



**Carleton University Department of Chemistry
Strategic Plan
2020-2025**

TABLE OF CONTENTS

Context	1
Our Process	3
Who We Are	5
Our Principles	9
Strategic Priorities	
<i>Direction: Share Knowledge. Shape the Future.</i>	10
<i>Direction: Serve Ottawa. Serve the World.</i>	12
<i>Direction: Strive for Wellness. Strive for Sustainability.</i>	14

CONTEXT

This document lays out a roadmap of goals and strategic actions for the Carleton Chemistry Department for 2020 and beyond. We are approaching three quarters of a century since the Department's inception in 1947, and the Department has never formalized a strategic plan. Reflecting on our past and looking towards the future, we were motivated to undertake a holistic review of our teaching, research, infrastructure, governance and external relations. We identified challenges to be met, noted opportunities to be seized and, importantly, found interest across the Department to work collaboratively to shape our plan for the future and to make it a reality.

Planning cannot happen in a vacuum. We are influenced by factors at the department and university level, and we need to adapt to a rapidly changing global context.

DEPARTMENTAL

Our Department is about to embark on a remarkable period of renewal and transformation. The enrollments in our undergraduate and graduate programs are stable and have room to improve and grow. We have recently launched new initiatives, such as the concentration in chemical toxicology at the undergraduate level and the collaborative specialization in biochemistry at the graduate level. The Department's first female chair was appointed. In the last year alone, we have had five faculty and two long-time staff members depart or retire, with more retirements on the horizon. We must embrace this singular opportunity to take bold but calculated risks to better position our Department as a leader within Canada and internationally while building upon our collegiality and inclusiveness.





UNIVERSITY

In parallel to our departmental planning, the University has recently released its Strategic Integrated Plan. The Plan asks departments, units, and faculties three main questions:

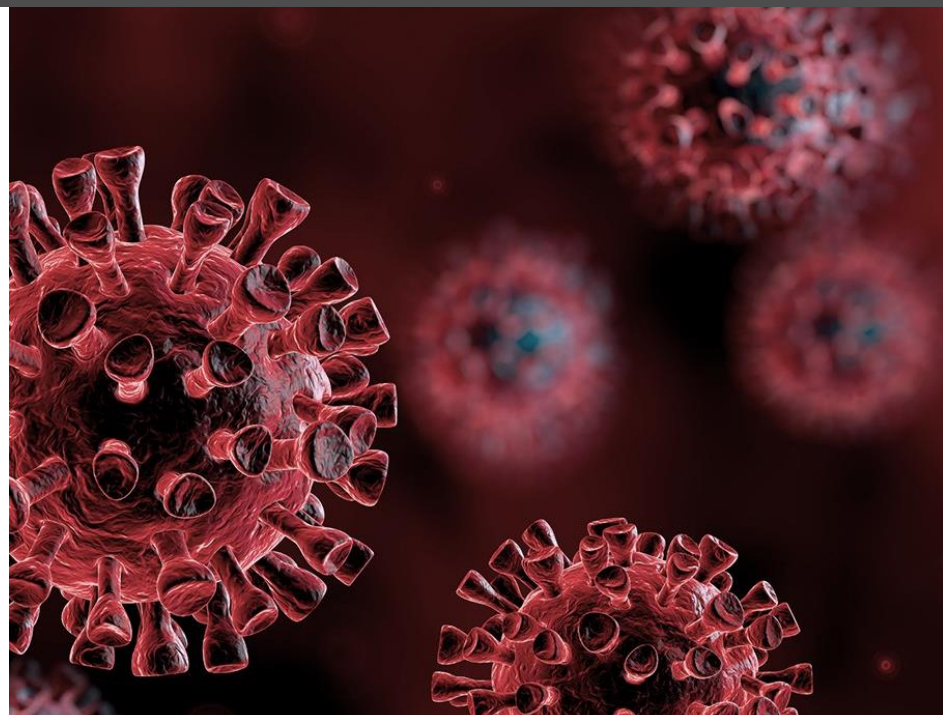
1. *How can we share knowledge and shape the future?*
2. *How can we serve Ottawa and serve the world?*
3. *How can we strive for wellness and strive for sustainability?*

We as a Department endeavored to answer these questions and align our plan of action with this framework.

