

FINAL ASSESSMENT REPORT

Institutional Quality Assurance Program (IQAP) Review

HONOURS BIOLOGY AND PHARMACOLOGY CO-OP PROGRAM (UG)

Date of Review: March 12th and 13th, 2024

In accordance with the University Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response, and assessments of the undergraduate program delivered by the Honours Biology and Pharmacology Co-op program. This report identifies the significant strengths of the program, together with opportunities for program improvement and enhancement, and it sets out and prioritizes the recommendations that have been selected for implementation.

The report includes an Implementation Plan that identifies who will be responsible for approving the recommendations set out in the Final Assessment Report; who will be responsible for providing any resources entailed by those recommendations; any changes in organization, policy or governance that will be necessary to meet the recommendations and who will be responsible for acting on those recommendations; and timelines for acting on and monitoring the implementation of those recommendations.

Executive Summary of the Review

In accordance with the Institutional Quality Assurance Process (IQAP), the Faculty of Health Sciences submitted a self-study in February 2024 to the Vice-Provost Teaching and Learning to initiate the cyclical program review of the Honours Biology and Pharmacology Co-op program. The approved self-study presented program descriptions, learning outcomes, and analyses of data provided by the Office of Institutional Research and Analysis.

Two arm's length external reviewers and one internal reviewer were endorsed by the Vice-Dean, Education of Faculty of Health Sciences and selected by the Vice-Provost Teaching and Learning. The review team reviewed the self-study documentation and then conducted an in-person site visit on March 12-13, 2024. The visit included interviews with the Vice-Provost Teaching and Learning, Deputy Provost, Executive Vice-Dean and Associate Vice-President Academic of Faculty of Health Sciences, the Vice-Dean Education of Faculty of Health Sciences, the Director of the program, and meetings with groups of current students, full-time faculty, and support staff.

The Executive Vice-Dean and Associate Vice-President Academic of Faculty of Health Sciences, the Vice-Dean Education of Faculty of Health Sciences, the Director of the program, and the Academic Program Advisor submitted responses to the Reviewers' Report in June 2024. Specific recommendations were discussed, and clarifications and corrections were presented. Follow-up actions and timelines were included.

Strengths

The BioPharm program review highlighted many of the program strengths including:

1. A dedicated Program Director and outstanding group of teachers and students.
 - The BioPharm program has been built on very dedicated teachers, many of whom have been part of the program for 5+ years, and a few who are even former BioPharm students.
2. Excellent outcomes seen in the career paths of the graduates.
 - The program is an ideal launchpad for any science or health sciences minded student considering future academic and career opportunities. This degree equally prepares students who wish to pursue a professional school (MD, dentistry, pharmacy), graduate school or enter the workforce.
3. Effective models of learning such as PBL and experience-based learning opportunities.
 - BioPharm students are exposed to course materials and program content in problem based learning coursework, including self-directed learning, but also through additional opportunities including co-op placements and a thesis project. As a result, our graduates succeed – they leave the program with the knowledge, laboratory and soft skills needed in their next step of life (academic or employment).
4. Self-study and final year thesis project, enhancing student confidence and providing training for advanced academic opportunities.
 - The BioPharm thesis project is an excellent way to prepare for graduate work, including a dedicated semester to complete research, a detailed written thesis and oral presentation

Areas for Improvement

The program continues to adapt and evolve every year. Some opportunities for improvement and enhancement include.

1. Consider mandating the students' feedback responses in the program survey (for example, making it as a condition of grade availability).
 - The program continuously reviews communication strategies to students and other ways to improve response rates.
2. Gauge student progress during the co-op placement.
 - A key function of the Faculty of Science Co-op office is to monitor student progress during their co-op placement. There may be opportunities to increase the support

to placement students and the Program.

3. Consider establishing a supervisory committee for student thesis projects.
 - Currently the thesis student's unofficial supervisory committee consists of the thesis supervisor and Program Director.

Effectiveness of the program's Self-Study preparation for site visit

The program's Self-Study provided an in-depth opportunity for participants to consider all facets of the program. As part of the process, the BioPharm program conducted several student focused surveys, leading to information not previously obtained, helping to shape course outlines, program scheduling and communication strategies. Throughout the process, the program often communicated with students, helping build stronger relationships and empower student advocacy and provide feedback.

Although program budgets are not a requirement in the Self-Study, considering the current financial situation in the Faculty of Health Sciences, including an added section on this issue and possible solutions could have been insightful. Several of the recommendations from reviewers are tied to financial implications and it is challenging to respond without financial clarity.

