REPORT OF THE ACADEMIC PLANNING COMMITTEE
TO THE REGULAR January 2021 SENATE

FOR DISCUSSION

QUALITY ASSURANCE - CYCLICAL PROGRAM REVIEW OF LAURENTIAN UNIVERSITY'S PhD PROGRAM IN BIOMOLECULAR SCIENCES FINAL ASSESSMENT REPORT & IMPLEMENTATION PLAN, JANUARY 2021

In accordance with the Laurentian University's Institutional Quality Assurance Process (IQAP), the Final Assessment Report has been prepared to provide a synthesis of the external evaluation and Laurentian's response and action plan. This report identifies the significant strengths of the program, opportunities for program improvement and enhancement, and 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 made necessary by those recommendations; any changes in organization, policy or governance that will be necessary to meet the recommendations; who will be responsible for acting on those recommendations; and timelines for acting on and monitoring the implementation of those recommendations.

SUMMARY OF THE CYCLICAL PROGRAM REVIEW OF THE PhD PROGRAM IN BIOMOLECULAR SCIENCES

Biomolecular Sciences is defined as pertaining to the study of the structure, function, and properties of molecules relevant to biological processes in plant and animal cells, including the use of such molecules in medicine, biotechnology, and other applied biosciences. The Ph.D. Program has two fields of specialty: Cell Regulation (CR) and Structure and Function of Biomolecules (S&F).

In 1998, Laurentian University, the Northeastern Ontario Regional Cancer Centre (NEORCC), and the Hôpital Regional de Sudbury Regional Hospital (HRSRH) (renamed Health Sciences North (HSN) as of September 2011) were awarded a 5-year grant from the Ontario Research and Development Challenge Fund to establish a Chair in Cancer Research. Recognizing the importance of training highly qualified personnel in health-related research areas, the Chair was directed to lead the establishment of a Ph.D. Program in Biomolecular Sciences. Laurentian University, having committed to the development of a few high-quality doctoral programs, supported the Program in Biomolecular Sciences. A brief was prepared and submitted to the Ontario Council of Graduate Studies (OCGS) in 2003 and Laurentian University was granted permission to offer the Ph.D. Program in Biomolecular Sciences commencing September 2004. This is a unique interdisciplinary program that draws expertise and infrastructure from multiple departments (Biology, Chemistry and Biochemistry, Human Kinetics, Neuroscience and Physics) and institutions (Laurentian University, Health Sciences North Research Institute (HNSRI) and the Northern Ontario School of Medicine (NOSM)). The

program which commenced with 2 students and 15 faculty members in 2004 grew to 22 students and 32 faculty in 2018, the year the self-study was completed.

In December 2018, the program submitted its self-study to the Office of Vice-President Academic and Provost of Laurentian University.

Part 1 of the self-study presented an overview of the program and then reviewed the program's self-perception of the faculty, physical resources, students, program regulations, and how the program harmonized with the strategic goals and mission of the University. It concluded with a section on planning which contained some ideas concerning possible future directions of the program. There were also six Appendices: A—Faculty Research Interests; B—BMOL-6106; C—BMOL—6207; D—Comprehensive Exam; E—[Student] Publications and F—Course Evaluations. Part 2 of the self-study contained the curriculum vitae of the faculty in the program

On 29 and 30 January 2020, after reviewing the self-study, the Review Team conducted a site visit. The two externals were Dr. Peta Bonham-Smith, Dean, College of Arts & Science, University of Saskatchewan, and Dr. Gianni Parise, Associate Dean, Research and External Relations, Faculty of Science, McMaster University. In addition, the team consisted of two Laurentian professors, Dr. Ramesh Subramanian (Engineering) from within the faculty and Dr. Hoi Chu (English) from the Faculty of Arts. Finally, there were two students in the program, Mr. Eyad Kinkar and Ms. Christine Lalonde.

The site visit was thorough and included Laurentian University's Perdue Central Analytical Research Facility and 7th Floor Science 1 Research Labs, Health Science North's Research Institute, and the Northern Ontario School of Medicine's Collaborative Research Laboratory.

Stakeholders consulted included senior members of the university administration (Dr. Serge Demers, Interim Vice-President Academic and Provost, Dr. Shelley Watson, Associate Vice-President Learning and Teaching, Dr. David Lesbarrères, Dean of Graduate Studies and Dr. Osman Abou-Rabia, Dean of Science, Engineering and Architecture). In addition, the team met with faculty teaching in the program, students and Alain Lamothe, the library's liaison to the program

In their report dated 12 March 2020, the reviewers noted that

- With its interdisciplinary nature and delivery, the Ph.D. Program in Biomolecular Sciences is consistent with the goal of Laurentian University – "LU prepares leaders who bring innovative and intelligent solutions to local and global issues." It is also integral to the "health focus" strategic priority of the Laurentian University Strategic Plan 2018-2023.

