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MEMORANDUM

ATTENTION: Senate	TEL
FROM: Jon Driver, Vice-President, Academic and Provost *pro tem*, and Chair, SCUP	
RE: External Review of the Department of Molecular Biology and Biochemistry (SCUP 19-33)	
DATE: November 13, 2019	TIME

At its November 6, 2019 meeting, SCUP reviewed and approved the Action Plan for the Department of Molecular Biology and Biochemistry that resulted from its External Review.

The Educational Goals Assessment Plan was reviewed and is attached for the information of Senate.

Motion:

That Senate approve the Action Plan for the Department of Molecular Biology and Biochemistry that resulted from its External Review.

c: N. Hawkins
P. Kench

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MEMORANDUM

ATTENTION Jon Driver, Chair, SCUP
DATE October 24, 2019
FROM Wade Parkhouse, Vice-Provost and Associate Vice-President, Academic
PAGES 1/1
RE: Faculty of Science: External Review of the Department of Molecular Biology and Biochemistry

Attached are the External Review Report and the Action Plan for the Department of Molecular Biology and Biochemistry. The Educational Goals Assessment Plan is included, for information only, with the Action Plan.

Excerpt from the External Review Report:
"Our overwhelming view is that MBB is a very collegial, supportive Department led by a strong chair…who has a collaborative, inclusive approach to leading the Department and working with the University administration. We were impressed by the engagement and enthusiasm of departmental members in the continued success of the Department."

Following the site visit, the Report of the External Review Committee* for the Department of Molecular Biology and Biochemistry was submitted in March 2019. The Reviewers made a number of recommendations based on the Terms of Reference that were provided to them. Subsequently, a meeting was held with the Dean of the Faculty of Science, the Chair of the Department of Molecular Biology and Biochemistry and the Director of Academic Planning and Quality Assurance (VPA) to consider the recommendations. An Action Plan was prepared taking into consideration the discussion at the meeting and the External Review Report. The Action Plan has been endorsed by the Department and the Dean.

Motion:

That SCUP approve and recommend to Senate the Action Plan for the Department of Molecular Biology and Biochemistry that resulted from its external review.

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*External Review Team:
Kirsten Müller, University of Waterloo (Chair of External Review Committee)
Anthony Clarke, University of Guelph
Laura Nilson, McGill University
Barbara Frisken (internal), Simon Fraser University

Attachments:
1. External Review Report (March 2019)
2. Department of Molecular Biology and Biochemistry Action Plan
3. Department of Molecular Biology and Biochemistry Educational Goals Assessment Plan

cc Paul Kench, Dean, Faculty of Science
Nancy Hawkins, Chair, Department of Molecular Biology and Biochemistry

External Review
Simon Fraser University
Department of Molecular Biology and Biochemistry

March 6-8, 2019

Review Team:

Professor Anthony Clarke, University of Guelph
Professor Kirsten Müller, University of Waterloo
Professor Laura Nilson, McGill University
Professor Barbara Frisken, Simon Fraser University (Internal Reviewer)

Preface

Drs. Laura Nilson, Anthony Clarke and Kirsten Müller would like to express their gratitude to the MBB department and Simon Fraser University for their hospitality and organization of the three days of our site visit, as well as their assistance and cooperation with the review process. The Self-Study Report prepared by the Department of Molecular Biology and Biochemistry was thorough, and we were pleased to meet the large number of people within the Department and University administration. The meetings were engaging, and the various stakeholders were open in their responses. Special thanks to Dr. Nancy Hawkins, Chair of the Department, and Dr. Barbara Frisken, Department of Physics, internal member of the review team.

The itinerary for the three-day site visit is summarized below:

Wednesday March 6

8:00 Senior Administrators: Drs. Parkhouse, Nicholls, O'Neil, Derksen, and Kench
9:15 Tour of MBB facilities led by Dr. Nancy Hawkins, Chair
10:15 Break
10:30 Departmental Undergraduate Curriculum Committee (6 faculty)
11:15 Departmental Graduate Curriculum Committee (6 faculty, 1 student)
12:00 Lunch
1:30 Departmental Office Manager: C. Beauchamp,
1:50 Departmental Office Staff: N. Suda, N. Inoue
2:10 Teaching Technicians: Drs. J. Lum and Z. Ding,
2:30 Research Support Staff: D. Napier, T. Heslip, D. De Jong-Wong
2:50 Break
3:00 Research and Resources Committee (5 faculty, 1 staff)

4:00 Dean, Faculty of Science: Dr. P. Kench

Thursday March 7

9:00 Associate VP Research: Dr. D. O'Neil
9:45 Dean, Graduate and Postdoctoral Studies: Dr. J. Derksen
10:30 Break
10:45 MBB Graduate Student Caucus (3 graduate students)
11:15 MBB Student Union (7 students)
11:45 Postdocs and research associates (5 PDFs)
12:15 Lunch
1:45 Research faculty (BCCA-associated): Drs. S. Gorski, R. Holt, S. Jones
2:15 Research faculty: Drs. T. Audas, D. Sen, P. Unrau, C. Cupples
2:45 Research faculty: Drs. C. Beh, N. Harden, E. Verheyen
3:45 Reception

