Western UNIVERSITY · CANADA

## Biomedical Engineering
## Final Assessment Report & Implementation Plan
## August 2026

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| **Faculty / Affiliated University College** | Faculty of Engineering | |
| **Degrees Offered** | Bachelor of Engineering Science (BESc) | |
| **Date of Last Review** | 2017-2018 | |
| **Modules Reviewed** | N/A | |
| **External Reviewers** | Dr. Moshen Akbari<br>Professor, Biomedical Engineering<br>University of Victoria | Dr. Michelle MacDonald<br>Professor, Biomedical Engineering<br>McMaster University |
| **Internal Reviewers** | Dr. Walter Rushlow<br>Assistant Dean, Schulich School of Medicine & Dentistry | Logy Shahin<br>3rd Year Undergraduate Student |
| **Date of Site Visit** | March 24 -25, 2026 | |
| **Date Review Report Received** | April 24, 2026 | |
| **Date Program/Faculty Response Received** | Program Response: May 28, 2026<br>Faculty Response: May 28, 2026 | |
| **Evaluation** | Good Quality | |
| **Approval Dates** | SUPR-U: September 22, 2026<br>ACA: October 6, 2026<br>Senate (for information): October 23, 2026 | |
| **Year of Next Review** | 2033-2034 | |
| **Progress Report** | June 2029 | |

**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 Undergraduate Biomedical Engineering Program, delivered by the Faculty of Engineering.

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 Engineering

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 Subcommittee on Program Review - Undergraduate (SUPR-U) and the Senate Committee on Academic Curriculum and Awards (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 cyclical review process that is made public; all other documents are confidential to the Program, the Faculty of Engineering, and SUPR-U.

**Executive Summary**

The Program in Biomedical Engineering (BME) at Western University integrates biomedical applications with core engineering disciplines, preparing students for careers in healthcare technology, biotechnology, and medical research. All students complete Western Engineering's first-year curriculum, which builds core competencies in mathematics, physics, chemistry, computing, and engineering design. In Year 2, students begin discipline-specific engineering coursework (Chemical, Electrical, Mechanical, or Mechatronic Systems Engineering) and are introduced to biomedical engineering. In Year 3, students build foundational biological knowledge and advance their engineering expertise through upper-year courses in their core discipline. Year 4 is structured around a four-course sequence that serves as the program's intellectual backbone. These courses draw connections across physiology, engineering, and

clinical application, and are designed around evolving, real-world case studies to reflect technological change and healthcare needs. Year 5 emphasizes independent inquiry and professional readiness though a year long research project, a design capstone course and a Leadership and Innovation course. As such, students pursue BME alongside one of four CEAB-accredited engineering disciplines. Total enrolment in 2024-2025 was 135 students.

The self-study was informed by structured data collection, curriculum mapping, a student focus group, and surveys of current students as well as alumni. An iterative internal review ensured that the final document reflected the experiences, insights, and priorities of the full program community.

The external reviewers shared a positive assessment of the Biomedical Engineering Program. They offer six recommendations with considerations for further enhancement.

**Strengths and Innovative Features Identified by the Program**

- Distinctive concurrent degree structure that combines substantial disciplinary depth in Chemical, Electrical, Mechanical, or Mechatronic Systems Engineering with interdisciplinary breadth in biomedical engineering.
- Independent biomedical engineering thesis, supported by a large network of faculty, clinical researchers, hospitals, and research institutes.
- Experiential opportunities with clinicians and industry partners allow students to apply engineering knowledge to authentic healthcare and biomedical challenges.
- Human-centred, equitable, and socially responsive orientation that has students engage with accessibility, health equity, ethics, cultural context, regulation, sustainability, and frugal innovation through design courses, non-technical electives, case studies, research opportunities, and student-led initiatives.

**Concerns and Areas of Improvement Identified and Discussed by the Program**

- Complex technical electives, the home-discipline capstone, and the independent BME thesis are concentrated in Years 4 and 5, contributing to workload pressure and the clustering of major deliverables.
- Unclear curricular pathways and constrained elective choices.
- Limited BME-specific coursework between the introductory course and the senior years appears to weaken continuity, belonging, and engagement.
- Project-based and BME-specific design experiences are concentrated in particular years – need for greater reinforcement in upper years.
- Earlier and more structured support for students to help identify supervisors, understand available projects, secure laboratory placements, and prepare for the final-year thesis experience.

- Students expressed interest in greater exposure to BME-specific regulatory knowledge, industry tools, translational methods, career pathways.