- The program requirements and learning outcomes are clearly defined and set at the appropriate level for a Ph.D. program. The mixture of course content, writing,

presentations and research, together provide the appropriate stage for student success on graduation

- The stated admission standards for the program are consistent with those applied across Canada for a Ph.D. program. 'Fast-tracking' from a M.Sc. to the Ph.D. program is possible for students admitted to a M.Sc. program in Biochemistry, Biology, Biophysics, Chemistry, Human Kinetics, Neuroscience[1] or Physics who show particular promise.

- The number of enrolled students has increased from the original expectation of 12 students at program maturity to a steady state ~21 students, a good indicator of the quality of the program.

- Since 2013, 20 students have graduated and found employment in the expected range of occupations, including industry, government and academic appointments – a good array of outcomes.

- The Faculty that constitute the supervisory cohort of the BMS program are collectively a relatively mid-career/mature group with a high level of enthusiasm for and commitment to, research.

- A highlight of the program is the impressive array of physical resources available to students and faculty in support of their research.

- From 2013-2018, BMS students collectively published 183 peer-reviewed manuscripts and were primary authors on 114 of them. This is an impressive level of productivity and is a reflection of the quality of the student, the supervisor and the research infrastructure available to the student. Graduates from the BMS program have gone on to enjoy careers in academia as well as industry setting an excellent example for in-program students.

- Over the period 2013 to 2018 the average time to completion of the BMS program was just over five years. This puts graduates of the program under the national average for time to completion, which is good.

Amidst these encomiums, there were some concerns expressed about the program in the body of the report. These concerns are organized according to the set of recommendations which follow although they also include several concerns not addressed in the recommendations which ACALPAN believes need attention:

I. Internal Issues

1 Laurentian does not have a MSc in Neuroscience

A. Curriculum

- The Biomolecular Sciences (BMS) program professes to have two fields of specialty: Cell Regulation (CR) and Structure and Function of Biomolecules (S&F) pertaining to research on prokaryotic and eukaryotic [plant and animal] cells, the latter referring to higher animal and plants. While there is one faculty member, Dr. Kabwe Nkongolo, with research interests that include plants, to state that the BMS program includes plant research is a misnomer and the program would benefit from dropping this angle and focusing on its strengths in health research.
- Few students (one in 2016) have taken the BMOL 6207 Structure & Function of Biomolecules course.
- During interviews, students and faculty both commented on a shortage of graduate (5000 or M.Sc. level) course offerings relevant to the BMS program, especially if the student completed their M.Sc. course work at LU.

B) Faculty

- The relatively unique nature of this program with some faculty supervisors holding non-tenured positions could lead to significant exposure for students. For example, there were multiple conversations of students whose non-tenured supervisor was terminated while they were in program. This led to much uncertainty and anxiety for the students.

C) Students

- The number of externally funded students shows a negative trend from a high of four students in 2013/14 to just 1 in 2017/18. This is not a viable trend for the future of the program…. There appeared to be a general lack of direct financial resources for students. University commitment for student support seemed low with only a guarantee of a $13 K TAship. In addition, there is one $1200 travel grant per student, provided by the Dean of Graduate Studies, that could be used at any time during the student's program. Outside of these provisions, financial support is entirely dependent on the supervising faculty member and is therefore quite unpredictable. Further, there does not appear to be a minimum financial commitment for incoming students.
- With 21 students in the program it appears that the program is adequately resourced from the perspective of faculty supervisors, although diversity of the faculty complement does not mirror that of the student body.

- The program primarily enrolls graduates of programs at LU or transfer students from these programs. The fact that the program does not actively advertise suggests that students at other institutions are simply unaware the program exists.
- The unwillingness to increase the number of BMS Ph.D. students will result in a significant underuse of the excellent infrastructure for research that is in place at the Perdue Central Analytical Research Facility and HSNRI facilities

D) Infrastructure – Maintenance/Repairs

- BMS students enjoy access to the recently built Perdue facility, which is a core facility with chromatography mass spec capabilities and will soon have capacity for genetic analysis. The facility operates on a fee for service basis, however, potential users suggested that fees were high and samples were being sent to external facilities for analysis where rates are less expensive.