Friday March 8

9:00 Undergrad advisor (Dr. I. Northwood) and Co-op advisors: S. Mandley, G. Lictchfield
9:30 Lecture faculty: I. Kovalyova, I. Northwood, S. Vlachos, E. Chin
10:00 Undergraduate research students (1 student)
10:30 Break
10:45 Research faculty: L. Craig, E. Young, J. Thewalt, M. Paetzel
11:15 Research faculty: J. Scott, J. Choy, M. Brockman
11:45 Research faculty: D. Vocadlo, L. Quarmby, W. Davidson, M. Leroux
12:15 Lunch
1:15 Research faculty: F. Brinkman, F. Pio, R. Morin, J. Chen
1:45 Break
2:00 Chair, Nancy Hawkins
3:00 Senior Administrators: Drs. Parkhouse, P. Keller, G. Nicholls, D O'Neil, J. Derksen, P. Kench

We recognize that the Department of Molecular Biology and Biochemistry is at point where there have been substantial retirements resulting in a decrease in graduate students and research funding and where faculty recruitment is increasing with two new faculty members starting in the summer of 2019. Hence, we note that had our review been two years earlier or later, our view of the Department may have been substantially different. However, this "in-between" stage is a good opportunity for the Department to take stock of their strengths and weaknesses and, taking into account our feedback and recommendations, plan for success for the future. We also recognize that the reforms to CIHR's open suite of research funding programs have greatly impacted the

Department and this concern was discussed extensively with the Department over the three days of our visit. We have provided recommendations that address these concerns as well as others from the many individuals who met with us during the site visit. Our overwhelming view is that MBB is a very collegial, supportive Department led by a strong chair, Dr. Nancy Hawkins, who has a collaborative, inclusive approach to leading the Department and working with the University administration. We were impressed by the engagement and enthusiasm of departmental members in the continued success of the Department. This report contains 33 recommendations in seven key areas: Undergraduate Studies, Graduate Studies, Postdoctoral Fellows, Research, Staff, Departmental Space & Support and Mental Health & Wellness.

A. Undergraduate Studies

I. Undergraduate Curriculum

As claimed by the Department, the MBB undergraduate curriculum provides students with a strong foundation in biochemistry, and molecular and cellular biology. Program goals are clearly articulated and the Department has worked hard since its last review to establish a comprehensive set of learning outcomes for both its programs and individual courses, together with measures for their assessment. As with similar programs across the country, students can specialize in either biochemistry, molecular or cellular biology after completing a common core of courses over their first two years of study. Innovations include joint programs with computer science, chemistry, or business administration. A particularly unique innovation is the opportunity for all students registered in MBB programs to obtain a Genomics Certificate. Current registrations suggest that this is of particular interest to students. There is considerable evidence of high quality and dedication to the undergraduate programming. Faculty members and staff are passionate and dedicated to providing a rich learning experience to their majors.

Recommendation 1: Increase the profile of the Biochemistry curriculum and recruit students to the program through initiatives that highlight potential applications (e.g. industry) and future jobs within this field.

The Department has been successful in attracting undergraduate students to their programs. Registrations have steadily risen over the past five years such that they have experienced 26 % growth over this period. Whereas students are drawn to the programs and appreciate the education they receive, they seem less sure of how they can apply their experiences and transferable skills to the job market. The Department may want to consider taking a more active role, perhaps in collaboration with Student Services, in advising on career planning. This could start simply with a list of potential

careers presented on promotional materials and the Departmental website. The latter could also include testimonials from alumni that reflect the value and potential of the degrees being offered.

Recommendation 2: Develop an undergraduate course in Enzymology, which is fundamental to a program in Biochemistry.

Faculty and staff are very busy offering a wide variety of third- and fourth-year courses while trying to remain engaged and competitive in the research arena. The list of these courses is relatively long, and a number appear to be highly specialized. While this is commendable and would appear to provide a rich opportunity for students, many are electives such that students would not be able to benefit from the content of each; program requirements permit selection of five from a total of 24 courses. Ironically, not available within this list is a fundamental course in enzymology. Given the current workloads, adding another course to the list would be difficult to manage but students should be provided with the option to take a course in enzymology. To accomplish this, while providing the opportunity to students for a broader learning experience, the Department may want to consider consolidating a number of courses while offering a new course in enzymology. For example, perhaps MBB 422 - Biomembranes, MBB 424 - Membrane Transport Mechanisms, and MBB 430 - Mechanisms of Secretory Transport could be consolidated into a single course on membrane biochemistry. The same opportunity may exist with MBB 423-Protein Structure and Function and MBB 443-Protein Biogenesis and Degradation.

Recommendation 3: Expand the oversight of courses to the 400 level by the Departmental Undergraduate Committee (DUC) and develop a terms of reference for the DUC.