WORLD

In 2020, chemistry, and science in general, is at a crossroads. Chemistry has the potential to provide solutions to some of humanity's greatest challenges: issues like climate change, food security, global health, and sustainable development. This great potential is juxtaposed against a public distrust of science and chemophobia that are obstacles to the application of chemistry to achieve progress. Resolving this dissonance will be critical to the advancement of the field and should play a role in how we prepare our students.

Our strategic planning has also taken place amid the global COVID-19 pandemic. We are adjusting to a "new normal" of physical distancing in our research labs and remote delivery for our teaching. This has underscored the need to be resilient and flexible as we plan our future as a Department.



OUR PROCESS

- **SPRING 2019**
Renewal Committee
- **SEPTEMBER 2019 - JANUARY 2020**
Environmental Scan
- **FEBRUARY 2020 - MAY 2020**
Departmental Consultations
 - Research
 - Teaching
 - Governance
 - Infrastructure
- **JUNE 2020 - JULY 2020**
Draft and Review the Strategic Plan
- **AUGUST 2020**
Receive Feedback on the Draft
- **SEPTEMBER 2020**
Strategic Plan Completed
- **SEPTEMBER 2020**
Operational Planning to Begin

In spring 2019, the Renewal Committee was formed in the Department of Chemistry to consider how to strategically fill vacant positions due to upcoming retirements. The Committee engaged the Office of Quality Initiatives (OQI) to support the process and quickly realized that there was an opportunity to think not only about strategically filling vacant positions but also to create a cohesive vision of the future of the Department.

Based on the Committee's input, OQI began by interviewing all faculty and staff members in the Department of Chemistry to hear their perspectives on the Department's strengths, opportunities, and future directions. OQI then reported back to the Renewal Committee on themes and ideas that emerged in the interviews. One of the strongest themes that emerged was a desire for a more inclusive and collaborative process for making decisions and setting the direction of the Department. Because of this feedback, the Renewal Committee actively engaged the entire Department in the strategic planning process.

The themes and ideas that emerged in the interviews were shared with all faculty and staff in the Department. Then volunteers in the Department completed an environmental scan to find out more about the offerings within chemistry departments at comparator institutions, to learn about opportunities to increase collaboration across academic units at Carleton, and to consider the opinions expressed in articles related to the future of chemistry as a course of study. All faculty and staff members in the Department were then invited to attend a series of consultations to provide input on four broad themes: research (two consultations), teaching, governance, and infrastructure.

In June 2020, Carleton University's governing bodies approved the University's Strategic Integrated Plan (SIP), which outlines a point of departure, directions and pathways to guide Carleton moving forward. Using the SIP as a framework, the Renewal Committee reviewed, sorted and organized all perspectives shared during the individual interviews and consultations and used the ideas to populate this Strategic Plan.

The Department will continue to work with OQI to operationalize the Department of Chemistry Strategic Plan and ensure that the goals and strategic actions are continually reviewed, assessed, and realized.



