Chemistry
Final Assessment Report & Implementation Plan
April 2025

Faculty / Affiliated University College	Faculty of Science	
Degrees Offered	Bachelor of Science (BSc)	
Date of Last Review	2016-2017	
Modules Reviewed	Honours Specialization in Chemistry Honours Specialization in Biochemistry and Chemistry Specialization in Chemistry Major in Chemistry Minor in Chemistry	
External Reviewers	Dr. John Paul Pezacki, Department of Chemistry and Biomolecular Sciences University of Ottawa	Dr. Michael Serpe, Department of Chemistry University of Alberta
Internal Reviewer	Dr. John Cuciurean Associate Dean Don Wright Faculty of Music	Olivia Matthews Faculty of Social Science, Year Two
Date of Site Visit	February 3 & 4, 2025	
Date Review Report Received	February 21, 2025	
Date Program/Faculty Response Received	Program: March 18, 2025 Faculty: March 19, 2025	
Evaluation	Good Quality	
Approval Dates	SUPR-U: June 4, 2025 ACA: September 9, 2025 Senate (for information): September 19, 2025	
Year of Next Review	2032-2033	
Progress Report	June 2028	

Overview of Western's Cyclical Review Assessment Reporting Process

In accordance with Western's Institutional Quality Assurance Process (IQAP), the Final Assessment Report (FAR) provides a summary of the cyclical review, internal responses, and assessment and evaluation of the Chemistry Program delivered by the Faculty of Science.

This FAR considers the following documents:

- the program's self-study brief;
- the external reviewers' report;
- the response from the Program; and
- the response from the Dean, Faculty of Science.

This FAR identifies the strengths of the program and opportunities for program enhancement and improvement, and details the recommendations of the external reviewers – noting those recommendations to be prioritized for implementation.

The Implementation Plan details the recommendations from the FAR that have been selected for implementation, identifies who is responsible for approving and acting on the recommendations, specifies any action or follow-up that is required, and defines the timeline for completion.

The FAR (including Implementation Plan) is sent for approval through the Senate Undergraduate Program Review Committee (SUPR-U) and ACA, then for information to Senate and to the Ontario Universities' Council on Quality Assurance. Subsequently, it is publicly accessible on Western's IQAP website. The FAR is the only document from the undergraduate cyclical review process that is made public; all other documents are confidential to the Program, the Faculty of Science, and SUPR-U.

Executive Summary

The first B.Sc. in Chemistry was granted in 1924. By 1948, the Department had five faculty members; three more appointments were made in the 1950s. Today, the Department of Chemistry consists of 31 core and 9 cross-appointed or adjunct faculty. Accredited by the Canadian Society for Chemistry (CSC), the program strives to combine core instruction in the five traditional areas of chemistry (analytical, organic, inorganic, physical, biochemistry) with enhanced freedom to specialize in topics of individual interest in upper years. In 2023-2024, the total number of students enrolled in chemistry modules was 139.

The self-study was informed by surveys of current students and recent program graduates as well as feedback from the undergraduate education committee and discussions at larger faculty meetings. With the support of the Centre for Teaching and Learning, program learning outcomes were reviewed and a curriculum mapping exercise was undertaken.

The external reviewers shared a positive assessment of the Chemistry Program. They offer four recommendations with considerations for further enhancement.

Strengths and Innovative Features Identified by the Program

- Significant lab component, among the highest of undergraduate programs at Western, aimed at developing “hands-on” practical skills.
- Development of research skills where the Specialization and Honours Specialization students are required to complete an independent research project which includes writing a mini thesis and giving a public oral presentation and defense of their results.
- Paid internship opportunities - Continuous annual funding of lab positions for chemistry undergraduates through the USRA and WUSRI programs.
- Experiential learning opportunities such as the capstone project-based course (Chemistry 4491E) and internship are well-enrolled.
- Flexible program structure allows for strong interdisciplinary connections with other Majors including Anthropology, Philosophy, Financial Modeling, French, Psychology, and Political Science.
- Global alignment with similar programs facilitates employment and further graduate studies nationally and internally, enhancing global impact of Western Chemistry graduates.
- Planned expansion in offerings with addition of module tentatively titled *Medicinal and Bioorganic Chemistry*.
- Positive alumni feedback indicating that graduates: 1) valued small class sizes, engaged professors, excellent resources; 2) benefited from relevant hands-on/lab experience and exposure to experimental techniques; 3) appreciated

exposure to many different fields of chemistry with options to tailor courses; 4) valued internship opportunities that enhanced career mobility.
- Strong student support through the Chemistry Program Advising Portal and the First-Year Chemistry Course Support Portal.
- Active Chemistry Club that helps foster student engagement and strong cohorts.
    - *WuCHEM mentorship program:* New event aimed at recruiting and retaining undergraduate students in the chemistry program.