E) Quality Enhancements

- Supervisory committees guide the student through their program. Supervisory committees meet at times arranged by the student, however, without administrative support for the BMS program this does not appear to occur in a regular and timely manner. Students need timely feedback on their progress, and it should not be up to the student to arrange these meetings.
- As an interdisciplinary program with students physically spread across buildings and departments it becomes difficult to maintain a cohesive feel to the program.
- There is a seminar course (BMOL 6005) which students must attend during the first two years of their program. While mandatory seminar attendance is expected, it appears that this is not monitored and that attendance by students is quite random.

F) Planning

- To date the mode of course delivery appears to be solely face to face classroom delivery. In proposing to strengthen the program by expanding to include both Algoma University and Nipissing University (both primarily undergraduate institutes) a more on-

line or block/compressed instruction approach would be needed. It was suggested to us that an expansion of the program would be undertaken to fill research 'gaps' in the current program - no such gaps were brought to our attention during the review process

II) External Issues

- Without dedicated administrative support there is a void for students and faculty in acquiring important program information (i.e. deadlines, process).
- At the time of this review the director indicated that there was no dedicated budget to support the BMS program. This meant no discretionary spending within the program and no funds for administrative support. It would stand to reason that a program with 21 students and 31 participating faculty across three institutions should be resourced with some administrative support
- An important resource that the various research groups enjoy is access to an equipment support/repair person. Overwhelmingly, feedback was that this individual is excellent and heavily relied upon. However, this person is stretched beyond capacity and could use additional support… Outside of the Perdue facility there appeared to be no avenue for repairing equipment when it failed.

III) Other Issues Raised in the Review which ACAPLAN will Address in its Recommendations

- The Self-Study made no reference to Indigenous students previously, currently, or future, in the program.
- Library resources are inadequate, and the library budget continues to be cut. There is a library at each of LU, NOSM and HSNRI and journal subscriptions are coordinated between the three libraries. The total library budget is ~$3.5 M but has been cut $0.5 M in each of the last two years. Faculty members are upset by journal packages being cut.

IV) Other Issues Addressed in the Review which ACAPLAN Will NOT Address in its Recommendations

- Students can be enrolled in the BMS Ph.D. program following completion of an M.Sc. degree in a related field or by transferring from an existing M.Sc. program. Transfers occur upon completion of course work and with permission of the supervisory committee. Additionally, approval from Graduate Studies, the Director of the BMS program and the supervisor are required. **There does not appear to be a standard**

transfer exam requirement or any other criteria aside from completion of course work.[2]

- Given the interdisciplinary nature of the program, faculty members in various departments/institutions can become members of the BMS program and have supervisory privileges as a result. **It is unclear what the criteria for membership are and while membership is reviewed every five years, it appears that once qualified no one has been disqualified.** [3]
- **The joint reporting structure for the Program Coordinator is not a best administrative practice**.[4]

Concerns aside, the reviewers noted that "Overall, the BMS program is a very good quality program that is appreciated by current students and faculty alike. The interdisciplinary nature of the program is perceived to be a strength of the program and access to expertise and infrastructure across the three participating institutions (LU, NOSM and HSNRI) is also thought to be quite positive." However, they concluded, "An interdisciplinary program that by its nature does not live in a department, rather cuts horizontally across departments and reports to the Dean of Science, Engineering and Architecture and the Dean of Graduate Studies comes with its challenges."

In April 2020, the Office of the Vice-President Academic and Provost received a document containing the reviewers' recommendations, and the reaction to those recommendations by the program as well as the Dean of Science Engineering and Architecture and the Interim Dean of Graduate Studies.

This document is synopsized starting on the next page.

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2 Since the Program is interdisciplinary, it attracts students from diverse scientific background with an interest in cell and molecular biology. It is impossible to have a transfer exam that will be fair in assessing the scientific knowledge upon entry that is necessary at the level of the comprehensive exam. Instituting a qualifying exam will deter students from transferring as this will be another hurdle. In addition, the reviewers were incorrect when they suggested the program relies heavily on transfer students. Such that it occurs, transfer into the program is for high quality students upon recommendation by the thesis committee and review of the admissions committee. The students are still required to complete the BMS comprehensive exam to continue. Due to the diverse background of students (ie. MSc in physics, chem/biochem, biology, etc), it would be difficult to adopt a "qualifying" exam that will be suitable and fair. At major institutions such as McGill, UBC, UofT all have individual program transfer criteria which include transfer exams, comprehensive exams, etc.

3 The membership criteria are described in the original OCGS brief. The program follows the renewal appointment established by Graduate Studies but goes further… faculty must actively contribute to the program (ie. Supervise, teach, sit on comprehensive exams) to have their appointments renewed. Reappointment is reviewed by the BMS faculty reaccreditation committee. As with all programs, renewal/reappointment is further reviewed by the Deans of SEA and GS. (Although not noted in the program review, a number of core faculty members have resigned.)