During the review, the DUC noted that they have oversight on courses that are below the 300 level. We recommend that the committee also oversee courses that are taught at the 400 level. As noted in the previous section (Recommendation 2), there is considerable overlap in some of these courses and they could be structured into a single course. Furthermore, several of the research focused groups also noted minor frustration about overlap in 400-level courses. In addition, we recommend that the DUC develop a terms of reference for the Committee that would allow for smooth transitions as members of the Committee cycle off the committee and when new departmental chairs begin their role in the Department. It would be ideal for all committees within the Department to develop their own terms of reference.

Recommendation 4: Develop and implement a lab course at the second-year.

Students gain practical experience in laboratory exercises in their third and fourth years of study. These are supported by a team of hard working and dedicated staff. However, students (mildly) complained, and faculty members agreed, that it would be most advantageous to provide a meaningful laboratory experience earlier in their program. In addition to complementing and enhancing second- and third-year lecture/course material, a practical experience in the second year of study would better position students for, *e.g.*, Co-Op work-term placements, and summer research opportunities. This point was also raised in section 7.0 ("Challenges") of Appendix K (the Co-Op Education Report), which noted that, "Students typically join Co-Op prior to completing MBB laboratory courses and therefore are disadvantaged when seeking MBB-related positions."

Recommendation 5: Ensure that there are enough offerings of key courses in the summer term to accommodate Co-Op students and balance the demand for Co-Op placements across the entire year.

SFU operates on a Tri-Semester system which greatly facilitates the offering of true co-operative educational programs, where work experiences and sandwiched in between academic semesters. However, this only benefits students if appropriate courses are available during each of their academic semesters. Whereas the Department is commended for the number of courses they offer in the Summer semester (10, not counting practica and self-directed learning courses), they are encouraged to ensure that key courses are available to students, especially at the third-year level, in order to allow students to take advantage of Co-Op placements in the fall and winter terms without compromising their academic progress.

Recommendation 6: Encourage Co-Op student hiring within individual researchers' labs.

The Faculty of Science or University should consider providing financial support to offset the cost of hiring Co-Op students for faculty researchers (please see recommendation 12). These opportunities would provide Co-Op students with jobs on campus, excellent training in research and also provide a pipeline for future graduate studies.

II. Teaching Infrastructure

Recommendation 7: Replace the current servers being used for bioinformatics courses with updated, stable infrastructure (more RAM) that allows for high usage at peak times and allows students to learn bioinformatic skills in the lab or at home on their own computers.

The capacity of the servers for Bioinformatics courses, which are also key to the high demand Bioinformatics Certificate, is not sufficient for the usage in these courses. The Department should work with the Faculty of Science to upgrade or replace these servers with more RAM that will allow for use while students are in class and has the capacity to handle high capacity at certain times, and will also allow for off campus access for students to work on course material outside of class hours and in the evenings. Consideration of this infrastructure should also include future planning for increasing demand for courses that are part of the Bioinformatics Certificate.

III. Advising

Recommendation 8: Consider succession planning for advising, as well as spreading this role over several individuals rather than one person.

The review team noted that there is currently just one person responsible for undergraduate advising within the Department and this individual has been responsible for this role for many years. We recognize that the Department is currently looking for another individual to take on this task and we recommend that this be expedited. However, the review team also recommends that there is succession planning that allows an advisor to leave this role with a smooth transition. Ideally this role would be spread over multiple individuals, to help with succession planning or coverages during absences, though we realize that this might not be feasible.

IV. Mentoring and Professional development

Recommendation 9: Develop, or support the MBB Student Union in developing, workshops or seminars to help undergraduate students find supervisors for research opportunities (volunteer, ISS, honours theses, Co-Op, graduate studies).

This point was raised in our meeting with the MBB Student Union representative, who mentioned that students want to gain experience in labs and to start getting involved, or to get advice about how to apply for summer research scholarships or graduate fellowships, but that they don't know how to go about finding this information.

Disseminating this information appears to be challenging, e.g. the MBB Student Union organized a "meet-a-grad-student" day, but the event was not well-attended. Workshops or seminars, possibly co-organized by current undergraduate researchers or graduate students, could help meet this goal. These opportunities would be valuable to students interested in academic or non-academic research or research-related careers, and would complement the broader career-planning guidance strategies mentioned in Recommendation 1.

B. Graduate Studies

I. Graduate Curriculum

Recommendation 10: Consider decreasing the course-load requirements for the MSc and PhD programs. To do this we recommend increasing the colloquium course (MBB 821) to 3 credits (from 1 credit) and require this course to be taken in the first term for graduate students. In addition, we recommend moving MBB 801 to the second term of the graduate program, when students have a better idea of what their research will be focused on. Finally, we recommend that this course be evaluated to ensure consistency among the various instructors.

The number of required courses for graduate students is relatively high, and this can add to the stress load of students and be a barrier to recruitment. By changing MBB 821 to a 3-credit course, the number of other required courses (not counting MBB 801 and MBB 806) would be 2 for the MSc and 3 for the PhD, which is more reasonable and in line with other similar programs across the country. We also recommend dropping the course requirement for PhD programs from three to two, provided this is not restricted by University or Provincial requirements.

