

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

Introduction

The University of Winnipeg is a learning institution with a strong history of research and teaching excellence spanning the natural and social sciences, humanities, and education, home to a number of leading research institutes and centres. Our growth in research is evident in faculty attracting grants and awards exceeding \$12 million in both 2018 and 2019 respectively. Faculty at the University remain leaders in integrating students into research programs. Our strength in training is illustrated by the numbers of students successfully competing for external and internal undergraduate and graduate research scholarships and awards, and going on to excel in a range of industries. This Strategic Research Plan draws on two key documents; our Strategic Directions (2015) and our Integrated Academic and Research Plan (2016-2021). From these documents, we outline how the Canada Research Chair (CRC) and Canada Foundation for Innovation (CFI) programs will continue to enhance our capabilities. Specifically, this plan is built on the University's Strategic Directions: Academic excellence and renewal, student experience and success, indigenization, research excellence, knowledge mobilization and impact, and financial and institutional resilience.

Objectives

By participating in the CRC and CFI programs and through our research thrusts described in this document, the University aims to expand our capabilities for interdisciplinary, and collaborative research, and to enhance our existing research capacity and resources. In order to achieve these goals, the University is committed to:

1. Promoting emerging areas of interdisciplinary, multidisciplinary and collaborative research;
2. Fostering research excellence by enhancing our role in the 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 (EDI) 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 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 external organizations (e.g. other universities, NCEs) and constituencies (e.g. governments, industry, NGOs, community).
- 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

1. Applied Health and Medical Research

Applied health and medical research 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. The University's support of research and training 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 is a multidisciplinary research area where researchers explore culture and the arts as part of a social, economic and political environment. Departments involved include: Education, English, (Art) History, Geography, Politics, Rhetoric, Writing and Communications, Sociology, and Women's and Gender Studies. The University 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 provide 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 research 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

Global warming, air and water pollution, forest and wildlife management, organic chemical contaminants, and community sustainability are the main foci of this important research thrust. Environmental Research is a highly collaborative and interdisciplinary research field which involves faculty members from various departments, including Biology, Chemistry, Economics, Education, Environmental Science, Geography, and Sociology. The University has a solid base of researchers making significant advances in environmental sciences, 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 recently established Richardson College for the Environment and Science Complex, the Centre for Forest Interdisciplinary Research (C-FIR) and the Prairie Climate Centre through its research partnership with the International Institute for Sustainable Development provide the infrastructure and support for globally impactful research in this area.

4. Experimental Physics

Since the establishment of its experimental subatomic physicist program in 2004, the University of Winnipeg has played key roles in many prestigious national and international research collaborations, and is training a highly qualified and successful next generation of physicists. The institution's research capabilities continue to expand through the acquisition of state-of-the-art infrastructure and recruitment of world class researchers. With its Canadian partner institutions, TRIUMF, the University of Manitoba, the University of British Columbia, the University of Northern British Columbia, and Simon Fraser University, the University of Winnipeg now plays leading roles in large collaborative international experiments such as the current development of a unique and state-of-the-art ultracold neutron source in the Western Pacific. 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 students and further enhance the University's strength in this area. 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 to 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 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 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 Chairs bringing health, history and art together, the University 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’s material chemist has established a world class materials institute to address these problems, PRIME (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 highly interdisciplinary and involves large collaborations among many institutions and national laboratories such as the Canadian Light Source and Chalk River National Laboratories. PRIME and the University also collaborate internationally 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. 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 commercializable 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 surroundings community as well as nationally.

10. Justice and Access to Legal Information

Justice, as a broad area of focus, is well represented with our Department of Criminal Justice. This department 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.nserc-crsng.gc.ca/InterAgency-Interorganismes/EDI-EDI/Dimensions-Program_Programme-Dimensions_eng.asp. It is important to acknowledge that we are 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, funding from NSERC 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.