4 The reviewers are referring to the dual reporting structure of the program to the Dean SEA and GS. At Laurentian, this is a common practice for graduate programs and deserves a discussion that goes beyond this review.

SUMMARY OF THE REVIEW TEAM'S RECOMMENDATIONS (R) THE PROGRAM'S (P) RESPONSES AS WELL AS THOSE OF THE DEAN OF SCIENCE, ENGINEERING AND ARCHITECTURE (D) AND THE INTERIM DEAN OF THE FACULTY OF GRADUATE STUDIES (GS)

I) Suggested Improvements (Program-initiated):

A) Curriculum

R1. There are currently very few course options for students. The structure/function course is undersubscribed to say the least. It should be removed as a course option and other courses should be developed. There was discussion of evolving the program to include "Metabolic Physiology" as a core area of study—a course should be developed in this area. A 6000-level course should also be developed in Methods/Statistics.

P1. The BMS Program currently has three courses: BMOL 6005 Seminar Series, BMOL 6106 Cell Regulation and BMOL 6207 Structure and Function of Biomolecules. We will develop and implement two additional courses in metabolic physiology and methods/statistics. The BMOL 6308 Metabolic Physiology course topics will include, but not limited to: energy metabolism, integrated cellular metabolism, metabolic regulation and metabolic disease. The BMOL 6409 Methods/Statistics course topics will include; standard and leading-edge methodologies for studying cellular regulation. The statistics section of the course will describe experimental design, analysis and interpretation. We agree that the BMOL 6207 Structure and Function of Biomolecules course has been undersubscribed. We will maintain this course in our BMS course inventory. In addition, the program will develop a Special Topics course which can be cycled to address specialized topics such as cancer biology, drug development etc., dependent on student needs and demands. Furthermore, the reviewers also recommended reading credit courses that are uncompensated that will enhance the learning of students. In addition, the program will work with administration to explore the possibility of students taking distance graduate courses from other Universities as credit courses. The program will implement a course development committee to institute these changes.

D1. The Dean will work with the Program Coordinator to ensure the creation of a Special Topics course and the offering of reading courses to respond to the student needs and allow them to graduate in a timely manner.

GS1. N/A

B) Faculty

R2. Given that non-tenured faculty can supervise students there is significant exposure if these positions are terminated. A formal plan needs to be developed that ensures

continuity for the student. This may include a policy that students supervised by non-tenured faculty must be co-supervised by a tenured faculty member.

P2. The BMS Program will initiate and perform a review to ensure that the current BMS core faculty hold appropriate appointments in the University to maintain their Core Faculty status. The program will develop a plan and implement a formal policy that will include the following. Firstly, all non-tenured, but tenure track faculty must be co-supervised by a tenured faculty member from within the program. This co-supervision will also include an agreement outlining the roles and responsibilities of each co-supervisor as well as a contingency plan should the non-tenured faculty position be terminated. Secondly, all non-tenured, non-tenure track faculty who wish to join the BMS program will also be given co-supervisory status. This co-supervisory status allows faculty to contribute their expertise to the program and thesis committee membership but does not allow these faculty to independently supervise graduate students. This formal plan will ensure continuity for the students within the program. The program also recognizes that in the rare event that a faculty member is terminated or leaves the University, the responsibility for supervision of the student will fall to the co-supervisor or the thesis committee; however, as recognized by the reviewers and the program, a plan must be in place by the University that will provide the financial stability (stipend and research) for the student to ensure successful completion of the program.

D2. In response to the reviewers' recommendation, the Program Coordinator, the Dean and the Dean of Graduate Studies all agreed not to allow adjunct and limited-term professors to be the student main supervisor due to the risk of their affiliations getting terminated. Graduate Studies is working on adding this condition in their rules. On the other hand, tenure-track positions are more stable and it's hard to take away that right from them.

GS2. Dean of Graduate Studies, Program Coordinator and Dean of SEA all agree not to allow adjunct and limited-term professors to be the student main supervisor due to the risk of their affiliations getting terminated. Graduate Studies is working on adding this condition in their rules.

C) Students

R3. A minimum funding level should be set for students in the BMS program. Attracting students into graduate programs is competitive and if the program wishes to diversify from where students are attracted, then competitive funding levels need to be identified and brought into practice.

P3. A key component in the current program for supporting graduate students is the mandatory stipulation that supervisors agree to, and provide evidence of, a minimum of $20,000 funding support for each student for the first four years of their enrollment. However, the program agrees with the external reviewers and will work with administration for additional funding

(such as increased funding for student conference travel, GTA funding, reduced tuition, scholarships) that will allow the program to be competitive and attract students.