We heard from students that having MBB 801 in the first term was too early as most students did not have an idea of what their research focus would be and, consequently, felt that it was difficult to focus on skills like oral communication of their thesis project. Though this comment does not seem to fit with the course description, the committee interpreted this concern as difficulty in relating to the MBB 801 material while their own research was just starting, especially with respect to oral communication of their thesis project. Offering MBB 801 in the second term might allow students to engage better with the material and appreciate its applicability to their own work.

The colloquium course MBB 821 could be given in the first semester and modified to include material appropriate for a 3-credit course, possibly including a writing assignment such as a research proposal. Furthermore, if MBB 821 material were linked

to the department seminar series, this could in turn would increase seminar attendance. In addition, if the writing assignments involved peer-to-peer review of each other's drafts, then this would be good training and perhaps foster a sense of collaboration between students, not to mention putting them in an "instructor role" rather than a student role which would also be valuable. Moreover, when the students take MBB 801 in the second term, their own work would be more developed. Also, students expressed interest in seeing more professional development in MBB 801, which is part of the course description but which was not equally provided by all instructors. Given this considerable variation in how MBB 801 is taught as well as course content (including around professional development), we recommend that this course be evaluated to ensure that there is consistency between terms and years.

II. Recruitment

Recommendation 11: Develop and implement a plan to increase the profile of the department to encourage graduate student recruitment within and outside of the University.

The review team strongly feels that more focus needs to be placed on the active promotion of the graduate programs and recruitment of graduate students. The review team heard from many individuals, as well as the Graduate Curriculum Committee, and most raised concerns about decreasing student numbers over the past five years and the difficulty in recruiting top students to their graduate research programs. Currently, faculty within the Department rely on self-recruiting of individual students and there is no concerted effort to recruit students as a department. As explained in the Self-Study Report, MBB feels that this practice might be hampering their broader recruitment efforts, for example by possibly deterring promising applicants who have applied to a supervisor whose lab is full. Changes to the process are already being planned, including creating a Departmental web page listing which supervisors are accepting new students, and developing a mechanism for students to apply directly to the Department rather than to an individual supervisor. The review committee agrees with, and supports, these steps, which are included in the list below.

In addition, the review committee recommends that the Graduate Committee (or a separate committee) focus on raising the profile of the Department to potential students within SFU and at nearby institutions. This concern was also raised in the previous review, which included a number of suggestions that are echoed here.

The review team has several specific suggestions for the Committee to consider:

- Update the website to include a section as to which supervisors are currently recruiting graduate students.
- Develop a mechanism for students to apply directly to the Department even if they have not found a supervisor. Many students view finding a supervisor as an insurmountable barrier and have difficulty knowing what to say or how to engage faculty members in a conversation about graduate school opportunities. The Graduate Committee could evaluate these potential students and recommend specific faculty members examine the student's application for possible interest.
- MBB Grad Open House (annual event) - invite undergraduate students from nearby institutions and from within SFU to an afternoon where faculty members wanting to recruit can give 3-5-minute talks on their research and potential projects for students. This can also include a tour and coffee/treats for potential graduate students. We recommend that this be pushed on various social media platforms.
- Consider attending a graduate fair or determine if this is being done by recruitment activities in Graduate Studies, to promote MBB to potential graduate students.
- Offer to have (junior) faculty members visit regional universities (at MBB expense) where they can give a research talk, and also present potential research opportunities at MBB.
- Use social media to promote potential research positions or include on the departmental webpage.
- Strengthen undergraduate research opportunities in Departmental labs, e.g. through independent study projects or Co-Op placements (see Recommendation 6 above), as a way to attract potential graduate students.

Recommendation 12: Develop and implement a plan to measure and address Equity, Diversity and Inclusiveness (EDI) in the recruitment of graduate students.

The review team was very concerned to see decreasing numbers of female graduate students enrolled in the Department. We recognize that the total number of graduate students is not large and hence a small number of students can make a large difference in the percentage of female students. Nonetheless, close attention should be paid to equity and diversity within the graduate student cohort in the Department. Similar to graduate student recruitment, this requires intention and recognition of the barriers that are present to graduate students that are from underrepresented groups in STEM. In addition, Tri-Agency grants (particularly NSERC) currently require a statement regarding EDI initiatives with respect to HQP in individual researcher's labs.

III. Degree Completion Timelines

Recommendation 13: Continue to monitor and further reduce times to completion of graduate programs.

The Self Study Report noted that completion times for MSc and PhD recently adopted by the Office of Graduate and Postdoctoral Studies are 9 and 18 terms (respectively), and for MBB the anticipated completion time is 6 and 12-15 terms (respectively). However, with an average of over 8 terms, completion times for the MSc program are well above the Departmental requirement. We recommend that MBB continue to monitor completion times of graduate students in both the MSc and PhD programs and work to reduce completion times of students in the MSc program. There are several mechanisms by which this can be accomplished (tends to be a very hands-on approach):

- As a student nears the time for completion (within two terms), require a supervisory committee meeting to evaluate student progress on the research and writing of thesis. Students often have unrealistic ideas about the time that it takes to write a thesis and guidance should be provided by the supervisor/committee.
- For students that are over their program limits, recommend committee meetings each term and the committee should work with the student to develop clearly articulated goals for each term.
- Engage faculty members in discussion regarding completion times, noting that students that continue outside of their program limits prevent the recruitment of new students into the program.
- Consider instituting meaningful barriers to registration beyond the normal time limit, for example by requiring that students submit a detailed timeline and work plan for the coming term (including committee meeting dates) and a letter of support from the supervisor (explaining the reason for the delay and the plan for finishing) before being allowed to register.

