

University of Windsor Strategic Research Plan Summary (2012 -2016)

The Strategic Research Plan (SRP) provides the strategic research direction for the University of Windsor during the five year period January 1, 2012 to December 31, 2016. The SRP also provides a strategic framework in which the University's Strategic Priority #2 can be realized. *Strategic Priority #2: Create a more research-intensive university with graduate programs that build on academic and professional strengths* was articulated in the April 2010 University of Windsor Strategic Plan.

Research Objectives

The main research objectives presented in the SRP are:

1. Build on established research strengths and pursue new strategic opportunities;
2. Attract, develop and retain highly qualified faculty, students, postdoctoral fellows and supporting staff;
3. Foster excellence, collaboration, and the integration of research with education and with societal needs;
4. Identify, strengthen and prioritize the University's existing and emerging areas of research excellence on an evolving basis; and,
5. Sustain and further develop an infrastructure that supports the University's strategic research and creative activities.

Each of these five objectives is further elaborated in the SRP with more specific action-oriented goals in order to clarify their intent and the strategy for achieving them.

Thematic Research Areas of Strategic Priority

The University has identified thematic research areas in which to promote development over the period 2012 to 2016. The following thematic areas of strategic priority currently exist at the University of Windsor. They build on core strengths that reflect investment by the University and the efforts of individuals and groups at the University of Windsor who have contributed to research excellence. These thematic areas are highly multidisciplinary in nature and are supported by many collaborative efforts that have enhanced synergy.

The thematic research areas of strategic priority for the University of Windsor are as follows: Automotive Research and Innovation; Environment and Ecosystems; Advanced Materials; Health and Wellness; and, Culture and Social Change. Cross Border Strategies has also been identified as an emerging thematic area of priority. These areas are described as follows:

Automotive Research and Innovation

The thematic area of Automotive Research and Innovation encompasses a broad based collaboration among many disciplines and Faculties. The researchers primarily supporting this effort are based in areas that include the Faculty of Engineering (Civil & Environmental, Electrical & Computer, Industrial and Manufacturing Systems, and Mechanical, Automotive and Materials), the Faculty of Science (Physics, Chemistry & Biochemistry, and Computer Science), and the Faculties of Nursing, Human Kinetics and Business. The nature of the research includes automotive health issues, safety, injury

prevention (especially in children), design processes, materials, manufacturing, testing (including non-destructive), powertrains (including electric vehicles), fuels and emissions, embedded intelligent systems, and sensors. Innovation takes the form of accelerating the transformation of research results into products and employment opportunities by pursuing the optimal path to economic impact and benefit to society.

The University of Windsor is the host institution to AUTO21 – a Network of Centres of Excellence whose mandate is to bring Canadian universities and industrial partners together to develop innovative technology products. The Network has been funded by the Government of Canada for a second term ending on March 31, 2015.

Environment and Ecosystems

Environmental research at the University of Windsor includes a broad cross-section of researchers, drawing expertise from the Faculties of Science (Biological Sciences, Chemistry and Biochemistry, Earth and Environmental Sciences, the Great Lakes Institute for Environmental Research (GLIER)) and the Faculty of Engineering. University of Windsor scientists are advancing ecological knowledge and developing leading-edge environmental applications of their research and technology that are providing scientific evidence to support policy that will impact the Canadian environment.

GLIER focuses on multiple stressors with strengths in monitoring and modeling the fate, transport and bioavailability of organic and metal contaminants, the effects of pollutants and multiple stressors on biological processes, vectors and trophic impacts of species invasions, geochemistry, and environmental genomics related to conservation strategies, invasion pathways and adaptive responses to stressors. Research strength in Biological Sciences and Earth and Environmental Sciences include behavioural and evolutionary ecology, conservation genetics, environmental assessment, geofluids, geochemistry and environmental geoscience, environmental genomics and proteomics, reclamation and remediation research and technologies, management and control of aquatic invasive species.

Engineering has rich history of pioneering leading edge environmental approaches and methods and working with industries and organizations to develop real-world solutions, ranging from: extensive studies into airshed pollution modelling, monitoring, and health effects; the development of efficient fuel production and electricity from waste products; assessing the recovery and recycling of materials from used automobiles; the development of novel techniques to enhance water treatment; the use of enzymes and bacteria to enhance wastewater treatment processes; and the application of environmentally sound engineering principles to enhance quality of life.