Recommendation #1:

Create a faculty-wide mechanism to recognize the values of teaching in the BioPharm program.

Recommendation #3:

Ensure that qualified and enthusiastic teachers are aware of the opportunities of teaching in the BioPharm program

Recommendation #5:

Develop a robust succession plan of leadership and core teachers (including clear assignment of education workload and recognition of teaching for all teachers)

Department's Response and Actions to be Taken:

1. The Program will work with the Department Education Coordinators to establish how the different departments quantify educational contributions so that we can effectively communicate it to any potential teacher. In this way we can inform them of financial and/or academic acknowledgement when contacted about a teaching role. For example, if the faculty member is in the department of Medicine, there is a clear understanding of educational points assigned from the BioPharm program.

2. The Vice-Dean Education, Program Director, and Academic Program Advisor have begun work to engage the departments to make them aware of BioPharm's teaching needs and support faculty recruitment activities.
3. The Program and Vice-Dean Education will collaborate to host a workshop with current instructors to discuss several issues brought up by the review, including longer term commitment to teach specific courses and leadership succession planning.
 - a. The Program Director has already begun a process of outreach to existing faculty who have indicated some interest in leadership of the Program.
 - b. Faculty who have expressed interest in leadership within the Program will be considered as members of the Program Committee (Recommendation #6) and given opportunities to take on specific activities around programming or curriculum development coming out of the IQAP or from the Committee.
4. We will have discussions with the chairperson of the department of Pathology and Molecular Medicine (PMM) who has expressed interest in supporting the BioPharm Program and potentially moving the Program to a department-based home (currently in the central FHS Education Services unit). Discussions have already begun with the Chair of PMM and will continue after all recommendations have been formulated. This aligns with the educational goal of the PMM department as stated in their strategic plan.

Dean's Response:

We are comfortable with and supporting of the Program's plans for these recommendations.

Recommendation #2:

Further support teacher recruitment activity. A longer-term contract arrangement for 3-4 years (CLA) may provide some form of continuity and remove an operational burden.

Department's Response and Actions to be Taken:

Due to the current financial constraints of the program as part of the Faculty of Health Sciences, at this time, we are unable to move forward with this recommendation; however, the program will continue to explore long-term contracts for seasoned instructors who have taught with the program previously. The program is also considering standardizing its sessional rate based on education, experience and knowledge of problem-based learning. The senior administrators in the Educational Services unit are actively engaged in this discussion and will be supporting other recommendations forthcoming (see recommendations #3 and #5).

We are hopeful that 2-to-3-year sessional contracts can be offered for more clinical faculty members requiring them to teach 2 core courses a semester, leading to opportunities such as Assistant Clinical Professorships.

Dean's Response:

As a smaller Program, Biopharm does not have the capacity to independently hire faculty or instructors on long-term contracts. Such faculty hires will need to be coordinated with other programs in the FHS and/or under schools or departments. There are already a large number of full-time faculty across the FHS and capacity to hire sessional instructors when appropriate. As per Recommendations #3 and #5.

Recommendation #4:

Tap into the alumni community for various support for the co-op placement.

Department's Response and Actions to be Taken:

The BioPharm Program office will continue connecting to the Alumni community through email communications and BioPharm community events such as Industry Night and on LinkedIn. The Program Office will continue to build a relationship with the McMaster Alumni Association and develop a communication strategy for networking purposes. Lastly, the Program Office will continue to cultivate placement opportunities with alumni in partnership with the Faculty of Science Co-op office.

Dean's Response:

We support this approach.

Recommendation #6:

Consider establishing a supporting council/board at a level of faculty for the program oversight.

Recommendation #9:

A curriculum committee should be formed to officially evaluate the courses regularly and support the director.

Department's Response and Actions to be Taken:

Establishment of a Program Committee. After all recommendations are discussed at the university level, we will strongly encourage our current teachers to join this newly formed committee. We will also invite the co-presidents of the BioPharm Student Society to be part of the committee. The Committee will meet twice a year in a hybrid format to obtain maximal attendance. A curriculum focus will come under the authority of the Program Committee. This will lead to ideas for change. An action plan will be created at the meeting and the director and academic advisor will implement. Each year, the Committee will be to evaluate student course evaluations and course content.

Dean's Response:

We are fully supportive of this approach.

Recommendation #7:

Start a program-wide discussion on the need of biochemistry- and cell biology focus pre-requisite for admission.