IV. Mentoring and Professional development

Recommendation 14: Develop a workshop or mentoring system to help graduate students in their applications for Tri-Agency scholarships and letter-writing workshops for supervisors/referees.

The guidance that undergraduate and graduate students receive is considerably variable among supervisors. The review committee recommends that the DGSC consider developing a workshop on the key points needed in a successful scholarship

application. A workshop for faculty on how to write an effective letter of reference for a graduate student (including avoiding gender bias) would also be advantageous. In addition, an increase in scholarships to graduate students within the department can impact the ability to recruit high quality students, at the very least by increasing overall available funding but possibly also by increasing the profile of the program, as noted in a previous recommendation.

Recommendation 15: To encourage students to be proactive in career planning and skills development, include a section on the Annual Progress Report on professional development where graduate students can report on their career planning activities in the previous year and where supervisors can discuss with them their future directions (academic or non-academic) and possibly provide advice on networking with colleagues at other institutions.

Graduate students expressed considerable interest in having discussions with their supervisors and advisory committees on career planning. Including a section in an existing activity, such as the Annual Progress Report or the Student-Supervisor Agreement, would provide a straightforward mechanism for encouraging these discussions and for prompting students to reflect on the planning activities and/or progress they have made during the previous year.

Recommendation 16: To provide guidance to graduate students and facilitate their career planning, develop and/or highlight a series of professional development activities.

To help students with their annual career planning exercise, the Department should consider developing and/or communicating a list of various types of opportunities that will allow graduate students to complement their scientific training with other transferable skills. This section can include suggestions about events or workshops, potential networking connections, internships, etc. It could also include ideas about leadership roles, at, *e.g.*, the Departmental, University, and/or community levels, that may enable graduate students to build additional skills that will help them to plan and be qualified for careers within and outside of academia. Simple examples include participating in organization of events like the student seminar series mentioned in Recommendation 17 below. In the longer term, this list could grow as students take the initiative to populate the list with their own experiences.

Recommendation 17: Aim to increase graduate student participation in Departmental activities by engaging them through a collaborative process from the beginning of new initiatives.

Inclusion of students in Departmental activities is an admirable and collegial goal, and an important part of their training, but it is important to note that when requests are made to graduate students to participate in Departmental activities, these may be perceived as demands rather than requests due to the inherent power differential between graduate students and faculty. For example, with the current seminar series, we recommend that, for now, the faculty host identify potential students to have lunch with the speaker, rather than asking student caucus group to identify students in the speaker's research area (which they may not know anything about). In the long run, it would be ideal if at least some graduate students would come to view these service responsibilities as leadership training opportunities, though how to go about promoting this shift in thinking is not clear. One approach might be for the department to aim to include the graduate students earlier in the planning process and to allow them to co-create their role in a given process (like planning the seminar series) instead of feeling like tasks are being assigned to them.

Recommendation 18: Encourage the development of Graduate student/Postdoctoral-led activities, which could include the development of a research seminar series for PDF and graduate students.

Such a seminar series would provide a platform for senior students and PDFs to present their work in a non-intimidating environment and help develop their communication skills among their peers. It would also help with community building and let the students know what the other labs are doing, share techniques/problems/troubleshooting, provide peer mentoring opportunities, etc. Ideally, the organization would be done by students/PDFs, which would provide them with important leadership credentials and organizational skills. Including a structured form of peer-peer feedback, *e.g.,* a small group of students (chosen by the presenter themselves, or by the organizers, or self-identified) who agree to spend a few minutes with the speaker to give post-seminar feedback, would enhance the training in communication skills.

V. Accelerated MSc program

Recommendation 19: Given that the structures for an Accelerated MSc program are already in place at the University, proceed with developing this program in the Department.

Section 7.11 in the Self Study Report noted interest in developing an Accelerated MSc program. The review committee agrees that this would be an excellent mechanism to recruit high quality undergraduate students into this program. This program would capitalize on students who have the ultimate goal of admission to professional schools (*e.g.*, Medicine) and provide excellent scientific training for these students.

C. Postdoctoral Fellows

Recommendation 20: Develop a welcome/orientation package for incoming postdoctoral fellows.

The review committee was made aware that postdoctoral fellows in other departments in the Faculty are provided with welcome packages that include essential information, such as clear instructions regarding items that need to be completed at the beginning of their fellowship. Postdoctoral fellows expressed concern that there were no clear instructions upon their arrival and little guidance was provided on campus as well. If they are not already doing so, the University should be encouraged to establish a system for recording/tracking postdoctoral fellows.

Recommendation 21: Develop a mentoring system for Postdoctoral fellows within the Department.