**Review Process**

As part of the external review, the review committee, comprising two external reviewers, one internal reviewer and a 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
- Vice-Provost, Academic Planning, Policy and Faculty
- Director, Academic Quality and Enhancement
- Associate University Librarian
- Dean, Faculty of Engineering
- Associate Dean, Undergraduate
- Director, School of Biomedical Engineering
- Associate Director, Undergraduate
- Chairs of Partner Programs
- Program Faculty Members
- Undergraduate Program Staff
- Undergraduate Students
- Program Alumni
- Western Engineering Biomedical Club Members

Following the site visit, the external reviewers submitted a comprehensive report of their findings which was sent to the Program and Decanal Office 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 FAR. The FAR is collated and submitted to SUPR-U by the Internal Reviewer with the support of the Office of Academic Quality and Enhancement.

**Summative Assessment – External Reviewers' Report**

External reviewers shared that "*The program is structured to provide students with rigorous technical training in a core engineering discipline through a dual […] This combination ensures that graduates are grounded in fundamental engineering principles while possessing the breadth required to address complex biomedical and healthcare challenges*."

**Strengths of the Program:**

- The five-year concurrent-degree model positions graduates well for both traditional engineering and interdisciplinary biomedical fields.
- A large, well-funded group of BME-affiliated faculty provides broad expertise, thesis-supervision capacity and research opportunities.
- The curriculum engages students with authentic healthcare and industry problems, while the required thesis provides substantial experience in independent research.
    - Coursework addresses ethics, health policy, disability, and the social dimensions of healthcare and technology.
- Recently renovated and well-equipped wet-lab and neural-systems facilities support hands-on work with cellular systems, biomaterials, biosignal acquisition, and analysis.
- Access to digital platforms including MyVLab, AppsAnywhere, and remote software appropriately complement in-person instruction by expanding access to specialized computational tools and supporting flexibility when physical access is constrained.

**Prospective Areas of Improvement for the Program to Consider**

- Formalize long-term teaching commitments from contributing departments, distribute responsibilities across more affiliated faculty, and consider additional instructional or program-support capacity as enrolment grows.
- Regular Program Committee meetings and structured meetings with service-teaching departments would strengthen institutional memory, collaborative planning, and responses to enrolment and scheduling challenges.
- Concurrent thesis and home-discipline capstone demands limit students' available research time, while enrolment growth may place increasing pressure on the supply of supervisors.
- Course conflicts, restricted elective availability, and limited access to courses or laboratory sections offered by partner units create challenges for student progression and curricular choice.
- The limited BME presence in Year 3 weakens students' connection to the program and may contribute to attrition.
- BME design experiences should extend beyond the existing introductory course, incorporate stronger representation from non-mechanical disciplines.
- Broader representation of non-medical engineering perspectives/guest speakers in BME 3201A/B.

**Summary of the Reviewers' Recommendations and Program/Faculty Responses**

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

| Reviewers' Recommendation | Program/Faculty Response |
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| **Recommendation #1: BME Thesis**<br>Consider placing independent thesis in 4th year. Placement of thesis in fifth year has it offered concurrently with the capstone which requires group work. If the thesis cannot be moved, then consider altering due dates for deliverables so that they are ahead of capstone due dates. | **Program:** The program acknowledges that scheduling the BME thesis and capstone concurrently in Year 5 may create competing demands. To provide flexibility, the program handbook's "Upper Year Strategies" allows students to complete the capstone in Year 4, enabling them to work with peers from their base engineering program while reserving Year 5 for more focused thesis work. Many students prefer this arrangement because it preserves established capstone teams without requiring the thesis to be moved or the curriculum to be restructured. The program has also staggered major deadlines to reduce overlap. In 2025–26, the thesis poster presentation occurred on April 8, two weeks after Western Engineering Design Day, and the final thesis was due April 24, allowing much of the examination period for completion. The Associate Director, Undergraduate, and the BME 4400E instructor will continue reviewing annual timelines to minimize conflicts and support appropriate attention to both projects.<br><br>**Faculty:** The Faculty agrees with the Program's approach, now already in place. |
| **Recommendation #2: Bolster teaching and program support capacity to ensure continuity, sustainability, and effective delivery of the program**<br>Consideration should be given to increasing instructional and coordination support. One approach would be to consider hiring a limited-term faculty member on a trial basis to evaluate the impact on teaching, program organization, and overall support. If a dedicated position is not feasible, an | **Program:** The School has sought approval for a BME Teaching Scholar through Engineering's annual budget process for several years. Creating such a position is constrained by the UWOFA collective agreement, which favours reclassifying existing limited-term faculty, and BME has no such faculty available. The School currently relies on partner departments to assign BME-affiliated faculty to teach BME courses within their normal workloads, but this approach limits long-term planning. Although 112 faculty are affiliated with the BME graduate program, only about 30 FTE have Engineering as their home Faculty. Under Western's budget model, assigning faculty from other Faculties to BME undergraduate teaching is difficult because their home Faculty would fund instruction for Engineering students. BME therefore welcomes exploration of viable institutional mechanisms to support stable and sustainable teaching capacity.<br><br>**Faculty:** The Faculty understands the motivation to increase teaching capacity for the BME program but respectfully disagrees that any additional faculty hires are necessary. The Faculty has a large cohort of biomedical engineering professors across three of our four departments, all of whom are available to teach in the program. While we will always seek to maximize teaching |