D3. The GTA funding and the program stipend is determined by the University and the Program respectively.

GS3. The GTA funding has been adjusted recently to permit some international students to obtain one. The dollar amount of the GTAship is not currently being looked at to be increased or decreased. The funding support for each student, provided by the supervisor, is determined by the program.

R4. The program should be more widely advertised to recruit students from other schools/programs.

P4. The BMS Ph.D. Program agrees that advertising of the BMS Ph.D. Program is indeed an area that has been lacking due to lack of financial resources and this area can definitely improve the marketability and visibility of the BMS Ph.D. Program. The recommendation of reviewers for a dedicated program budget would assist in the resourcing and development of an advertising campaign. The program will work with the Dean of SEA and Dean of Graduate Studies to develop an advertising campaign/program to increase exposure and market the program to national and international students.

D4. An independent budget has been created for the BMS program and should help covering some of the marketing and recruitment initiatives.

GS4. Advertisement of the program amongst students of Masters programs at Laurentian can be facilitated by Graduate Studies. The budget identified by the Dean of SEA will help with recruitment outside of Laurentian.

D) Infrastructure – Maintenance/Repairs

R5. Although students have access to an impressive array of infrastructure, equipment maintenance appears problematic (i.e. confocal microscopes all down with no funding to repair them). A capital plan needs to be developed to ensure continued operation of equipment. This should include user fees for shared equipment, such as the confocal microscopes, so that there is a readily available fund to pay for repairs and down-time for equipment is minimized/eliminated.

P5. The infrastructure expenses are the responsibility of the three different institutions housing the BMS faculty, each having different mechanisms, priorities and governance. The BMS program does not have a direct say in how these institutions deal with capital expenses. Furthermore, the BMS program does not (at this time) have a budget of its own, which could allow contributions to support infrastructure in the home institutions of the BMS faculty. As such it is not possible for the program to independently develop an infrastructure plan. However, a number of initiatives have been undertaken. At NOSM efforts are currently underway to renew

or repair equipment in the laboratories. A joint CFI application has been developed between NOSM, HSNRI and the Departments of Chem/Biochem and Biology at Laurentian University which would fund new equipment. The application aims to acquire a new confocal microscope, which would be housed at the Perdue Facility at Laurentian and a new flow cytometer, to be housed at NOSM. Other CFI grants have been submitted by other program faculty. The Perdue Facility is still relatively new but is in the process of developing centralized analytical capabilities which will operate on a user fee basis, as the reviewers suggest. As the reviewers have pointed out, to be successful, these user fees will have to be competitive in order for the facility to survive. The BMS faculty are striving to contribute to several initiatives that will contribute to infrastructure renewal and repair, primarily through the processes mandated by their individual home institutions.

D5. One of the reasons for the creation of the Purdue Central Analytical Facility to house all major equipment at Laurentian is to implement a fee for use in order to cover the cost of equipment repair and maintenance.

GS5. N/A

R6. The program director should work with the Perdue facility to secure rates in the facility that will keep faculty/students from sending samples elsewhere for analysis. If this is not done, core facilities will be forced to close, which will ultimately have a negative impact on the program.

P6. The Perdue Facility does not provide program-specific rates for analytical work. It does however provide university-wide preferred rates. Members of the program are aware of this information and is available on the facility's website. However, as identified by the reviewers, some of the fees are higher than other facilities, resulting in analysis being conducted elsewhere. Administration at Laurentian University should be encouraged to review and negotiate fees with Perdue to assist all research programs and provide stability to the core facility.

D6. See above.

G6S. N/A

E) Quality Enhancements

R7. A student handbook, including a student/supervisor contract, should be developed and distributed to all students outlining program expectations, policies and processes, important dates and key contacts. This will also help improve communications in the program as students articulated that most program-related information comes through word of mouth from other students, which is not ideal.

P7. The program agrees with the reviewers that updated information about the program requirements and expectations being readily available to students is important. All the

required information was once readily available and accessible to students; however, with the changes in the Laurentian University website where the program is hosted, some information had disappeared. The program believes that having an updated and functional website is more useful than a student handbook which will require constant updating and printing with financial implications. The program will work with Nicholas Ryma (Digital Strategy) and Graduate Studies to develop a more functional website with the appropriate program information, and access to graduate studies policies and processes. Having a dedicated program administrative assistant as identified by the reviewers would provide valuable assistance in updating program information.

D7. I totally agree with the reviewers and I will work with the Program Coordinator to develop an updated student handbook specific to the program.

GS7. Fully agree with reviewers.