The review committee heard from several postdoctoral fellows that a sense of community was lacking, as were mentorship opportunities. The postdoctoral fellows would like to have regular meetings (*e.g.*, once per term) with an advisory committee to discuss career trajectories, leadership opportunities and direction in research area. In addition, the committee recommends that the supervisor and Department support postdoctoral fellows in engaging in departmental and university service to build their professional portfolios. Organization of and participation in a trainee seminar series (see Recommendation 17 above) is one example of possible departmental service, and would also serve to strengthen connections between postdocs and could provide a mechanism for peer-to-peer mentoring.

D. Research

I. Research Funding

Recommendation 22: Develop a mentoring system to aid faculty in establishing collaborative initiatives to bring in more research funding and consider more collaborative efforts with other campus departments.

The research funding landscape has evolved considerably over the last several years. Current trends that shift funding away from the traditional single-investigator operating grant model and toward collaborative/interdisciplinary work and translational research, together with drastic and poorly-conceived reforms to CIHR's open operating grants, have impacted researchers across Canada. The research programs of MBB faculty members seem to have been affected to different extents, possibly correlating with research area. In meetings with the review team, some researchers mentioned finding that it was very challenging to adapt to the new funding environment and that they were having a hard time learning how to pivot to align with new funding priorities. To address this issue, we recommend developing ways to get faculty members organized for group grant applications, help them to recognize and partner appropriately to be eligible for other opportunities, etc. This role could be accomplished by a committee, analogous to the Research and Resources Committee, that would stay informed about funding opportunities, identify faculty members that might be appropriate, help facilitate collaborations where necessary, and generally encourage and support faculty members in taking advantage of such opportunities. The ADR office could also provide support and/or guidance. The goal would be to help make it easier for faculty members to identify new funding opportunities and to take advantage of them.

II. Research Awards

Recommendation 23: Create an Awards committee to nominate faculty and students for awards.

We recommend that the Department establish an Awards Committee to actively nominate faculty and students for awards, prizes, etc. that are available on campus and outside the institution. This can improve the profile of the Department and increase graduate student interest in the faculty.

III. Research space and equipment

Recommendation 24: While respecting any relevant legal constraints, the University should continue to allow the Department to carry forward funds to maintain and purchase new equipment.

We learned that the Department has been very successful at securing new equipment, and that they've done so by applying for external funding but also through a combination of recovered user fees, salary awards and contract overheads. These sources generate a balance from time to time, as funds accrue for planned maintenance or purchases and, in the Self Study Report, MBB noted that it is imperative that the University not start to claw back these funds and continue to let the department carry them forward.

Recommendation 25: The Faculty and University Administration are urged to address the electrical issues that include loss of power that result in delays and losses to research.

During the review, there was concern expressed by numerous groups regarding the instability of power coming into the building. This has greatly impacted the research that is ongoing in the environmental rooms and has sometimes ended with a complete loss of ongoing experiments. In addition, there is no back up or alarm system on the -80 degree freezers, which results in the loss of costly samples and material. This lack of a stable electrical supply directly delays research productivity and hence negatively impacts competitiveness for future funding. The cost of this to the researcher is considerable and steps should be taken to address this as soon as possible to prevent future delays and losses. The MBB Self Study Report refers to detailed records that have been kept since 2016 and cites the number of failures etc. If the Department has not done so already, this information and its financial and scientific impact should be summarized in a report to be submitted to the Faculty and University to emphasize the need to address these issues and find a solution in a timely fashion.

Recommendation 26: The Department is urged to provide information regarding the specific needs for computing and bioinformatics platforms to the Faculty and University administration as well as the specific problems and delays associated with the recent centralization of research computing, including the impact and loss of relationships that is occurring due to these delays.

Important concerns were raised about the adequacy of the computing and bioinformatics platforms, and in particular the effectiveness of the central management of research computing. Downtime for servers is reported to have had considerable impact, including loss of contracts and delays for courses that use the servers. In

addition, some of the large datasets that were being hosted are now reportedly being moved due to concerns about reliability. The review committee recommends that the Department prepare a detailed report to explain the problems experienced to date and their impact on research, teaching, and hosted functions, the relationship to Compute Canada resources, and what would be needed to fulfill contractual/teaching/research obligations. The goal of such a report would be provide administrators with a clear accounting of the problems being faced and to provide recommendations on possible solutions.

Recommendation 27: The Faculty and University administration are urged to address the issues around a lack of computing power and central resources for faculty that require resources for bioinformatics (at teaching and research levels), considering the information provided by MBB.

A detailed report of the deficiencies in computing resources for specialized research and teaching, as outlined in Recommendation 25, should be provided to the appropriate Faculty of Science and University administrators. This report should be used as a basis for planning and implementing, in a timely fashion and in consultation with MBB, improvements to infrastructure and management that will resolve these problems.

IV. Faculty Renewal – 2020 hire

Recommendation 28: Consider a hire in Bioinformatics/Genomics for 2020.

