Department of Chemistry, University of Victoria, Victoria, BC, Canada

Strategic Plan 2012

Mission:
"The Department of Chemistry fosters world-class research and outstanding chemical education. We build on the strengths of our students, faculty, staff and alumni to interact with the local, national and global community."

Vision:
Our vision is to be the Department of choice for motivated graduate and undergraduate students who will be challenged in outstanding programs at the forefront of Chemistry. We want to produce strong annual cohorts of creative, competitive Chemistry graduates at all levels, and to establish and enhance interdisciplinary research collaboration with other departments, institutions, and industries. We aspire to be the Canadian Department of Chemistry that best integrates research, teaching and experiential learning. We promote policies emphasising safe practices, responsibility and sustainability. As members of a wider Chemistry community, we strive to maintain lifelong interactions with alumni and regional stakeholders of the Department, to promote national and international collaboration and valuable learning opportunities for all our students.

Strategic Initiatives:

All members of the Department and outside stakeholders provided input over a six month period in a variety of forums. The members met on a number of occasions to discuss the key topics and formulate strategic initiatives. The ***priority 1 initiatives*** are expected to be completed within 5 years.

A) Maximizing Opportunities and Support for Undergraduate Students in Chemistry

- **Undergraduate Recruitment *(Priority 1 initiative):*** The Department is renewing the promotion of chemistry undergraduate programs to science students, alerting them to the value of a chemistry degree and the vast consequential career opportunities. The Department will establish a consistent recruitment and retention plan that celebrates and markets the outstanding experiential education offered in the chemistry undergraduate programs. The faculty and staff will reach out to science students, offering mentoring of professional development, career planning and time management. The Department will ensure that students are offered programs that can be completed within four years. The Department has new aspirations to graduate 70 BSc majors and 20 BSc honours annually.
- **New Programs *(Priority 1 initiative):*** As society and science evolve, the education needs of students must adapt to offer appropriate preparation for the career opportunities and the needs of society. In this context, the Department will develop new relevant chemistry programs, beginning with "Chemistry for Medical Sciences".
- **Undergraduate Lab Review *(Priority 1 initiative):*** The Department will review the workload of students in the undergraduate laboratory classes in the context of comparative data that will be collected from other Canadian chemistry programs and from Science programs at the University of Victoria. While maintaining academic standards, efforts will be made to recalibrate student workload with national norms, reducing costs, and to ensure effective use of teaching assistant positions.
- **Sponsorship of Undergraduate Lab Facilities:** The lab components of the chemistry undergraduate programs at the University of Victoria are celebrated by students, staff and

faculty. Maintenance and development of instrumentation and facilities that support the lab components requires substantially more financial support than is available. These important capital needs will be addressed by the Department with the establishment of fund raising and collaborative sponsorship programs.

- **Curriculum Review:** As a natural requirement of any academic program, the Department will review the chemistry curricula within the next three years.
- **Undergraduate Class Revisions:** A chemistry undergraduate degree at the University of Victoria requires that a student successfully complete as many as 40 courses. All courses must be refined and upgraded on a regular basis and some should be replaced as the science evolves. A number of recommendations for new or modified courses are already being considered by the Department, including the introduction of research lab courses at the 200 and 300 level, the adaptation of CHEM 300A as Chemistry in Energy and CHEM 300B as Chemistry in Health, the application of CHEM 337 as an alternative to BIOC 299 and the development of experiential learning opportunities outside of the curriculum.
- **Teaching Initiatives:** A new content resource has been introduced in first year chemistry and the approach to the presentation of the lecture component has been well received. The Department will support and promote analogous teaching initiatives with a view to expanding the concept to other courses.

B) Research Innovation

- **Industrial Collaboration *(Priority 1 initiative):*** Many researchers in the Department have strong interactions with private sector organizations who have interest in the research outcomes. Such relationships provide excellent opportunities for research that could not otherwise be achieved due to resource limitations, and offer the possibility of efficient and direct design of products or technology of significant societal value. The Department will augment existing collaborations with industry and will search for other industrial relationships by appropriate advertising of ongoing research activities. It is expected that enhancement of industrial collaborations will provide additional opportunities for experiential learning and CO-OP appointments for students.
- **Industrial Partnership *(Priority 1 initiative):*** Technology transfer of discovery and invention to government and the private sector is vital to ensure optimal benefit for society. UVic Industry Partnerships at the University of Victoria is an effective organization to facilitate formal joint ventures between the private sector and academia. A most effective and efficient approach to implementing key discoveries in society is the appointment of faculty members who interact with industrial partners on a daily basis, and whose research programs are co-defined by the professor and the industrial partner. The Department will search for opportunities to appoint a professor in chemistry through the NSERC Industrial Research Chair (IRC) program.
- **NMR Spectroscopy *(Priority 1 initiative):*** NMR spectroscopy represents the most powerful characterization technique available to chemical and biological scientists, providing structural, thermodynamic and kinetic information about molecules and their interactions. This has revolutionized the way scientists approach research, development, diagnosis and treatment. The Department has established a well equipped NMR facility

that represents a vital and unique asset on Vancouver Island. The Department will market and develop these NMR facilities including application for CFI funds.

