



## 2019-2025 Strategic Research Plan

### Summary for the Canada Research Chair Program (CRCP) and the Canada Foundation for Innovation (CFI)

#### **Brock University Strategic Research Plan**

#### **“Niagara Roots – Global Reach”**

Home to over 19,000 students and 600 faculty in six academic Faculties, and with an allocation of 12 Canada Research Chairs, Brock University has grown from its modest roots of primarily serving the Niagara region. Students and scholars from every continent are welcomed to Brock, and they in turn represent the university in partnerships and initiatives around the world. As we look forward to marking our 60<sup>th</sup> anniversary in 2024, this Strategic Research Plan (SRP) will guide us in defining areas of existing research excellence, as well as areas of emergent opportunity, all while holding firm to principles of equity, diversity, and inclusion (EDI); commitment to reconciliation with Indigenous communities; and embracing different ways of knowing, including Indigenous knowledge and transdisciplinarity.

#### **Strategic Research Plan Objective**

In accordance with the Brock University Strategic Plan 2018–2025, the objective of this Strategic Research Plan is to promote alignment among research capacity and infrastructure, areas of excellence, recruitment of scholars and graduate students, and capacity for Brock research to have high impact through uptake, partnerships, commercialization, and collaborations. The Canada Research Chairs program (CRCP), and affiliated Canada Foundation for Innovation programming, will serve as multipliers on the intensity and impact of Brock University research, scholarship, and creativity, by supporting collaborative and transdisciplinary inquiry across areas of research excellence.

Brock is committed to equity, diversity, and inclusion in all our functions, including within the research enterprise. As the CRCP grows, the relatively small number of Chairs at Brock means that gaps remain in some Designated Groups. Our efforts to address these gaps are guided by an Equity, Diversity, and Inclusion (EDI) Action Plan, which identifies how equity efforts are being monitored and evaluated, and is supported by the Human Rights & Equity Office and the Vice-Provost of Indigenous Engagement.

Within Brock University’s Strategic Plan (2018–2025), four strategic research goals were defined to build *research capacity* across the university. These goals are to:

1. *Nurture a culture of research and creative excellence.*
2. *Invest in research infrastructure and support to ensure sustainable and accessible research services for the Brock scholarly community.*
3. *Enhance transdisciplinary research and high-impact research practices.*
4. *Build awareness of Brock University as a centre of research excellence.*

The following themes represent areas where Brock University will focus its recruitment and retention efforts in the CRCP. Each research theme builds on existing capacity at Brock, as

demonstrated through centres, institutes, and transdisciplinary hubs, through existing collaborations with community and industry partners, and research facilities.

### **Theme A: Cognition, Creativity, and Culture**

At Brock, the complexity and richness of thought and culture from the ancient to the contemporary are understood through methods encompassing artistic expression and literature, discovery, analysis and preservation of material culture, and neuroscience and behavioural sciences. The Marilyn I. Walker School of Fine and Performing Arts brings together cultural and artistic initiatives including the Small Walker Press, theatre and musical performance, and gallery space, that enrich and are inspired by its urban environment in downtown St. Catharines. Brock University researchers conduct ground-breaking scholarship in a number of areas, including preservation and display of antiquities, posthumanist philosophy, rhetoric and lexical choice in communication, animal cognition and inter-species relations, and cognitive processes, preferences, and decision making across the lifespan.

The intersection of technology and creativity will continue to build Brock's research capacity in the foundations of thought, language, and emotion, while enabling novel methods and transdisciplinary approaches to research in the arts and culture. Existing resources include the following:

- Research centres, institutes and transdisciplinary hubs: Digital Humanities Lab; Centre for Neuroscience; Centre for Research in Multiliteracies; Tecumseh Centre for Aboriginal Research and Education; Posthumanism Research Institute; the Brain and Language Lab, and the Humanities Research Institute.
- Collaborations with community and industry partners include the Educational Research and Innovation Hub (ihub), an educational technology incubator that connects educational technology companies and researchers with teachers and students in the local school in which it is housed; the FirstOntario Performing Arts Centre; Tecumseh Centre and Local Indigenous communities including a number of Friendship Centres; the Six Nations Polytechnic Institute; and the Oshki-Wenjack Institute.
- Research facilities include Words in the World lab; Digital Scholarship Lab; Neurocognitive Aging Lab; Learning Innovation Networking and Collaboration (Brock LINC); and multiple Makerspaces.

### **Theme B: Health, Sport, and Performance Across the Lifespan**

Whether examining tropical diseases, risk factors of children and youth, improving seniors' fitness or understanding how physical activity and recreation can improve our well-being, Brock research is leading edge. Brock University will continue to build on its strengths in research across a wide array of health-related issues, including chronic health conditions and physical challenges, disease management and related social and health complications, epidemiology, and social and developmental determinants of physical and mental health.