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| alternative would be to appoint a BME faculty member with partial responsibility for the program. | resources available to our programs we must balance needs and resources. At present the needs are greater elsewhere. |
| **Recommendation #3: Increase enrolment and retention**<br>Alter the sequencing of BME courses so that students have at least one BME course per year (or per term) to build a sense of cohort and program identity. | **Program:** The program agrees that a strong BME cohort identity across all years is essential to retention and engagement. Effective September 2026, BME 3301A/B will move from Year 4 to Year 3, providing earlier BME-specific content. In September 2027, Biology 1001A and Biology 1002B will move to Year 2. Together, these changes will give students BME-relevant coursework every year from Year 2 onward. Further sequencing opportunities will continue to be explored.<br>The program is also addressing enrolment barriers. Following discussions with Undergraduate Services in April 2026, it is considering reserved seats in historically required electives and prerequisites offered outside Engineering. Students are now pre-enrolled in engineering sections compatible with first-year Biology, and this practice will continue. An annual summer retreat with partner departments will support proactive enrolment and scheduling coordination.<br>To strengthen career visibility, alumni outcomes are being shared through recruitment events and advising. Beginning in 2026–27, BME 4400E will include a LinkedIn profile assignment and Career Services session, supporting students' professional development while enabling more systematic tracking of graduate pathways.<br><br>**Faculty:** The Faculty fully supports the initiatives outlined in the Program response. The shift of BME 3301A/B from 4th to 3rd year was recently approved for implementation in September 2026. The movement of Biology 1001A and 1002B to 2nd year will be submitted in September 2026 for implementation September 2027. |

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| **Recommendation #4: Increasing stakeholder input**<br>This recommendation is threefold. 1) Hold undergraduate program committee meetings in person to facilitate discussion, brainstorming, and deliberations. 2) Meet annually in person with departments who contribute service teaching to facilitate planning, resolution of pain points with registration in required courses, etc. 3) Proceed with the creation of an external advisory group. | **Program:** The program agrees that formal stakeholder-engagement structures are important to its long-term sustainability. Beginning in 2026–27, the Undergraduate Program Committee will meet in person once each term, with formal agendas and minutes to strengthen accountability, continuity, and institutional memory.<br>The inaugural BME Undergraduate Summer Retreat, planned for May 2026, will bring together BME faculty and staff, partner engineering and service-teaching departments, academic advisors, and student representatives. This annual forum will support collaborative planning related to course scheduling, enrolment, reserved seating, curriculum changes, thesis-supervision capacity, alumni outcomes, and program growth. It will also strengthen relationships among units that have often interacted primarily on operational matters.<br>The program will also establish a shared external advisory board for its undergraduate and graduate programs. The board will support industry engagement, curricular collaboration, applied research connections, and professional networking. Initial outreach will focus on organizations with existing program relationships, including Boston Scientific, General Dynamics, and Trudell Medical International. The program aims to establish the board and hold its inaugural meeting by early summer 2027.<br><br>**Faculty:** The Faculty agrees with the reviewers' recommendations and supports the Program's plans to formalize the Program committee meetings, the proposed annual BME Summer Retreat, and the establishment of a graduate/undergraduate advisory board. |
| **Recommendation #5: Assist students with career planning**<br>There is still an underlying perception with applicants and students that there are few career opportunities in biomedical engineering. By tracking graduates through LinkedIn, exit surveys, and the co-op office, the Program can begin to gather | **Program:** The program agrees that improving the visibility of biomedical engineering career opportunities is important for recruitment and retention. Alumni outcomes collected through the IQAP self-study are now shared with current and prospective students through a "Where Are Our Alumni" feature at recruitment events. In April 2026, these outcomes were also shared with Undergraduate Services so advisors can communicate confidently about BME career pathways.<br>Career development is further supported through collaboration with the co-op office and annual industry networking and career events organized by the Western Engineering Biomedical Club. Beginning in 2026–27, BME 4400E will include a LinkedIn profile assignment and Career Services session, strengthening students' professional skills while supporting systematic tracking of graduate outcomes. The planned external advisory board will create additional opportunities for employer engagement, networking, and curricular collaboration.<br>Starting in September 2026, the Undergraduate Associate Director will visit BME courses annually to share current information about careers, co-op placements, graduate outcomes, thesis planning, and |