Concerns and Areas of Improvement Identified and Discussed by the Program

- Enrolments have been trending lower since 2019.
- Aging infrastructure of the Chemistry building and the lab space which is currently utilized at full capacity and has a limited potential for expansion.
- Create and implement a program-level EDIDA plan to replace the current ad hoc instructor-directed approach.
- Facilitating transfer from other programs (e.g., Bachelor of Medical Sciences) by allowing certain Chemistry courses taken in non-Chemistry modules to be counted toward progression in Chemistry Major and Specialization modules.
- Student feedback highlighted the need for: more pathways towards degree completion, greater flexibility in the course offerings and modular structure, more elective courses and fewer prescribed ones, and better advertisement of Chemistry modules and the opportunities for experiential learning.
- Alumni feedback indicates the need for: 1) enhanced networking opportunities with industry practitioners; 2) more industry-focused courses in the curriculum; 3) enhanced professional development with focus on career preparation; 4) better equipped labs and clearer guidelines for lab reports; 5) encouragement to take courses from other departments (applied math, computer/data science, writing); and 6) enhanced quantitative aspects including coding, data analysis, statistics, and computational modeling/simulation.

Review Process

As part of the external review, the review committee, comprising two external reviewers, an internal faculty reviewer, and an internal student reviewer were provided with Volume I and II of the self-study brief in advance of the scheduled review and then met in-person over two days with the:

- Vice-Provost (Academic Programs)
- Acting Vice-Provost (Academic Planning, Policy and Faculty Relations)
- Director of Academic Quality and Enhancement
- Associate University Librarian
- Dean, Faculty of Science

- Associate Dean (Academic), Faculty of Science
- Department Chair
- Undergraduate Chair
- Administrative Staff
- Program Faculty
- Program Students

Following the site visit, the external reviewers submitted a comprehensive report of their findings which was sent to the Program and Dean for review and response. Formative documents, including Volumes I and II of the Self-Study, the External Report, and the Program and Decanal responses form the basis of this Final Assessment Report (FAR) of the Chemistry Program. The FAR is collated and submitted to SUPR-U by the Internal Faculty Reviewer with the support of the Office of Academic Quality and Enhancement.

Summative Assessment – External Reviewers' Report

External reviewers noted that *"the program is of high quality and meets and exceeds the standards set out by Western."*

Strengths of the Program

- Strong curriculum supported by very knowledgeable faculty members in their respective areas of expertise, producing highly skilled chemists.
    - Full-time faculty members teach nearly all courses in the department; they should be recognized and held as an example of efficiency.
    - Well supervised labs supported by knowledgeable lab support staff.
    - Excellent research opportunities available to 4th year students.
    - Inclusion of an industrial chemistry course and internship opportunities provide experiential training.
- Strong faculty expertise with many high-quality publications, awards and funding.
- Exceptional student support, as highlighted by students and alumni who expressed appreciation for the extensive support that chemistry professors provide within and outside of class.

Prospective Improvements for the Program to Consider

- Aging building and infrastructure including undergraduate lab space. More specifically: 1) overcrowded labs resulting in difficulties with instruction and safety concerns; and 2) poor condition of analytical lab facilities with limited and aging hood space (*Associated with Recommendation #1*).