R8. To help promote a more cohesive environment within the program an annual BMS research day should be held where all participating faculty and students attend. It was clear that the only formal way in which students and faculty in the program are brought together is through the seminar course, but it was also articulated that most faculty do not attend. A greater effort to promote a cohesive environment and generate a distinct culture around the BMS program would significantly improve the student experience.

P8. The concept of a BMS Research Day is interesting. As the reviewers noted, while the BMS program does organize a weekly seminar series where students, faculty and invited speakers may present research seminars, not many faculty are able to attend. This is likely due to competing obligations in their home departments, such as teaching, meetings or other seminar series. However, there is a seminar day associated with the BMOL6106 course (held at the end of the winter term), where BMOL6106 students present their research grant proposals they developed to fulfill the course requirements, and this seminar day does attract approximately 20 faculty and students. Based on this, an annual BMS Research day or retreat could be successful in attracting both faculty and students to a collegial event. More senior students could present their research progress in oral presentations, which would help prepare them for their eventual thesis defenses and junior students could prepare poster presentations, also a useful exercise in learning how to present research data.

However, an important aspect of this type of event is funding, to pay for refreshments (nutrition breaks, breakfast and/or lunch). Some funds could be used for awards, for example for the best oral presentations or poster. Since the program at this time receives no funding support, it would be difficult to organize such an event, despite the potential benefits to the program. Alternatively, in coordination with the Office of Research and Creativity and Office of Graduate Studies, the program can host a session at the Graduate Students Symposium during the Research week (February). Minimal funding will be required since the cost is covered by the organizers

of the Graduate Students Symposium (Office of Graduates Studies and the Research Office). Attendance and presentation at the annual research day will be a program requirement. Faculty will be strongly encouraged to attend, however, it is recognized that timing for the BMS Research Day will be critical, due to faculty commitments during the academic year.

D8. Several programs have a specific research day in order to bring all their students and faculty together in order to create such a sense of cohesiveness and belonging. The creation of a specific budget for the BMS should help cover any expenses associated with such an event.

GS8. The Faculty of GS would be happy to include a specific symposium for the BMS program during Research Week, if that is the direction the program wishes to take

F) Planning

R9. Development of an M.Sc. in the BMS program should not be done. The rationale for a BMS M.Sc., articulated by faculty, is to provide financial stability to the program. This would not be advisable since the BMS program already enjoys a good relationship with graduate programs in feeder departments. A stand-alone BMS M.Sc. would put the BMS program in competition with feeder departments and strain the relationship they currently share.

P9. The development of a full Graduate Department of Biomolecular Sciences, that offers both MSc and PhD degrees was discussed for future planning by the program. After further discussions and evaluation, the program agrees with the reviewers that it is best not to compete with the feeder departments in which good relationships currently exists.

D9. N/A

GS9. Agree with the Program. There is currently not the critical mass to create a department, which would simply dilute the faculty complement in other units.

R10. Expansion of the BMS program to include other institutions such as Algoma and Nipissing was discussed. The motivation for this was not entirely clear, but if the intent is to *grow the program into complimentary areas* that the program currently does not support then this proposed expansion would benefit the program and the students. Additionally, it may serve to recruit new students, however, these students cannot be left isolated in their home institute.

P10. Expansion of the BMS program was also discussed for future planning. The program will further discuss and weigh the risk and benefits to the program and students carefully, before moving forward with expansion to other Institutions. Further discussion will be required.

D10. N/A

GS10. Algoma has no graduate programs – it bills itself as an undergraduate-only university. Nipissing has only one Masters of Environmental Science/Studies program that could be remotely close to the BMS field. With that context, this recommendation should not be pursued, given that collaborations are already a complicated endeavor.

II) Suggested Improvements (External action required):

R11. An administrator should be hired to serve the program. It might be reasonable that an administrator is hired to serve all interdisciplinary programs in the Faculty. Students identified poor communication in the program as a problem. An administrator would help solve that problem.

P11. In the past year alone, the BMS program had part-time support from 4 different administrative assistants which has had an impact on support for the program, impacting communication to students, faculty and committees. The program is supportive of the recommendation.

D11. As the program is multidisciplinary in nature and falls under the Dean, administrative support is also provided by the Dean's Office.

R12. A clear and adequate budget with discretionary resources should be provided. Improving and evolving the program requires resourcing.

P12. The BMS Program currently does not have a dedicated budget which limits its ability to self-direct and improve areas of programming. The program is supportive of the recommendation.

D12. As was previously mentioned, an independent budget has been created for the BMS program and should help covering some of the marketing and recruitment initiatives.