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| some concrete examples of where graduates work. Also, consider working with the co-op office and student club to hold industry networking events and career planning events. | upper-year options. The program is also exploring the inclusion of a recent BME graduate ambassador in Engineering recruitment materials, providing prospective students with a visible example of graduate success.<br><br>**Faculty:** The Faculty agrees with the importance of the recommendation and fully supports the Program's response. |
| **Recommendation #6: Western Engineering Biomedical Club support**<br>Allocating resources and space to the club could help to further address some of the forementioned recommendations. | **Program:** The program strongly endorses the reviewers' recognition of the Western Engineering Biomedical Club (WEBMC), whose contributions are integral to BME's identity, recruitment, industry engagement, and national profile. The club's succession model, in which students advance through leadership roles and outgoing presidents mentor their successors, provides exceptional continuity and institutional memory. This is further strengthened when former presidents remain at Western for graduate study.<br>WEBMC has demonstrated considerable initiative and organizational maturity. Students introduced a transparent $20 design-team fee to purchase a 3D printer without external funding. The club also founded the True North Biomedical Competition, a national, student-led initiative that brought more than 140 participants from 10 universities to Western in 2026, attracted sponsors including Dexcom Canada and Ansys, and connected students with real-world healthcare challenges. The competition will return in 2027 as an annual signature event.<br>The program supports securing dedicated space for WEBMC in the new engineering building. Consistent with the Undergraduate Engineering Society's allocation process, the Undergraduate Associate Director and School Director will assist the club president in preparing a formal space proposal. Dedicated space and institutional support would recognize WEBMC's substantial contributions and enable its continued growth.<br><br>**Faculty:** The Faculty agrees with the reviewer's assessment of the value of the WEBMC and fully supports the Program's response to the recommendation. |

## Implementation Plan

The Implementation Plan provides a summary of the recommendations that require action and/or follow-up. In each case, the Undergraduate 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 |
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| **Recommendation #1:** BME Thesis | • Review and refine deliverable timelines each year to minimize overlap and ensure students can give appropriate attention to both the thesis and capstone. | Associate Director Undergraduate | Follow up as part of the progress report in 2029 |
| **Recommendation #2:** Bolster teaching and program support capacity to ensure continuity, sustainability, and effective delivery of the program | • Explore ways in which faculty members affiliated with the BME program (but outside of the Faculty of Engineering) can be assigned to teach BME courses. | Director, Partner Department Chairs, Decanal Office | Follow up as part of the progress report in 2029 |
| **Recommendation #3:** Increase enrolment and retention | • Move BME 3301A/B from Year 4 to Year 3, providing earlier BME-specific content (for Sept 2026). Move Biology 1001A and Biology 1002B to Year 2 (for Sept 2027). Explore further sequencing opportunities.<br>• Institute an annual summer retreat with partner departments to collaboratively plan for the upcoming academic year. This will allow partner units to anticipate BME student enrolment needs, coordinate course scheduling proactively, and address potential access barriers.<br>• Introduce a LinkedIn profile assignment within BME 4400E, with a guest session led by Career Services to teach students how to build and use their profiles effectively. | Associate Director Undergraduate; BME 4400E Instructor | By September 2027 |

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| **Recommendation #4:** Increasing stakeholder input | • Hold undergraduate program committee meetings in person once per term with documented agendas and minutes to ensure continuity and institutional memory.<br>• Establish a shared advisory board serving both the undergraduate and graduate BME programs, ensuring coordinated and efficient engagement with external partners. | Director; Associate Director Undergraduate; | By September 2027 |
| **Recommendation #5:** Assist students with career planning | • Visit BME 3201A/B, BME 3303A/B, BME 3301A/B, and BME 4400E at the start of each academic year to speak directly with students at each stage of the program to ensure students have access to timely and accurate information about their program and future opportunities.<br>• Use alumni data to continue ensuring that advisors are equipped to speak about BME career pathways when working with prospective and current students.<br>• Include a recent BME graduate ambassador in the Engineering View Book. | Associate Director Undergraduate | By January 2027 |
| **Recommendation #6:** Western Engineering Biomedical Club support | • Support the WEBMC president in developing a formal proposal for dedicated club space. | Associate Director Undergraduate | By January 2027 |