:

https://www.nserc-crsng.gc.ca/InterAgency-Interorganismes/EDI-EDI/Dimensions-Program_Programme-Dimensions_eng.asp. This work will be critical for long term EDI implementation. As well, the UW received

funding from NSERC Equity completion is helping support an institutional strategy:

<https://news.uwinnipeg.ca/uwinnipeg-receives-grant-to-strengthen-equity-diversity-and-inclusion-on-campus/>

Planning and Approval Process

The University of Winnipeg's planning and approval process for CRC and CFI opportunities is open and includes consultations with all Departments and Faculties and is articulated within our current Collective Agreement. This plan is part of the CRC Equity Plan that is published and reviewed annually for progress and posted on the Research Office website.

For Canada Research Chairs, a nomination selection committee consisting of faculty members elected by their peers, the appropriate faculty Dean, the Vice-President, Research and Innovation and the Provost and Vice President, Academic is formed. This committee puts forward a call for nominees which are then vetted and interviewed before a final applicant who will be put forward as the institutional nominee is selected. It is important to note that the committee structure, training and resources are expanded within our CRC Equity Plan.

For CFI opportunities, the Vice-President, Research and Innovation initiates an open invitation to faculty members to submit a letter of interest to apply for CFI funds. This letter includes a 3-5-page summary of the proposed infrastructure and project, and a budget justification and an EDI statement. An ad-hoc internal committee reviews all proposals and determines which will be asked to prepare an external application. Final approval comes from the Vice-President, Research and Innovation and the President.

Postscript

This CRC/CFI Strategic Research Plan outlines the thematic areas in which we are deploying our CRCs and focusing our requests for CFI infrastructure. It does not address all research strengths at the University of Winnipeg.