In the terms of reference for the External Review Committee, it was noted that the Department would like guidance on the 2020 faculty recruitment in either immunology or bioinformatics. In addition, Section 6.6 of the self-study report notes that MBB is committed to developing a program in Immunology and Infectious Disease (IID) with the Departments of Biological Sciences and the Faculty of Health Sciences. Based on this emerging program and the network of SFU immunology researchers, we recommend:

- Hire in genomics/bioinformatics in 2020 to further develop an important strength of the Department.
- Tailor the job ad to include candidates who use bioinformatic techniques to study immunology/infectious diseases.
- Continue to participate in developing the IID program and use it as a platform for research collaborations or a graduate program, thus maintaining a strong network in this research area so that the remaining two immunologists in MBB won't be isolated.

E. Staff

Recommendation 29: Provide cross-training for staff in the Departmental office to provide cover for when staff are away or busy.

We encourage the Chair and Departmental manager to work on cross-training the staff members in the Departmental office on the different areas that are currently being managed by these staff. This would provide better coverage over lunch hours when only one staff member is present and there are concerns about being short-staffed within the office, particularly when staff members are on vacation or ill.

Recommendation 30: The Department and Faculty should hire an additional Equipment Technician position to provide back up when technician is away or busy.

Currently, there is one individual that is responsible for managing the equipment within the Department. This includes approximately thirty separate pieces of equipment that are managed by one person with no coverage on vacations, after hours or sick days. In addition, there is currently no succession planning arranged for this position. Should there be a sudden reason that the current individual could not continue in this role, this would place the Department in a precarious position regarding the maintenance of important and expensive equipment. We recommend that the Department and Faculty of Science look at hiring a second person to manage the equipment in the Department to address these concerns. This could also include cross-training and support across different departments within the Faculty of Science to ensure that the technician does not have to respond to concerns in non-working hours.

F. Departmental Space and Support

Recommendation 31: The Department and faculty should renovate and reorganize the Departmental Office to include private offices to ensure confidentiality for the chair's secretary, graduate secretary and Office Manager.

The Departmental Office space was poorly designed and it does not provide an environment where individual confidentiality can be ensured. Faculty, staff and graduate students should have the ability to speak with their relevant contact in the Departmental office without feeling concerned that their confidential matters may be overheard or that they will draw attention to a private situation. The current office does not allow for this important level of privacy and confidentiality, and lack of individual office space raises concerns about the security of confidential paperwork that may be

on unsecured desks. In addition, there are safety concerns regarding the cabinets in the office that are not properly affixed possibly prone to tipping over.

Recommendation 32: Faculty of Science should examine opportunities to allow for connectivity and IT links for people who are not on the main campus, such as jointly appointed faculty members, to attend departmental meetings remotely.

The review team recognizes that there is an excellent relationship between BC Cancer and the Department and that the Department has several joint appointments with this organization. This is a relationship that is clearly valued by the Department. However, given the extensive commuting issues in lower mainland BC and considering green initiatives, the review team recommends allowing more opportunity for the joint members of the department to connect remotely to Departmental meetings. Existing Departmental technology may be sufficient for this purpose, as the review team had several teleconference meetings during the site visit, including one with at least six participants participating simultaneously.

G. Mental Health and Wellness

Recommendation 33: The Department should engage the Health and Counselling Office to provide orientation for faculty and staff members on recognizing undergraduate and graduate students experiencing mental health concerns, responding appropriately, and providing direction to additional resources.

The review team heard from a number of individuals that expressed concern regarding the training of faculty and staff members and their ability to recognize students that are in distress. The Department should encourage faculty and staff to engage in the programs that are available at the University and this will enable these individuals to be prepared to direct students to the appropriate resources on campus. Holding such sessions could be held on-site, in the Department, if possible, would facilitate participation.

EXTERNAL REVIEW – ACTION PLAN

Section 1 – To be completed by the Responsible Unit Person e.g. Chair or Director

Unit under review	Date of Review Site visit	Responsible Unit person	Faculty Dean
Molecular Biology and Biochemistry	...March 6-8, 2019...	...Nancy Hawkins...	...Dr. Paul Kench.....

Notes

1. *It is **not** expected that every recommendation made by the External Review Committee be covered by this Action Plan. The major thrusts of the Report should be identified and some consolidation of the recommendations may be possible while other recommendations of lesser importance may be excluded.*
2. *Attach the required plan to assess the success of the **Educational Goals** as a separate document (Senate 2013).*
3. *Should any additional response be warranted, it should be attached as a separate document.*

1. PROGRAMMING

1.1 **Action/s (description what is going to be done):**

1.1.1 Undergraduate:

A) MBB will review the content of its biochemistry courses to ensure sufficient Enzymology content and include additional lecture material in relevant courses if necessary.

B) As previously done several years ago, MBB will undertake a comprehensive review of it's fourth year courses to ensure that they align with the program goals and provide both breadth and depth without duplication of content. This review will be overseen by the Departmental Undergraduate Curriculum Committee.

C) MBB will develop a second year lab course designed to introduce students to basic laboratory skills in molecular biology and biochemistry. This course will align with the content of MBB 222 and provide practical experience for second year students applying for Co-op positions and summer research opportunities. This will also necessitate the concomitant removal of a second year course to create room in the program. MBB will consult with the Faculty of Health Science in addition to relevant departments within the Faculty of Science in the development of the second year lab course.