RENEWAL COMMITTEE MEMBERS

Véronic Bézaire
Committee Chair

John ApSimon

Seán Barry

Robert Crutchley
Outgoing Departmental Chair

Maria DeRosa
Incoming Departmental Chair

Amy Rand

Jeff Smith

OFFICE OF QUALITY INITIATIVES

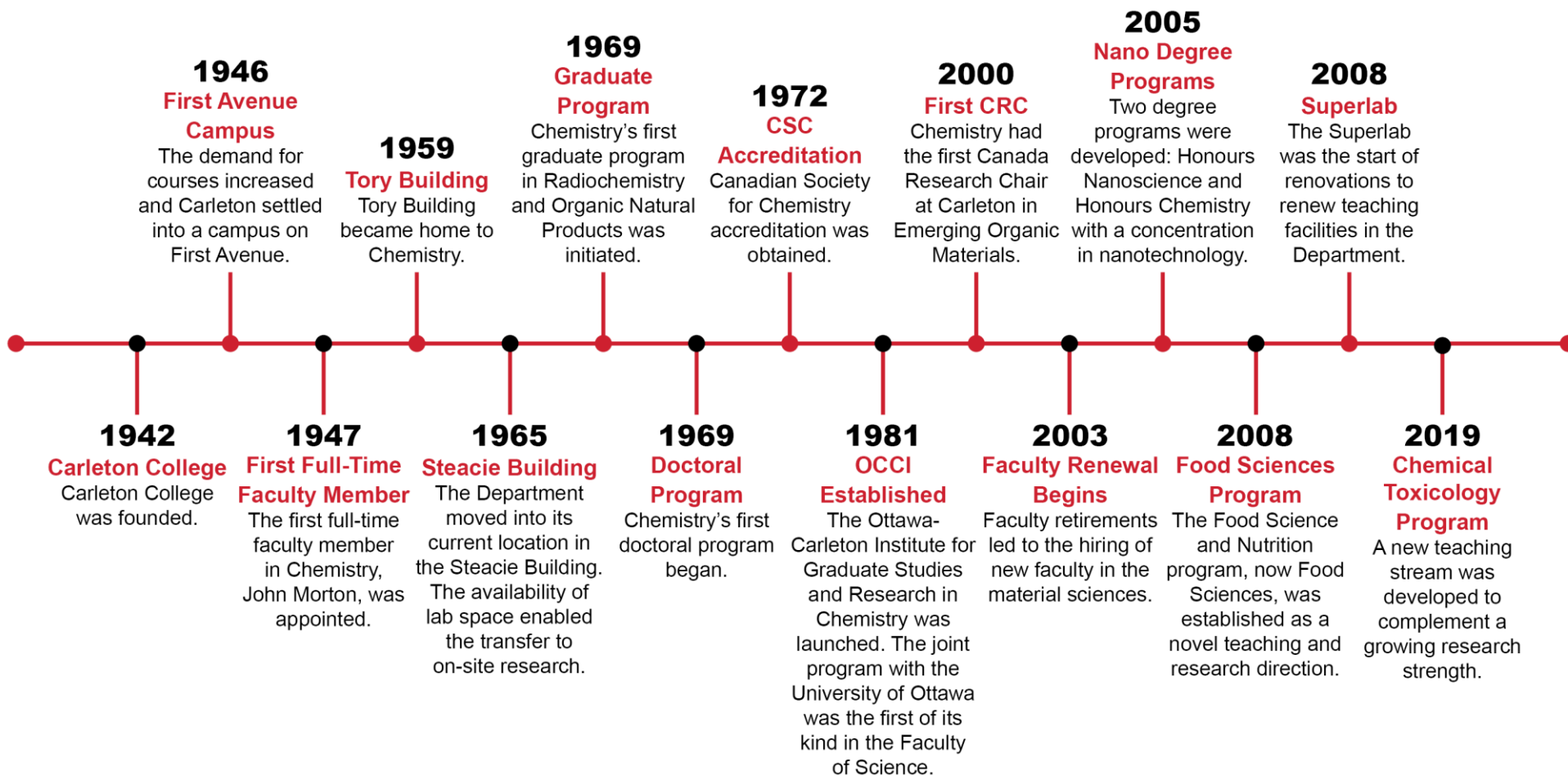
Mandi Crespo
Senior Quality Advisor

Jessica Boateng
Continuous Improvement Assistant

WHO WE ARE

OUR PAST

The history of our Department spans several decades and shows an evolution in the focus of both research and teaching directions.