Health research, sport research, and the study of human performance implicate factors ranging from basic science in biology and human development to issues in socio-economic policy, education, training, technology, and nutrition. A transdisciplinary approach aims to integrate these issues, emphasizing their determinants and their implications across the spectrum from the sub-cellular to the social. Brock University will support excellence in this research through institutional strengths, infrastructure, and partnerships that include the following:

- Research centres, institutes, and transdisciplinary hubs: Brock–Niagara Niagara Centre for Health and Well-Being; Centre for Lifespan Development Research; Centre for Sport Capacity; Brock Institute for Electrophysiological Research; Centre for Bone and Muscle

Health; Centre for Youth Sports Research; Centre for Vector-Borne Diseases; Advanced Biomanufacturing Centre; Niagara Community Observatory; Environmental Sustainability Research Centre.

- A rich set of community, industry, and agency partners in research and innovation, including partnerships with major regional health providers; sports technology and clothing designers and manufacturers; the 2021 Canada Summer Games; partners in the wearable technology industry; and providers of technology for the fields of mining, firefighting, and search and rescue.
- Research facilities include Brock's Environmental Ergonomics Laboratory; Nutritional and Musculoskeletal Research Laboratory; Lifespan labs; EEG labs; a Sleep Research Laboratory with associated EEG infrastructure; The Skating Lab; Outdoor Education Lab; Level 3 Containment Lab (CL3).

### **Theme C: Society, Well-Being, and Social Change**

With rapid social change comes the need for governance tools and strategies to help manage these changes. From the functioning of societies to the well-being of their citizens and their relationships with the natural world, Brock researchers generate high-impact findings on issues that span the personal and the organizational at all levels. Areas of research strength include democratic processes, social change and history in the Niagara region and globally, business and entrepreneurship, critical animal studies, and determinants of mental health.

Through the implementation of its integrated strategic plan, Brock University will continue to build scholarly excellence for inquiry and evidence-based analysis that supports policy development, political and historical scholarship, socio-economic analysis, and a broad understanding of wellbeing that spans personal, organizational, and environmental factors. Institutional resources, organizations, and partnerships that support these outcomes include the following:

- Research centres, institutes, and transdisciplinary hubs: Brock–Niagara Centre for Health and Well-Being; Centre for Business Analytics; Centre for Lifespan Development; Niagara Community Observatory; Environmental Sustainability Research Centre; Posthumanism Research Institute; Tecumseh Centre; and the Centre for Multiliteracies.
- Community, industry, and agency partners in research and innovation include the Niagara Parks Commission; the Region of Niagara; the town of Lincoln; local Alzheimer's support and advocacy networks; and the CPA Brock Accounting Research and Education Centre (BAREC).
- Research facilities include the Brock Research Innovation Centre site; dedicated interview and focus group space within the Social Justice Research Institute; a Physical, Augmented, and Virtual Reality Consumer Lab; imaging and testing suites within the Centre for Lifespan Development; the Brock–Niagara Centre for Health and Well-Being; and the Outdoor Education Lab, which capitalizes on our Niagara Escarpment location.

### **Theme D: Environment, Bioproducts, and Physical Systems**

Its location on a UNESCO Biosphere Reserve and in one of Canada's primary wine-growing regions has meant that Brock researchers have developed expertise in environment, agriculture, and earth's physical and chemical systems. The Cool Climate and Oenology Viticulture Institute (CCOVI) addresses the priorities of the local grape and wine industry offering virus-testing and VineAlert (cold hardiness monitoring) programs, sensory and consumer preference analysis and fermentation research. Brock researchers are also noted for their expertise in organic compound synthesis, isotope geochemistry, and micromorphology.

Brock's demonstrated expertise in organic synthesis and fermentation lead naturally to new research thrusts in bio-products, capitalizing on the momentum building around the local cannabis industry, for example. New partnerships with local industry will create new capacity in testing, prototyping, and manufacturing in the region's core industries of wine production, fermentation, cannabis, food-based products, healthcare, medicines, nutritional supplements, polymers, and resins.

Supporting these new lines of inquiry are Brock's connections with industry, communities, and government organizations, its remarkable research facilities and analytical capacity, and research centres in this thematic area, including the following:

- Research Centres, Institutes and Transdisciplinary Hubs: Advanced Biomanufacturing Centre; Cool Climate Oenology and Viticulture Institute (CCOVI); Environmental Sustainability Research Centre; Niagara Community Observatory; and the Social Justice Research Institute.
- Community and industry partnerships include Brock–Lincoln Living Lab; Ontario Grape and Wine Growers; Cannabis industry; Canadian Food Inspection Agency; Agriculture and Agri-Food Canada; and Ontario Ministry of Agriculture Food and Rural Affairs.
- Research Facilities: The expansion of Brock's analytical infrastructure including mass spectrometry, tools for genetic biomarking, instrumentation for precision agriculture, and a scanning electron microscope are envisioned. Existing research infrastructure supporting ongoing and new strategic research areas include, production greenhouses; the Brock Research Farm; Theal House; Brock–Lincoln Living Lab; superconducting quantum interference device (SQUID); scanning electron microscope; NMR spectroscopy; virus testing facilities; X-ray diffractometers.