- The absence of a building manager poses a risk to the long-term health of the building and teaching laboratories, and creates safety concerns (*Associated with Recommendation #1*).
- Promote a renewed focus on the development of a program-level EDI strategy (*Associated with Recommendation #2*).
- Stagnant or reduced enrolment, which may be somewhat linked to a lack of marketing of the program. Consider marketing strategies focusing on transferable skills; revising pathways into chemistry to attract medical science students who do not get into medical school (*Associated with Recommendation #3*).
    - Also, explore the possibility of an early entry path for high school students to apply directly to chemistry.
- Strengthen connections with alumni and use of alumni outcomes as part of the program's marketing strategy (*Associated with Recommendation #4*).
- Consider curricular enhancements to introduce research courses earlier in the program to encourage applied thinking and provide "real world" experience; and modernizing chemistry topics being taught (e.g., machine learning course, AI course, data treatment).
- Explore greater syllabus standardization to ensure consistency in content and inclusion of key information including: resources for accessibility and mental health, student supports, policies on AI use in coursework.
- A TA orientation specific to Chemistry is needed to highlight departmental expectations, establish benchmarks for satisfactory and unsatisfactory performance, clarify scope of TA duties.
- Varied methods of assessment can reduce reliance on test scores, particularly in upper-level courses, through writing assignments, presentations, among others.
- Consider a succession plan for faculty renewal and a strategic plan for both research and teaching activities.

Summary of the Reviewers' Recommendations and Program/Faculty Responses

The following are the reviewers' recommendations in the order listed by the external reviewers.

Reviewers' Recommendations	Program/Faculty Response
Recommendation #1 Address undergraduate laboratory needs with major space renewal/replacement and hire a building manager/administrator who has key competencies.	**Program:** The program accepts this recommendation as being critical to the health and success of the program's operations. **Faculty:** The Faculty of Science recognizes the need for infrastructure renewal and dedicated facility management and will continue to advocate for these improvements through central university planning processes. It should be noted that the Faculty does not directly control capital project funding. Upcoming actions include: • The Department will engage with Facilities Management to assess interim solutions for lab space concerns, and the Department and Faculty will collaborate to advocate to central administration for funding in capital planning discussions. • The Department and Faculty will jointly request building management support, aligning with broader Faculty-wide facility management needs. Additionally, the Faculty has proposed a new Associate Dean (Infrastructure) role with similar portfolio responsibilities. • In the new Bioconvergence Building, there will be 24,000 square feet of space – much of which will be dedicated to undergraduate lab space.
Recommendation #2 Create a program-level EDI plan.	**Program**: The Department will host workshops for faculty members in collaboration with the Office of Indigenous Initiatives, Office of Equity, Diversity and Inclusion, and Centre for Teaching and Learning Centre on how to incorporate EDIDA into the curriculum. It should be noted that all TAs currently participate in mandatory training in support of their role with students (e.g., EDI, Accessibility). The Faculty of Science has taken the following steps to implement the strategic EDIDA plan across programs: • recruited members from each Department, including Chemistry, to provide guidance and focus resources towards actioning of institutional EDIDA strategic plan. • established a position of Assistant Dean, Decolonization whose role is to deepen and strengthen EDID efforts within the faculty and assist integration of Indigenous ways of learning into the classroom and research. **Faculty:** The Faculty strongly supports Chemistry's commitment to EDI and recognizes the department's efforts to integrate Western's broader EDIDA plan. Given the importance of EDIDA in STEM education, the Faculty encourages Chemistry to continue embedding discipline-specific EDI strategies within its curriculum (i.e., integrating Indigenous perspectives and inclusive pedagogical practices), faculty development, and student support structures.