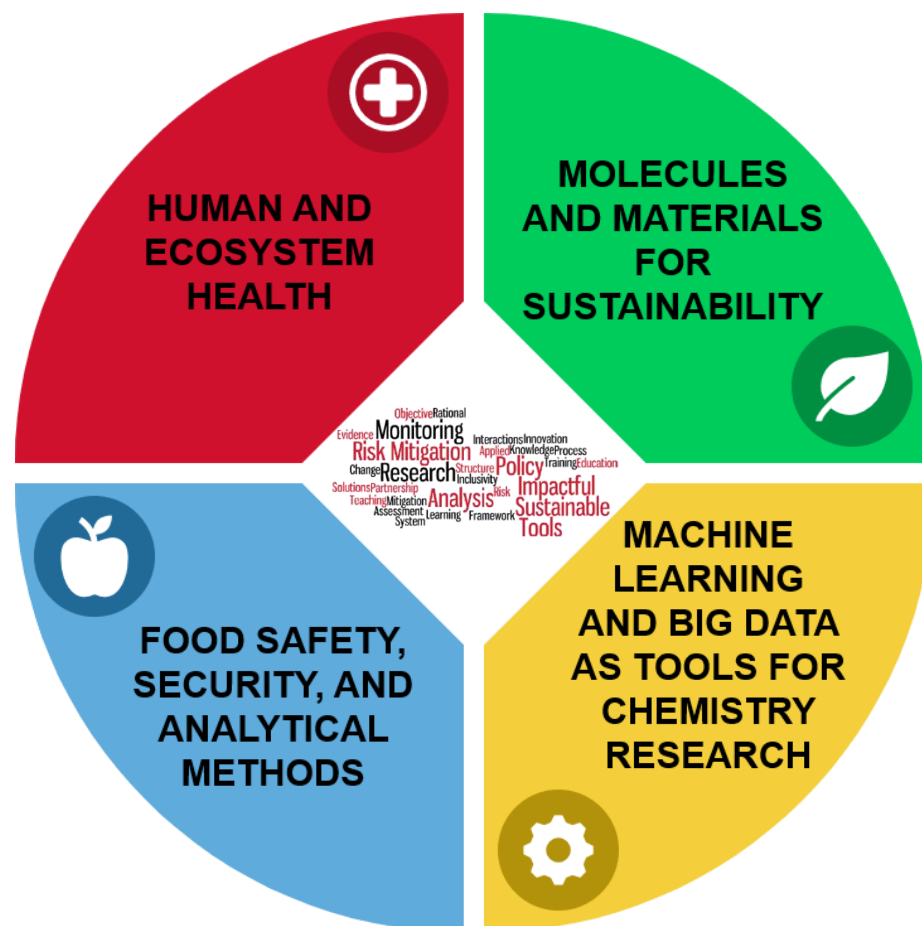
OUR PRESENT

The traditional divisions of chemistry that we have become familiar with and likely guide our thinking are fast becoming blurred. The common themes (Analytical, Inorganic, Organic, Physical) have loosened in more recent times and we see the biological sciences and theoretical aspects of chemistry commonly becoming part of chemistry education and research. Emerging issues of concern for chemists lie also in the social spectrum, such as in ethics, regulation, policy and the increasingly important area of equity. These must now form an integral part of any educational system in science. The chemical sciences have the opportunity to address issues using present technological developments (e.g. AI in collaboration with computer science). In essence, a systems approach to teaching and research seems timely as graduates in chemistry will no longer face the same discipline of yore. The challenge is to still convey all of the basic principles of chemistry to our students along with multidisciplinary strengths.

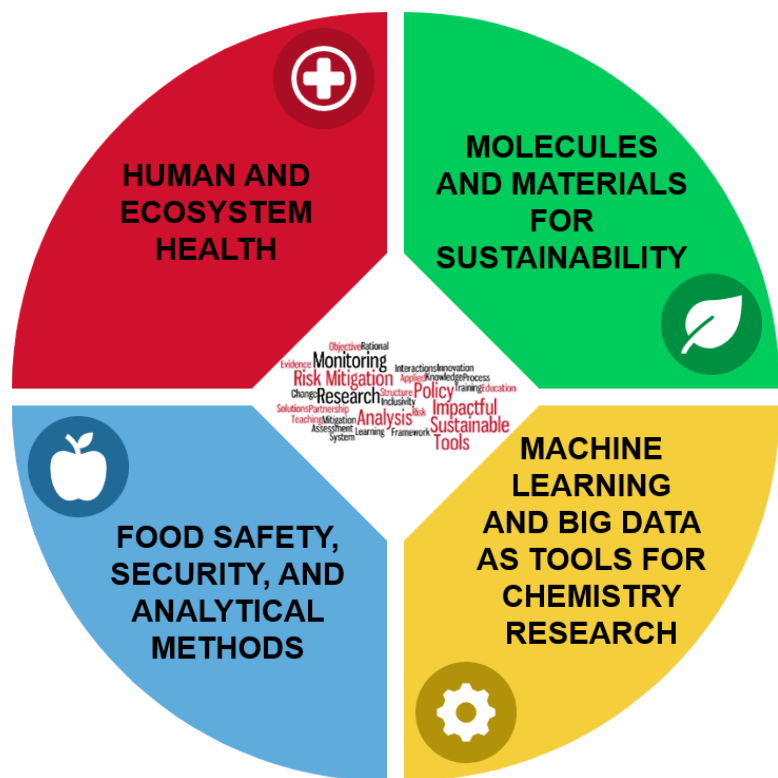
Our aspirations for the future of the Department are built on our commitment to high quality teaching and research, and grounded in the excellence and collegiality of our faculty and staff. We offer a holistic chemistry education while providing distinctive programming in food science, nanoscience, and toxicology. We take full advantage of our size: we are small enough to remain student-centred and accessible, yet large enough to have access to world-class facilities and equipment. Finally, we benefit from our location in Ottawa that has us well positioned for partnerships with industry and government.