Department's Response and Actions to be Taken:

The Program recognized the need for additional biology related pre-requisites last academic year (2023/24) and submitted changes for the upcoming 2024/25 academic calendar. These changes were approved by Senate after the IQAP reviewers visit in March 2024. The biology related course requirements have been extended to include a minimum of 6 credits from three science/health sciences related course lists, grouped by subject focus. On list A, comprised of biology courses, more than 35% of the course options include cell biology or biochemistry as its focus. These courses include Bio1A03, Bio2B03, Bio3P03, Bio2E03, HS2K03 and HS1LL3. On list B, comprised of chemistry courses, more than 30% of the course options include cell biology or biochemistry as their focus.

These courses include Biochem 3B03, 2BB3, 2EE3, 3D03, 3G03, 3H03 and 3CB3. On list C, comprised of general science courses to build on foundational first year learnings, almost 25% of the course options include cell biology or biochemistry as their focus. These courses include Molbio 3B03, 3D03, Biotech 2BC3 and Lifesci 2BP3.

The Program will continue to monitor these prerequisite changes and if additional revisions are needed based on student GPAs, instructor and student feedback. This process will be undertaken in future years under the auspices of the Program Committee (see recommendations #6 and #9, combined above).

The problem-based learning format allows for more variety of student experiences compared to traditional teaching. When students prepare for classes, they can and do focus on upgrading where they are weak.

Nevertheless, a strong biochemistry/cell biology background is needed, and the current admission requirements fulfill this, more so than prior admission requirements.

Dean's Response:

We fully support the change that Program initiated this year for next year's admission cycle. As the Program has described, this is appropriately monitored by the new Program Committee through review of Program, student, and faculty feedback.

Recommendation #8:

The material/synopses of the mandatory courses should explicitly mention EDI learning as one of the objectives through PBL cases, so that both learners and teachers can be fully aware.

Department's Response and Actions to be Taken:

Equity, diversity and inclusion are issues that are close to the heart of one of the external reviewers and he is a leading force for these issues at his university. We thank him for bringing this perspective forward. Although our teachers are aware of the issues and pharmacology has unique characteristics that pertain to this, in particular related to personalized medicine, we do not mention the issues specifically in our course outlines.

The Faculty of Health Sciences (FHS) has recently appointed an Associate Dean, Equity & Inclusion in addition to a previously appointed Associate Dean, Indigenous Health. The Health Sciences Education Council, under the chairing of the Vice-Dean Education, has been advancing discussions related to equity and inclusion, including retreats in 2023 focused on accessibility and 2024 focused on equity, inclusion, and Indigenous reconciliation. The Vice-Dean has also been working with the Associate Deans and our Equity, Diversity, Inclusion, and Indigenous Reconciliation Committee (EDIIRC) to consider the structures required to facilitate advancing EDI-IR issues in education in the FHS.

The BioPharm program will work with the Vice-Dean and Associate Dean to conduct a review of its current programming, in collaboration with our newly formed Program Committee and our faculty members and students, to begin to develop a systematic approach to addressing EDI-IR issues throughout our program. Although there are known issues around the inclusion of EDI-IR objectives in problem-based and other similar pedagogies, we will work with experts in this area within the Faculty to ensure that this content is covered in an inclusive and safe manner.

Dean's Response:

We are fully supportive of this approach.

Recommendation #10:

Consider providing an opportunity for students to have classroom interaction with those in the other PBL cohort.

Department's Response and Actions to be Taken:

To most effectively conduct problem-based learning, groups are split in half, approximately 11 students. It is correct that the two groups do not formally interact although students naturally interact outside of their tutorials. We do not see this as an issue because problem-based learning, by definition, comes from ideas, experiences and research of all individual students and tutors, hence the actual learning will follow a slightly different path for each group. Nevertheless, the overall objectives of the course are fixed, and the tutor and students have a joint responsibility to achieve those objectives, including that program and course assessments are based on the overall program learning outcomes and course objectives. For the first problem-based learning course, there is always some anxiety amongst students that they might miss out on something the other group did. This can be dealt with by explaining the problem-based learning philosophy and process. Nevertheless, if a cohort wishes to have some interaction, there is no objection to this whatsoever. A joint class may be possible, dependent on schedules and that topics are discussed synchronously.

Dean's Response:

We agree with the Program's response that this recommendation is understandable as students in problem-based learning often have concerns about whether they are learning the right things or the same things as all their other classmates. We also agree with the Program that this pedagogy is now well beyond being proven to be effective, including in a science-based curriculum such as the BioPharm Program and that this kind of pedagogical adjustment is not a necessity. However, given the commitment in other recommendations towards the development of a Program Committee that will also address curriculum issues, we would support the Program in reviewing this recommendation at that newly formed committee for a final decision.