R13. The equipment maintenance and repair staff is highly valued but recognized by faculty to be working at capacity. Additional staffing should be considered, but a succession plan needs to be developed at the very least.

P13. This is a point that will require more discussion among faculty members of the program. What complicates such planning, including additional staffing and succession, is the fact that the equipment that serve the program are not centralized and housed at multiple partner institutions. Students in the program can access equipment housed at the three main locations: NOSM, Laurentian University (Departments of Biology, and Chem/Biochem) and the HSNRI. Equipment repair is handled separately at the three institutions, occasionally by individual faculty members. Logging user hours and sharing the cost of repair accordingly may resolve the issue of repair but staffing will need to be discussed further. However, the program supports the reviewers' position that administration should consider additional repair staff and succession plan to support all research programs, including Biomolecular Sciences.

D13. An additional technologist has been added to support the main faculty technologist responsible for the faculty equipment repair.

GS13. N/A

ACAPLAN'S RESPONSE

ACAPLAN endorses most of the recommendations of the Review Team but notes the following recommendation has already been addressed:

R9. Development of an M.Sc. in the BMS program should not be done. The rationale for a BMS M.Sc., articulated by faculty, is to provide financial stability to the program. This would not be advisable since the BMS program already enjoys a good relationship with graduate programs in feeder departments. A stand-alone BMS M.Sc. would put the BMS program in competition with feeder departments and strain the relationship they currently share.

Reason: The program agrees with these comments so there is no need for further action.

ACAPLAN will not include the following recommendations in its own recommendations:

R1. There are currently very few course options for students. The structure/function course is undersubscribed to say the least. It should be removed as a course option and other courses should be developed.

Reason: While parts of the first recommendation need to be followed up, ACAPLAN does not support deleting BMOL 6207. In fact, is being offered this year to BMS students and in discussion with the Dean SEA it will be cycled as needed.

R5. Although students have access to an impressive array of infrastructure, equipment maintenance appears problematic (i.e. confocal microscopes all down with no funding to repair them). A capital plan needs to be developed to ensure continued operation of equipment. This should include user fees for shared equipment, such as the confocal microscopes, so that there is a readily available fund to pay for repairs and down-time for equipment is minimized/eliminated

Reason: As the program has pointed out, "the infrastructure expenses are the responsibility of the three different institutions housing the BMS faculty, each having different mechanisms, priorities and governance. The BMS program does not have a direct say in how these institutions deal with capital expenses. Furthermore, the BMS program does not (at this time) have a budget of its own, which could allow contributions to support infrastructure in the home institutions of the BMS faculty. As such it is not possible for the program to independently develop an infrastructure plan."

That said, the BMS faculty are striving to contribute to several initiatives that will contribute to infrastructure renewal and repair, primarily through the processes mandated by their individual home institutions. These include numerous grant applications.

R10. Expansion of the BMS program to include other institutions such as Algoma and Nipissing was discussed. The motivation for this was not entirely clear, but if the intent is to grow the program into complimentary areas that the program currently does not support then this proposed expansion would benefit the program and the students. Additionally, it may serve to recruit new students, however, these students cannot be left isolated in their home institute.

Reason: ACAPLAN agrees with the Dean of Graduate Studies whose comments follows; Algoma has no graduate programs–it bills itself as an undergraduate-only university. Nipissing has only one Masters of Environmental Science/Studies program that could be remotely close to the BMS field. With that context, this recommendation should not be pursued, given that collaborations are already a complicated endeavor.

R11. An administrator should be hired to serve the program. It might be reasonable that an administrator is hired to serve all interdisciplinary programs in the Faculty. Students identified poor communication in the program as a problem. An administrator would help solve that problem.

Reason: Current university financial circumstances to not allow for a new hire who would serve the program exclusively. As the program is multidisciplinary in nature and falls under the Dean of Science, Engineering and Architecture (Dean SEA), some ` administrative support is provided by the Dean's Office.

R12. A clear and adequate budget with discretionary resources should be provided. Improving and evolving the program requires resourcing.

Reason: The Dean SEA has created an independent budget for the BMS program which should help.

R13. The equipment maintenance and repair staff is highly valued but recognized by faculty to be working at capacity. Additional staffing should be considered, but a succession plan needs to be developed at the very least.

Reason: As the Dean SEA has pointed out: "An additional technologist has been added to support the main faculty technologist responsible for the faculty equipment repair."