OUR FUTURE

Four themes emerged from our research consultations that stem from our current strengths and build on collaborative opportunities within the University and Ottawa area. Each theme, along with its key topics and potential partners, builds on present strengths within the Department, and – importantly – is tied together with the other themes by our conceptual competencies and shared interests. At the nexus of these four themes are the core precepts that our research will be impactful and sustainable, will provide tools for solving problems, will serve as evidence for policy, and will offer the highest quality training for our students. These themes will guide our future faculty hires, our planning for infrastructure, and our applications for large-scale research grants. In order for this research vision to become a reality, we as a Department must embrace a collaborative approach to research by leveraging our collective talent.



THEMES DETAILS



Builds on: strengths in food science, organic and analytical chemistry, toxicology

Key topics: legacy pollutants and emerging contaminants, water, environment, and human environment livability

Potential partners: biochemistry, biology, environmental science, health sciences, neuroscience, civil and environmental engineering, numerous government departments and industrial partners



Builds on: strengths in nanotechnology, inorganic/organic chemistry, food science

Key topics: value-added materials from biomass, carbon neutrality and sustainability, smart materials, materials for energy, green chemistry, solar cells, solar fuels, remediation using nanotechnology, coatings for electronics and solar cells

Potential partners: biochemistry, electronics, mechanical engineering, civil and environmental engineering, numerous government departments and industrial partners



Builds on: strengths in food science, toxicology, analytical chemistry, nanotechnology

Key topics: policy in food, food toxicology, biomedical toxicology

Potential partners: biochemistry, public affairs, Sprott School of Business, numerous government departments and industrial partners



Highlights a gap in our research capacity but presents an opportunity to collaborate with computer science and data science, who are currently experiencing rapid growth

Key topics: omics, imaging and biosensing, computational chemistry, modelling of biological, chemical and food systems, AI and aptamers

Potential partners: computer science, math and stats, data science, biology and biochemistry, numerous government departments and industrial partners

OUR PRINCIPLES



1. We value welcoming and forward-thinking teaching:

- We will create positive learning outcomes for our students
- We will meet the expectations of a diverse and changing student population
- We will champion equity, diversity, and inclusion
- We will prepare our students for an ever-changing future
- We will empower our students to be engaged citizens
- We will embrace experiential learning

2. We value global-minded research:

- We will relate learning to real-world problems and try to solve them
- We will be collaborative in our science
- We will employ fundamental research to drive innovative discovery
- We will use teaching and research to promote societal wellness and sustainability

3. We value a community-minded approach:

- We will open our doors to the local community
- We will be openly involved in our community through teaching, learning, and collaboration
- We will be engaged citizens
- We will lead by example

4. We value a mutually respectful workplace:

- We will be collaborative in our administration
- We will engender holistic and unified teaching among faculty, staff, and teaching assistants
- We will champion equity, diversity, and inclusion

STRATEGIC PRIORITIES

DIRECTION: SHARE KNOWLEDGE. SHAPE THE FUTURE.

The Department of Chemistry engages in chemical education and research that spans from the pursuit of fundamental knowledge to the development of applied solutions. Our efforts impact problems of local, national, and global significance. We aim to disseminate this knowledge to our students, our community, and beyond. Research and teaching are interwoven in our Department. Integrating our students in our research endeavours provides them with the highest quality of experiential learning. We aim to prepare our students to be active participants in a future where science and evidence effect positive change. We will accomplish this by renewing our focus on professional skills in our teaching, and on interdisciplinary approaches in our research.

Goal 1: We will develop academic programming that responds to societal needs to bridge the gap between academia and application. This will improve graduation and employability outcomes and prepare students for success in an ever-changing future.

Strategic Actions:

- Perform a comprehensive curriculum review to create a scaffolded program that offers the knowledge, skills, and experience needed for the 21st century
- Incorporate concepts of “science for policy” within our teaching and our research pursuits
- Seize opportunities to incorporate instruction on professional and soft skills throughout our program. Consider creating a job stream and micro-credentials/skills certifications to expand our focus on job-ready training
- Relate course and lab content to real world topics to answer the question, “What am I going to solve using chemistry,” and to better align with industry and government standards
- Renew our computational stream to leverage opportunities to partner with computer science and data science



Goal 2: We will apply high-impact practices in our teaching and research. This will provide our students access to top-quality training, improving their experience and future prospects.