Recommendation #3 Design a plan to mitigate risk of loss of upper year courses to new enrolment thresholds. (Consider Admissions, new option like "Chemistry for Life Sciences", and better marketing strategies).	**Program:** It is absolutely essential that the program maintain courses related to the Canadian Society of Chemistry accredited programs. The program has taken steps to revitalize recruitment measures in an attempt to meet enrolment thresholds and bolster enrolment. For instance: • inviting researchers to describe to first year chemistry students, the interesting and important work that chemists do. • starting a letter-writing campaign and inviting the top students from 1st year to meet the Chair for a personalized tour of Chemistry. • continue long-term recruitment efforts by participating in many outreach events in the community and on-campus with the aim of increasing enrolment. • developing a non-accredited Bachelor's program in the "Chemistry of Life" to attract students interested in Life Sciences and also provide low barrier pathways to chemistry for students that cannot progress in the BMSc. • actively revising the core modules, and preparing to offer higher-level specialty courses in an organized and advertised alternate year fashion, if necessary. **Faculty:** The Faculty of Science acknowledges the challenges posed by minimum enrolment thresholds and supports Chemistry's strategic enrolment and program diversification efforts. The Faculty will continue to work with the department to ensure sustainable upper-year course offerings (e.g., alternate-year rotation, where necessary) while exploring new pathways to attract and retain students.
Recommendation #4 Strengthen interactions with alumni and industries that employ alumni and incorporate feedback and input into program renewal plans.	**Program:** The Chemistry Department maintains strong ties with Alumni and industry via several initiatives, although the COVID-pandemic has had a lingering deleterious effect. Activities include: 1) Alumni event hosted by the Department at the Canadian Society for Chemistry national conference; 2) Homecoming – Alumni event (Faculty BBQ) and Chemistry Building tours are offered; 3) Internship Advisor Faculty member: many students enjoy and benefit from an experiential internship year and strong collaboration with the Faculty of Science Internship office; 4) Local industries and alumni are invited to present industrial research in the 3rd year course "Industrial Chemistry"; 5) Local industries and alumni are invited to act as evaluators for 2nd and 3rd year analytical chemistry student presentations during "poster day"; 6) Local industries and alumni are invited to participate in 4th year thesis course 'mock interviews'; and 7) Local industries and alumni are invited to special seminars such as the Pattison Lectureship. More recently, the Faculty and the University has established the "Nuclear Hub" focusing on nuclear isotopes and exploring opportunities in nuclear energy. This involves both education and research. The Department is developing courses in the nuclear field (e.g., radiochemistry, radiopharmaceuticals, etc.) to answer the need for more workers in the nuclear industry.

	Faculty: The Faculty of Science recognizes Chemistry's strong engagement with alumni and industry partners and supports efforts to expand these relationships. Strengthening alumni connections and incorporating industry insights into curriculum development will further enhance student employability and program relevance.

Implementation Plan

The Implementation Plan provides a summary of the recommendations that require action and/or follow-up. In each case, the Program Chair, and the Dean of the Faculty are responsible for enacting and monitoring the actions noted in Implementation Plan.

Recommendation	Proposed Action and Follow-up	Responsibility	Timeline
Recommendation #1 Address undergraduate laboratory needs with major space renewal/replacement and hire a building manager/administrator who has key competencies	• Engage with Facilities Management to assess interim solutions for lab space concerns; continue to advocate to central administration for funding in capital planning discussions. • Request building management support, aligning with broader Faculty-wide facility management needs. Continue advocating for budgetary allocation to hire a Faculty-wide Facilities Manager and a new Associate Dean (Infrastructure) role.	• Dean's Office	Ongoing, with update after the 2024-2025 budget requests cycle.
Recommendation #2 Create a program-level EDI plan	• Support implementation of Faculty-wide EDIDA initiatives, ensuring alignment with institutional goals. • Offer discipline-specific EDI workshops tailored to Chemistry faculty, staff, and students (starting in spring 2025). • Review curriculum with the aim of integrating Indigenous perspectives and inclusive pedagogical practices.	• Department Chair • Dean's Office	By June 2027

Recommendation #3 Design a plan to mitigate risk of loss of upper year courses to new enrolment thresholds. (Consider Admissions, new option like "Chemistry for Life Sciences", and better marketing strategies).	• Explore the option of scheduling upper-year courses in an alternate-year rotation, where necessary, to maintain offerings under enrolment constraints. • Continue to expand recruitment initiatives aimed at increasing enrolment in first-year and upper-year Chemistry courses. • Continue developing 'Chemistry of Life' program, ensuring alignment with Faculty-wide strategic priorities.	• Dean's Office • Department Chair	The 'Chemistry of Life' program is expected to launch by September 2027. Ongoing monitoring of upper-year course viability, with annual reviews and update as part of the June 2028 progress report.
Recommendation #4 Strengthen interactions with alumni and industries that employ alumni and incorporate feedback and input into program renewal plans.	• Expand alumni engagement and foster industry partnerships with the aim of increasing industry placements for Chemistry students (particularly via Faculty Co-op Office). • Create a Western Nuclear Hub on campus. Explore opportunities to expand nuclear-related chemistry courses.	• Dean's Office • Department Chair • Science Careers • Science Alumni Relations & Development	Ongoing, with annual review of alumni engagement activities. The Nuclear Hub courses would be introduced gradually from 2025 to 2030, based on resource availability and enrolment feasibility.