ACAPLAN is also concerned that the review team missed some opportunities to make further recommendations on several of the issues it identified in its report:

1. New focus on the recruitment of Indigenous students.

Reason: The review team commented that: As a Northern Ontario program located on the traditional territory of the Atikameksheng Anishnawbek First Nation, in a University with more Indigenous teachers than any other university in Ontario (LU Strategic Plan 2018-23), **it would be an expectation that the program establishes, in collaboration with the Science departments, an enabling policy for current Indigenous students to progress from undergraduate to M.Sc. to BMS Ph.D.**

2. Back the library in its request for resources

Reason: The review team noted that: Library resources are inadequate, and the library budget continues to be cut. There is a library at each of LU, NOSM and HSNRI and journal subscriptions are coordinated between the three libraries. The total library budget is ~$3.5 M but has been cut $0.5 M in each of the last two years. Faculty members are upset by journal packages being cut. Financial support should also be provided to assist faculty in publishing in open access journals. [5]

3. Involve the liaison librarian in the program

Reason Each program has a liaison librarian and in most, they are invited to meet with incoming cohorts to review library support and address such issues as the challenges of the current publishing environment. The program should coordinate with the liaison librarian for this program, Alain Lamothe to present a session with students in the program.

LAURENTIAN QUALITY ASSURANCE IMPLEMENTATION PLAN FOR THE PhD. PROGRAM In BIOMOLECULAR SCIENCES

Recommendation	Proposed Follow-up	Responsibility for	Timeline

5 See next page.

At Laurentian itself, the Acquisitions allotment has dropped as follows:

BUDGET REDUCTION

- 2017-2018 - $2,254,225
- 2018-2019 - $2,104,225 - $150,000
- 2019-2020 - $1,893,836 - $210, 389
- 2020-2021 - $1,713,502 – $180, 334

		Leading Follow-up	
1. Create a course in "Metabolic Physiology" and as a core area of study—a 6000-level course developed in Methods/Statistics.	i. Create Course Development Committee ii. Create BMOL 6308 Metabolic Physiology, BMOL 6409 Methods/Statistics, as well as a new "Special Topics" course and submit to CELP	Program Coordinator with Dean of SEA	June 2021
2. Eliminate non-tenured faculty as supervisors	Develop a formal policy concerning supervision by non-tenured faculty as well as action to be taken when a supervisor who is a tenured leaves the university	Program Coordinator with Dean SEA and Dean GS	June 2021
3. Advertise program beyond the university	Work with Laurentian's Marketing unit on a plan and then implement, using some of the funds set aside by Dean SEA	Program Coordinator with ED, Communications, Marketing and Government Relations	September 2021
4. A minimum funding level should be set for students in the BMS program.[6]	i. Raise GTA support above $13,000 ii. Scholarships should be developed and established to attract external students	Dean of Graduate Studies	June 2021
5 Recruit more Indigenous students	Develop policy enabling current Indigenous student to progress from bachelor's to the doctoral level	Program Coordinator with Dean SEA and Associate Vice-President, Academic & Indigenous Programs	June 2021
6. Create student handbook outlining	i. Compile this information from	Program Coordinator	September2021

6 The program has no problems increasing the min stipend level it has set from $20000 to $25000, but the issue raised is institutional/administrative support (which the reviewers indicated is not sufficient). The intent of the reviewers is for the university to provide additional funding to attract competitive students. Currently, due to lack of funding, the program is not able to offer entrance scholarships to attract students who are being offered scholarships to attend other institutions.

program expectations, policies and processes, important dates and key contacts	existing sources ii. Examine possibility of publishing contents of handbook on Web.		
7. Create an annual BMS research day should be held where all participating faculty and students attend	i. Decide whether to create a specific symposium for the BMS program during Research Week ii. Organize day's agenda and then consult Dean about funding for incidentals	Program coordinator with Dean GS and Dean SEA	September 2021
8. Encourage Laurentian to review and negotiate fees with Perdue to assist all research programs and provide stability to the core facility	Bring issue to SEA Faculty Council for support then join Dean in working with the Vice-President Administration	Vice-President, Research	June 2021 and ongoing
9. Assist the library is explaining the program's resource needs	i. Speak up about issue at faculty council meetings ii. Work with Vice-President Administration	Program Coordinator coordinating program members	June 2021 and ongoing
10. Embed library's Liaison Librarian in program	With each incoming cohort, Invite the program's liaison librarian to speak to students on how library can support them and include discussion on how to get published in a world of predatory journals	Program Coordinator with Liaison Librarian	June 2021 and ongoing

The Dean of Science, Engineering and Architecture shall be responsible for monitoring the implementation plan. The details of progress made shall be presented in the Dean's Annual Report and filed with the Vice-President Academic and Provost. The executive summary and the monitoring reports will be posted on Laurentian University's web site.

CONCLUSION

The PhD program Biomolecular Sciences in is approved to continue and it will be reviewed in the fall of 2027.