Strategic Actions:

- Develop new and flexible opportunities for student-centered learning
- Create more active learning approaches and spaces
- Implement virtual learning components
- Improve integration of course content and laboratory experiences
- Engage with students to assess the effectiveness of our teaching methods
- Increase experiential learning opportunities, in particular research opportunities

Goal 3: We will foster an interdisciplinary and collaborative approach to direct our research to solve critical issues. This will help us to capitalize on opportunities and enhance our reputation as leaders.

Strategic Actions:

- Focus our collaborative efforts on our identified research themes (page 7)
- Initiate and strengthen collaborations within the department, the Faculty (Computer Science, Health Science, Data Science) and the University (Engineering, Public Affairs)
- Empower new collaborations by applying for joint funding among departmental members
- Hire strategically for increased alignment on specific research themes (page 7)



DIRECTION: SERVE OTTAWA. SERVE THE WORLD.

At Carleton University, we take pride in our legacy of serving the Ottawa community. We have always forged alliances and engaged in activities that have benefited all facets of our city. In this, chemistry has been no exception. One of the mandates of our Department moving forward will include constant focus on how we may best serve Ottawa and, by doing that, best serve our nation and the world at large. To this end, we will take action to position ourselves in a manner that enables engagement and collaboration with the Ottawa community.

Goal 1: We will open our doors to the community at large, increasing collaboration with Ottawa-area partners. This will inspire our students to be engaged citizens while increasing a sense of societal responsibility. Undertaking these actions will also encourage networking within the scientific community and prepare students for the job stream.

Strategic Actions:

- Expand community-based research through external funding to solve complex problems that impact our community
- Expand community-based pedagogy with industry-based classroom case studies, guest speakers, and work-integrated learning opportunities
- Through strategic intellectual property and research agreements, grow our entrepreneurship and innovation with local partners



Goal 2: We will strive to have continuous incorporation of feedback from major stakeholders. This will enhance our programs through interaction with a network of community, government, and international partners and will help build bridges to the rest of the world.

Strategic Actions:

- Align our programs with industrial and government standards to ensure that our students gain realistic and practical experience as they progress through our programs
- Involve local partners in defining research directions, program structure, learning outcomes, and course delivery

Goal 3: We will hire new faculty and staff with a collaborative, community-oriented focus. These partnerships will have the capacity to have immediate regional impacts that will grow over time and enable leadership opportunities for our faculty, staff and students, on a provincial, federal and global scale.

Strategic Actions:

- Seek out candidates that engender collaboration within the Department as well as the external community
- Define job descriptions that encourage community partnerships and collaboration



DIRECTION: STRIVE FOR WELLNESS. STRIVE FOR SUSTAINABILITY.

The Department of Chemistry is dedicated to adopting a holistic sense of wellness for its faculty, staff, and students. This includes establishing a transparent and participatory governance structure that encourages equal workloads; encouraging equity, diversity and inclusivity; and supporting positive student mental health. We seek to develop a healthy and inviting professional environment for all. The Department also aims to be a model in sustainability, adopting sustainable practices in teaching and research, and contributing to research areas related to sustainable and green chemistry.

Goal 1: We will develop a governance structure, programing, and spaces that embrace our commitment to wellness. These actions will create a culture within the Department of Chemistry where students, staff, and faculty can thrive.

Strategic Actions:

- Adopt governance practices based on transparency, participation, and consensus-building
- Embrace student-centered approaches in academic programming
- Renovate lab space to provide a safe working environment
- Develop communal space to foster teambuilding and wellbeing
- Establish student space that promotes mental, social, and physical wellbeing



Goal 2: We will encourage and nurture equity, diversity, and inclusivity. This will promote the development of positive identities in our Department that will contribute to a balanced society.

Strategic Actions:

- Increase diversity of departmental members
- Actively recruit from under-represented populations
- Incorporate Indigenous learning bundles in our science teaching
- Create accessible forms of classroom and laboratory learning

Goal 3: We will embed sustainability in our research, teaching, and organizational operations. This will allow us to play a leadership role in the wellness of our country and our planet.

Strategic Actions:

- Hire researchers in areas of planet health, including human and ecosystem health, sustainable materials, food safety and security, and environmental toxicology (page 7)
- Adopt green chemistry practices in our research and teaching laboratories
- Incorporate sustainable chemistry in our undergraduate and graduate programming



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