Advanced Materials

The thematic research area of Advanced Materials is inherently interdisciplinary and involves several facets, including synthesis and preparation of materials, characterization of their physical properties, and their development and deployment as new technologies. Active research and development in Advanced Materials is ongoing in both the Faculties of Engineering and Science, with contributions from more than 30 faculty members, over 50 graduate students and over 50 highly qualified undergraduate researchers in Materials Engineering, Chemistry and Biochemistry and Physics. Potential future linkages exist to Business, Law, Nursing and the Faculty of Arts and Social Sciences through paths to commercialization, marketing and the social impacts of the research.

There is currently a large cluster of researchers in Advanced Materials from both the Faculties of Science and Engineering with a broad range of significant research expertise. The Centre for Catalysis and Materials Research (CCMR) in Chemistry and Biochemistry develops and characterizes new materials used in advanced technologies, such as innovative molecular machines, nanostructured solid-state materials, new biodegradable polymers and clean stoichiometric and catalytic processes. In Physics, the contributions to chemical and physical rapid scanning analysis has led to technology transfer in the areas of acoustic imaging and laser-induced breakdown spectroscopy, that have both medical and manufacturing applications. The faculty in Engineering conduct fundamental research concentrated on the tribological, processing, physical, mechanical and chemical aspects of engineering materials and associated applications including lightweight materials, advanced coatings, and lithium batteries and fuel cells.

Health and Wellness

This thematic area has evolved from existing strengths in a number of disciplines including, but not limited to human kinetics, humanities, nursing, mathematics, biochemistry, biology, physics, computer science, economics, engineering, business, social work, sociology and psychology and through the increasing synergies between University researchers and community partners. A number of clusters are emerging in Biomedical and Translational Research, Community/Public Health, Medical Imaging, Social Determinants of Health and Health Informatics. Basic biomedical research clusters include areas such as cancer, heart and stroke, and neurological disorders. Many projects are being conducted with partners from the larger healthcare community locally, within Canada and internationally.

In the social context health research focuses on social determinants of health, including poverty and homelessness, improved product development for a healthier society, health behaviours, the provision and quality of health care facilities, and wellness through therapeutic support. The University of Windsor will continue to build and support health research involving multiple disciplines and recognizes that health research is a shared benefit, a shared responsibility, and an investment in Canada's future.

Culture and Social Change

In the current climate universities are regarded as key institutions driving social change and development, in addition to the important role of producing highly skilled and qualified personnel and generating new knowledge. The researchers and scholars of all disciplines at the University of Windsor are committed to working with the regional as well as international community to address research pertaining to specific social needs.

A number of subthemes have emerged in the past which include, but are not limited to entrepreneurial education and research, knowledge management, social and economic changes and adaptability in a pluralistic society, protection and empowerment of vulnerable groups, social and legal justice, theories exploring various social and literary worlds.

Emerging Areas of Strategic Priority

The University's research, innovation and creative activity are not limited to the areas of strategic priority previously described as it will continue to foster new opportunities and entrepreneurial activities. In order to respond to changing environments and societal needs there will be an ongoing review of the areas of strategic research priority to ensure they embody leading edge research and take advantage of new transformative opportunities as they emerge. Research into Cross Border Strategies

has been identified as an emerging area of strategic priority. Located on the Canada-US border, Windsor is recognized as the busiest and the most economically important border crossing in North America. This emerging area will be highly multidisciplinary in nature and is of great importance to the local region and Canada.

Research Collaborations

The University of Windsor has a number of existing and proposed research collaborations in the strategic priority areas outlined above. In the Automotive Research and Innovation theme, collaboration between University researchers and industry has led to the formation of various research centres including the Centre for Integrated Microsystems (RCIM), a NSERC Synergy Award recipient for collaboration with the Canadian Microelectronics Corporation, and the Intelligent Manufacturing Systems Centre (IMSC), the Centre for Automotive Research and Education (CARE), the Clean Diesel Technology Group, the Ford/University of Windsor Powertrain Engineering Research And Development Centre, Fluid Dynamics Research Institute (FDRI), the Light Metals Casting Technology Research Group, the \$600 million University of Windsor/DaimlerChrysler Automotive Research and Development Centre (ARDC), and the GM/NSERC Industrial Research Chair – Tribology of Lightweight Materials.