Recommendation #11:

Make the Health Sciences courses in the restrictive course list equally available to PB students.

Department's Response and Actions to be Taken:

The Program Office analyzed the restrictive elective course list in Aug 2023 and revised it based on course size and availability, on feedback from the Honours Health Sciences program who control the health sciences courses and current BioPharm students. The course list is now compact and provides BioPharm students a fairer opportunity to enroll in all the courses on the list. Since BioPharm does not administer any of these courses, we are unable to reserve space, but can reach out to other programs on a students' behalf.

Our current strategy includes.

1. Opening up BioPharm courses to other Health Sciences programs at the discretion of the Program Director, if four courses are not full. The criterion will be whether students have the preparation to do well in BioPharm courses.
2. Continue discussions with the Honours Health Sciences program, including reserving seats and prioritizing spaces for BioPharm students when possible.

Dean's Response:

We are fully supportive of this approach. The Vice-Dean Education will bring this forward to future meetings of the Undergraduate (non-clinical) Programs and in regular meetings with the Assistant Dean of the Honours Health Sciences Program.

Recommendation #12:

Increase the Academic Program Advisor to 100%.

Department's Response and Actions to be Taken:

The Program recognizes that as the needs of its students evolve, so too does the responsibility of the Program Office. Although the BioPharm program is small, much of the administrative tasks are similar to that of larger programs due to university policies and procedures. The program may benefit from an APA who is available more than 50% of the time, changing the position from 2.5 days a week to 3.5 or 4 days a week.

Discussions are taking place to strategize the financial feasibility of this with Educational Services administration. We believe that the current situation is working, in large part because the current APA is very dedicated, knowledgeable, and efficient. Education Services, the home for the BioPharm Program in the FHS, will conduct a review to understand the current needs of this role.

Dean's Response:

The FHS regularly conducts role and work reviews with all our education program administrative roles. The Education Services unit will undertake a review of this role in support of this recommendation.

Recommendation #13:

Discussions should continue to evaluate a 4+1 model from the equity viewpoint as well, given the increasing number of 1 year MS programs at McMaster University.

Department's Response and Actions to be Taken:

The 4+1 option refers to changing the 5-year co-op program into a 4-year program ending with an honours degree, with the option for students to take a 1-year master's degree in pharmacology. Currently, McMaster has many 1-year master's degree options. Hence, for those willing to spend 5 years at McMaster, they can choose between 5-year undergraduate programs or the 4+1 model that gives them a master's degree. This gives competition for our BioPharm program, especially the BDC 4+1 model. This competition is resulting in our program not maximizing our student intake, which makes it logical to contemplate if a 4+1 model would be viable for us.

We believe that our 5-year co-op program is excellent as an undergraduate program and changing it into a 4-year undergraduate program will significantly reduce its quality. Students who would take the 4+1 model would get an education similar to what our 5-year program offers. The master's degree program would have to be open to students outside the BioPharm program, which could bring revenue and international interest to McMaster.

The review panel did not see the 4+1 model as a high priority but as worthy of consideration. We will discuss this topic in our upcoming Governing Council meetings.

Dean's Response:

As the Program has indicated, this was not positioned as a high priority, but something that should continue to be considered. We agree with the approach being taken to keep this option under active consideration, but to do so through an appropriately thorough review process and with involvement of important Program constituents.

Implementation Plan

Summary of the Reviewers' Recommendations with the Department's and Dean's Responses

Recommendation	Action(s) to be Taken	Responsibility for Leading Action	Timeline for Completing Action
<p>#1: Create a faculty-wide mechanism to recognize the values of teaching in the BioPharm program.</p> <p>#3: Ensure that qualified and enthusiastic teachers are aware of the opportunities of teaching in the BioPharm program</p> <p>#5: Develop a robust succession plan of leadership and core teachers</p>	<ol style="list-style-type: none"> 1. Meet and discuss with BioPharm instructors at Program Committee meeting 2. Meet and discuss with each FHS dept 3. Meet and discuss with Vice-Dean of Education for input/approval 4. Include educational point value in all job postings 5. Continue discussions with Pathology regarding moving to a dept 	<p>Program Director – lead (1, 2, 3, 5)</p> <p>Academic Program Advisor – supporting role (1, 4)</p> <p>Vice-Dean – Approver (2, 3)</p>	9-12 months
#2: Further support teacher recruitment activity. A longer-term contract arrangement for 3-4 years (CLA) may provide some form of continuity and remove an operational burden.	<ol style="list-style-type: none"> 1. Determine the financial viability of long term CLA contracts 2. Engage with HR or union as needed 3. If viable, move forward with posting/hiring 	<p>Associate Director, Finance (1)</p> <p>Program Director and APA (2-3)</p> <p>Vice-Dean, Education (1, 3)</p>	4-6 months
#4: Continue to build alumni networks	<ol style="list-style-type: none"> 1. Host 2 alumni invited events annually 2. Maintain LinkedIn profile and engagement (1-2 posts per month) 3. Continue to engage graduating students each year and request personal emails post McMaster 	Academic Program Advisor (1-3)	6-12 months, and then ongoing thereafter