### **Theme E: Computation, Analysis, and Data**

Brock is home to a broad range of research that responds to the burgeoning issues and opportunities of a data-rich world. Through computational methods, data analytics, and data visualization, Brock researchers are responding to community, professional, and industry challenges in business and marketing, genomics, sports and performance, cognition research, socio-economic indicators, and health research.

Over the course of its Strategic Plan, Brock University will build research capacity in computation, analysis, and data interpretation. High-performance computing applications will support innovative data visualization approaches to data management and digital preservation, while advances in statistical, qualitative, and arts-informed analyses will be realized through disciplinary, transdisciplinary, participatory, and Indigenous approaches. This capacity building incorporates institutional resources, organizations, and partnerships that include the following:

- Research centres, institutes, and transdisciplinary hubs include Brock Institute for Scientific Computing; Centre for Business Analytics; Centre for Digital Humanities; Certified General Accountants of Ontario Research Excellence Center; Institute for International Issues in Accounting; Institute for Electrophysiological Research; Environmental Sustainability Research Centre.
- Community, industry, and agency partners include SHARC-Net; Niagara Region (Niagara Prosperity Institute initiative); Stathletes (hockey data); Centre for Business Analytics; SAS analytic software provider, and many others.
- Research facilities include Brock LINC, the Digital Scholarship Lab; Bioinformatics and Comparative Genomics lab; Qualitative Research Lab; Data Analytics Lab; behavioural observation labs; epidemiology research lab.

## Canada Research Chairs

Brock University supports and distributes its allocated Chairs in a way that exploits both existing and developing areas of research strength. An institutional commitment to research intensity, collaborative and transdisciplinary inquiry, and a culture of difference-making scholarship creates multiplier effects on research across the university, and on the impact and uptake of research outputs across disciplines and partners. This commitment is a key component of Brock's strategy for attracting and retaining Chairs. All CRC postings are open for both internal and external candidates. Recruitment processes and monitoring of EDI efforts are found on our Public Accountability page: <https://brocku.ca/research-at-brock/research-chairs/crc-equity/>

The table below expresses our priorities for the CRC program, not our intentions; specific titles may change as Chairs are renewed or added. In addition to the 13 CRCs (active or under recruitment in 2018–2019) that are distributed across thematic areas and granting councils, five additional long-term research priorities are identified, which will inform the future of the CRCP at Brock during and beyond the timeline of this plan.

| Research Area  | SSHRC  | NSERC   | CIHR  |
|--|--|---|---|
| <b>A: Cognition, Creativity, and Culture</b>                 | Indigenous Arts Practice                                 | Cognitive Neuroscience of Aging                                       |   |
| <b>B: Health, Sport, and Performance Across the Lifespan</b> | Children and Youth: Performance and Mental Health        | Neuromuscular Mechanics and Ergonomics<br>Bone and Muscle Development | Tissue Remodelling and Plasticity Throughout the Lifespan |
| <b>C: Society, Well-Being, and Social Change</b>             | Gender, Work, Care, & Community                          | Biological Psychology   | Mechanisms of Health and Disease                          |
| <b>D: Environment, Bioproducts, and Physical Systems</b>     | Human Dimensions of Water Resources and Water Resilience | Plant Biotechnology<br>Organic Synthesis and Biocatalysis             | *Nutraceuticals<br>*Cannabinoids                          |
| <b>E: Computation, Analysis, and Data</b>                    | *Digital Scholarship                                     | Bioinformatics / Computational Biology                                | *Population Health in Niagara<br>*Epidemiology            |

\*potential future research chair priority

## Canada Foundation for Innovation

Canada Research Chairs have priority access to the John Evans Leader's Fund (JELF). We proudly demonstrate a track record of fairness and balance in gender representation in access to all CFI programming, include JELF. All JELF funds in excess of those used by CRCs are offered on a competitive basis to researchers who demonstrate excellence, capacity in training highly qualified personnel, and a record of high-impact knowledge output.

## Planning and Approval Process

There was extensive consultation and stakeholder feedback for the Institutional Strategic Plan (ISP), including its research elements, across all members of the campus and community partners. It was approved by both the Board of Trustees and the Senate. The ISP assigns the designation of areas of research priority, as encompassed in this SRP, to the implementation phase. In the implementation phase, an SRP draft was produced in consultation with Associate Deans Research, representing researchers in all academic Faculties and the Library, and feedback was sought from the Research and Scholarship Policy Committee of Senate, the Senior Administrative Council, and the Council of Academic Deans.