In the Environmental and Ecosystems priority area, GLIER is the host of the NSERC-funded Canadian Aquatic Invasive Species Network (CAISN). GLIER is also home to the NSERC Collaborative Research and Training Experience (CREATE) training network, whose mandate addresses graduate and postdoctoral training in Aquatic Ecosystem Health. Interdisciplinary collaborations between Chemistry and Biochemistry and Environmental Engineering focus on development of new environmentally-friendly processes, clean stoichiometric processes, catalytic chemical and biocatalytic processes for waste water treatment.

The Advanced Materials research cluster has an impressive assembly of national and international collaborators, and access to international research facilities. There are currently intricate collaborative webs among faculty members in Science and in Engineering. These developing collaborations will build new external partnerships with industry and other institutions, will promote growth in the underlying areas of established research strengths, and enhance the research profile of the University of Windsor.

The theme of Health and Wellness has been advanced by the establishment of a new medical education facility at the University of Windsor, in collaboration with the University of Western Ontario and the Schulich School of Medicine and Dentistry. It has provided an impetus to expand the health-related research capabilities and encourage collaborative research with local hospitals, Western University, Wayne State University (Detroit), Henry Ford Hospital, and other area health research centres.

In the Culture and Social Change area, the University of Windsor has and will continue to invest and foster synergy among Faculties, researchers, and scholars in areas leading to social innovation and change. Some examples are the Centre for Enterprise and Law, the Humanities Research Group, the Centre for Studies in Social Justice and Research and the Centre for Research in Reasoning, Argumentation and Rhetoric. A number of Centres and research groups are emerging and are expected to galvanize the social impact under the thematic area of Culture and Social Change.

Canada Research Chairs

The SRP highlights the on-going and future major research programs and activities which the incumbents of our Canada Research Chairs (CRCs) will help to strengthen and for which research

infrastructure support has been or will be requested from the Canada Foundation for Innovation (CFI) to support the Chairs. The CRCs and associated CFI infrastructure have and will continue to be deployed to enhance the above mentioned thematic research areas and emerging areas of strategic priority. The holders of these Chairs meet international standards of academic excellence. In addition, they provide research leadership, linkages to external research organizations and serve as mentors and role models within, between and among disciplines. The following table shows CRCs (both occupied and vacant) by research area and by granting council:

Thematic Research Area	NSERC		SSHRC	
	Tier 1	Tier 2	Tier 1	Tier 2
Automotive Research and Innovation	2	2		
Environmental and Ecosystems	1	4		
Advanced Materials	2			
Health and Wellness				1
Culture and Social Change			1	1
Totals	5	6	1	2

Gender Representation

Gender representation in Canada Research Chair Appointments is governed by the University’s policy on employment equity which is administered by the President’s Committee on Employment Equity (PCEE). Accordingly, each Appointments Committee has an Equity Assessor (EA) as a member. In all instances, the University of Windsor’s recruitment materials and processes address gender equity.

Assessment and Performance Metrics

The University of Windsor has selected a number of key performance metrics to measure its progress towards achieving its research objectives as outlined in the Strategic Research Plan. The utilization of performance metrics commonly used by external peer review groups to identify research, innovation and creative activity excellence will be adopted. The success of implementing the University’s SRP will also be evaluated in the context of these performance metrics. The metrics used in assessing research performance have been divided into two categories and are set out in the SRP as University Oriented Metrics or Faculty Member Oriented Metrics. It is recognized that measuring the impact of research is the most difficult metric to develop and the area where the University has the least control in ensuring results.

Planning and Approval Process

The Canada Research Chairs (CRCs) are allocated according to the University of Windsor thematic research areas, and the allocation as to the designated area and Faculty is the responsibility of the President who is assisted by the Vice-President, Research and the Provost and Vice-President, Academic. A Committee formed for the purpose of recruiting a CRC candidate for a specific allocation, internally or externally, will review prospective nominees and make a recommendation as to the likelihood of a successful nomination. The University of Windsor has a centralized employment equity monitoring infrastructure which involves oversight and intervention at each stage of the hiring process.