- **Chemistry Research Chairs:** The Department hosts many high profile research programs. Some of these programs are truly outstanding. In recognition of the exceptional research achievements and potential, the Department will strive to establish endowed research chair(s) in Chemistry.

C) Enhancing Opportunities and Support for Graduate Students in Chemistry

- **Graduate Student's Guidance and Advice:** The Department will develop a document (Graduate Student Handbook) defining the Departmental expectations for graduate students. The goals of the graduate programs will be described in terms of learning outcomes and competencies. The Department will engage with the Learning and Teaching Centre to develop career advising and counselling service for graduate students in Chemistry. The seminar program will invite more speakers from industrial and government organizations as well as chemistry alumni that have careers outside chemistry.
- **Graduate Recruitment:** The Department will enhance recruitment activities with aspirations to achieve a graduate population of 90 students.
- **PhD Requirement Review:** The Department acknowledges that the PhD requirements should be reviewed in comparison with programs at universities in Canada.
- **Graduate Student Office Space:** The Department will review graduate office space and establish sufficient space for the graduate population.

D) Departmental Development

- **Promoting Chemistry at the University of Victoria:** The Department will advertise research and educational achievements to both the UVic community and to the public. This will include public lectures highlighting activities in the Department, communication with science reporters for mass media outlets and presentation on video screens in the Bob Wright building.
- **Fund Raising:** The Department will develop a sponsorship program to support research instrumentation and research activities within the Department.
- **Renovation:** The Department will develop a long term plan for the renovation of the second floor of the Elliott Building.
- **Friends of UVic Chemistry:** The Department will establish a board of advisors and invite participants from the alumni, from the private sector and from the community.

Strategic Plan 2012

Strategic Research Plan 2012

The Department of Chemistry at the University of Victoria is a research intensive unit. Each of the professors is leading an independent research program, and the research areas are broad ranging. Research activities are funded by a variety of agencies including the Natural Sciences and Engineering Research Council (NSERC), the Canada Research Chairs (CRC), the Canadian Institutes of Health Research (CIHR), the Canada Foundation for Innovation (CFI), the BC Knowledge Development Fund (BCKDF), the Michael Smith Foundation for Health Research (MSFHR), and the Petroleum Research Fund (PRF). Grants in excess of 1.5 million dollars per year support research in the Department resulting in high impact scientific discoveries that are published in the most prominent journals and enable research training for undergraduate students, graduate students and postdoctoral fellows.

As the 'Central Science' the discipline of Chemistry plays a key role in many scientific discoveries, and chemical processes or phenomena are often pivotal in technological developments that impact society on a day to day basis. The University of Victoria has appointed some of the nation's most impressive researchers into the Department to establish a nationally competitive academic unit that provides international leadership in a number of research areas. The Department values mechanistic and hypothesis-driven chemistry and believes that frontier fundamental science is the driver for innovation.

Researchers in the Department occupy research space in three buildings, including a state-of-the-art new building (2008). The research activities within the Department are supported by state-of-the-art instrumentation in Nuclear Magnetic Resonance spectroscopy (NMR), Mass Spectrometry (MS) and Laser facilities, that are managed and maintained by Departmental staff with first class and specific expertise.

The interdisciplinary nature of many of the research programs within the Department requires the development and initiation of strong collaborative interactions with research centres at the University of Victoria and beyond the campus. In particular, members of the Department lead programs supported by the Centre for Advanced Materials and Related Technology (CAMTEC), by the Integrated Energy Systems Research Centre (IESVic), by the Vancouver Island Health Authority (VIHA) and by the Centre for Biomedical Research (CBR). In addition, strong interactions have been established or are developing with researchers in the Division of Medical Sciences and with other departments in the Faculty of Science. Moreover, a number of collaborations with industrial partners provide vital mechanisms for innovation and development.

The Department has identified "Health" and "Energy" as two strategic research areas of emphasis that will have the greatest societal impact and for which many members of the Department have established expertise and demonstrated impact through their research contributions. Existing and future research activities within these two branches are described below in the context of the established areas of strength within the Department and the expectations for the future. In addition, the Department supports a broad array of research activity beyond the designated strategic research areas.

Health Research in Chemistry at the University of Victoria

Human health is a primary focal point for scientific research globally and chemistry provides the foundational data for understanding disease, diagnosis and therapy. The following research activities in the Department represent the priority contributions.

a) New therapeutic molecules
b) Modeling complex bio-molecular systems and surfaces
c) Control and study of dynamic bio-molecular systems
d) Chemical and bio-analytical devices for health diagnostics and imaging

Energy Research in Chemistry at the University of Victoria

The discovery/identification and development of alternative and viable sources of energy represents the most intense scientific challenge of the 21 century. While the developments will involve dramatic contributions in engineering, physics and economics, a comprehensive understanding of the chemical processes is essential for success. The following research activities in the Department represent the priority contributions.

a) Catalysis for a sustainable energy future
b) Design and fabrication of new functional materials
c) New molecular strategies and building blocks for devices