<p>#6: Consider establishing a supporting council/board at a level of faculty for the program oversight.</p> <p>#9: A curriculum committee should be formed to officially evaluate the courses regularly and support the director.</p>	<ol style="list-style-type: none"> 1. Develop a Terms of Reference for a Program Committee (all BioPharm instructors will be invited to join) 2. Meetings to occur once in the fall and once in the winter semesters 3. Topics to be discussed include student recruitment, problem-based learning strategies, and the student learning experience 	<p>Program Director (1-3) Academic Program Advisor (2-3) Program Committee members (2-3)</p>	<p>First Program Committee meeting to occur within 4-6 months</p>
<p>#7: Start a program-wide discussion on the need of biochemistry- and cell biology focus pre-requisite for admission.</p>	<ol style="list-style-type: none"> 1. Update program website to include link to new academic calendar with biol and biochem prereqs. 2. Review prereq on an annual basis and update the academic calendar as needed 	<p>Academic Program Advisor (1-2) Program Director & Program Committee (2)</p>	<p>3 months Annually thereafter by Program Committee</p>
<p>#8: The material/synopses of the mandatory courses should explicitly mention EDI learning as one of the objectives through PBL cases, so that both learners and teachers can be fully aware.</p>	<ol style="list-style-type: none"> 1. Program Committee standing topic of discussion 2. Consult with external (Dr. Akbarali) and internal EDI experts regarding the plan moving forward 3. Discuss with students annually (including current practice feedback and possible ideas moving forward) 	<p>Program Director and APA (1-3) Vice-Dean Education & Associate Deans Equity & Inclusion, and Indigenous Health & Reconciliation (2)</p>	<p>Planning: 15 months Implement: 24 mo Monitoring and iterative response to feedback: ongoing through Program Committee</p>
<p>#10: Consider providing an opportunity for students to have classroom interaction with those in the other PBL cohort.</p>	<ol style="list-style-type: none"> 1. The Program Committee will consider this recommendation. 	<p>Program Director and Committee (1)</p>	<p>12 months</p>

#11: Make the Health Sciences courses in the restrictive course list equally available to PB students.	<ol style="list-style-type: none"> 1. Annually review which BioPharm courses could be opened to non-program students and revise the academic calendar as needed 2. Continued discussions with administrators in the Honours Health Sciences program regarding saving seats 3. Review the restrictive elective list on an annual basis and revise as needed 4. Vice-Dean to bring forward as discussion item in Undergraduate Program Committee 	Academic Program Advisor (1-3) Program Director (1-3) Vice-Dean, Education (2, 4)	4-6 months Annually thereafter
#12: Increase the Academic Program Advisor to 100%.	<ol style="list-style-type: none"> 1. Conduct a review of the Program Advisor role, considering time commitments, fiscal constraints, HR, collective agreement, current employee, and other related issues as appropriate. 	Executive Director, Education Services (1) Program Director and APA (1)	6-9 months
#13: Discussion should continue to evaluate a 4 + 1 model from the equity viewpoint as well, given the increasing number of 1 year MS programs at McMaster University.	<ol style="list-style-type: none"> 1. Meet with Vice-Dean of Education regarding next steps 2. Review with Program Committee once the committee has been created 3. Engage with the MacPherson Institute regarding procedures if appropriate 	Program Director (1-3)	4-6 months initially; ongoing thereafter as needed

Quality Assurance Committee Recommendation:

McMaster's Quality Assurance Committee (QAC) reviewed the above documentation at the September 19, 2024, meeting. The committee recommends that the **Honours Biology and Pharmacology Co-Op** undergraduate program should follow the regular course of action with an 18-month progress report and subsequent full external cyclical review to be conducted no later than eight years after the start of the last review.