D) To increase summer course offerings, MBB will offer MBB 321 (Intermediary Metabolism) in the summer semester.

E) MBB will work with the Faculty of Science to upgrade the computer infrastructure necessary for teaching bioinformatics and genomics courses.

F) MBB will develop and implement strategies to better inform undergraduate students about research opportunities (volunteer, Directed Studies, NSERC USRAs, Co-op etc.).

G) MBB will work toward developing/enhancing career planning for undergraduate students by providing career information on the MBB website and develop additional strategies to educate students about potential job opportunities.

H) MBB will work with the Faculty to Science to explore the development of a Life Sciences Program.

1.1.2 Graduate:

A) With oversight from the Departmental Graduate Studies Committee, MBB will review MBB 801 (Student Seminar in Molecular Biology and Biochemistry) to ensure consistent course content regardless of instructor. MBB 801 will include career planning and professional development activities.

B) MBB will develop a 2 unit Seminar Course that will be aligned with the Departmental Seminar Series with the goal of reducing course load requirements and enhance graduate student attendance at seminars.

C) MBB will develop and implement strategies for the recruitment of quality graduate students, including improvements to the MBB website and hosting an MBB Grad Open House. MBB will also explore the possibility of having a junior Faculty member giving a research seminar at other BC Universities where they can promote graduate opportunities in MBB.

D) MBB will develop and implement a plan to address Equity, Diversity and Inclusion in the recruitment of graduate students.

E) MBB will continue to monitor graduate program completion times and will implement strategies to reduce MSc completion times.

F) MBB will explore the development of an Accelerated MSc program.

G) MBB will collaborate with the MBB Graduate Caucus to develop a graduate student/PDF research seminar series.

1.2 Resource implications (if any):

1.1.1 C) The development of a second year lab course would necessitate access to additional teaching lab space not currently available to MBB, as well as teaching technical support and potentially laboratory equipment/supplies. This will also require a shift in Faculty teaching responsibilities. The MBB DUCC has been actively working with both BISC and FHS in the development of a second year lab course.

1.1.1 D) Any additional course offerings in the summer may, at least in the short term, require the hiring of a sessional instructor.

1.1.1 E) Finally, MBB will need to work with the Faculty of Science to fund upgraded computer infrastructure for undergraduate teaching.

1.3 Expected completion date/s:

It is anticipated that the majority of Actions will be accomplished within three years. The implementation of 1.1.1 C will depend on obtaining the necessary resources.

2. RESEARCH

2.1 Action/s (what is going to be done):

A) MBB will work collaboratively with the Associate Dean of Research to develop plans to support Faculty members experiencing a loss of research funding. One approach will be to identify collaborative grant opportunities and these potential collaborations may extend across departmental boundaries.

B) MBB will continue to provide information to both the Faculty of Science and the University Administration concerning serious issues with Research Computing, including delays to research, loss of productivity and negative impacts on contracts, grants and damage to stakeholder relationships.

C) MBB will create an Awards Committee to nominate Faculty, Staff and Students for awards.

D) MBB will continue to work with departments within the Faculty of Science, as well as the Faculty of Health Science, on common research interests.

2.2 Resource implications (if any): None

2.3 Expected completion date/s: The awards committee will be formed September 2019. The other action items will be on-going.

3. ADMINISTRATION

3.1 Action/s (what is going to be done):

A) MBB will update a "how to manual" for each main office position so that essential tasks can be covered in the event of illness or absence and all office staff will be informed of the location of the manual.

B) The Chair's secretary, Graduate Program Assistant and Undergraduate Program Assistant all occupy a very cramped, open concept space with no privacy or ability for confidential conversations. MBB places a high priority on the redesign and renovation of the MBB office.

C) MBB will explore IT options to allow Faculty members to attend Faculty meetings remotely, particularly joint members at the BCCA.

3.2 Resource implications (if any): A renovation of the MBB office is only possible with significant funding from either the Faculty of Science or the higher administration.

3.3 Expected completion date/s: The expected completion date for renovation of the MBB office is unknown. The other action items can be completed within a year.

4. WORKING ENVIRONMENT

4.1 Action/s (what is going to be done):

A) MBB will invite Health and Counseling Services to offer a workshop annually for all Faculty and Staff aimed at recognizing and responding to student mental health concerns.

4.2 Resource implications (if any): None

4.3 Expected completion date/s: Yearly

5. Postdoctoral Fellows (*OTHER*)

5.1 Action/s:

A) MBB will work with postdoctoral fellows to identify ways to provide more mentoring and integration within the department.

5.2 Resource implications (if any): None

5.3 Expected completion date/s: On-going

The above action plan has been considered by the Unit under review and has been discussed and agreed to by the Dean.

Unit Leader (signed) Nancy Hawkins **Name ...Nancy Hawkins..... Title.....Associate Professor and Chair.....**	**Date** **.....July 12, 2019.....**

Section 2 - Dean's comments and endorsement of the Action Plan:

MBB has developed a thoughtful response to the External Review report.

The action items for the undergraduate program reflect a need to streamline curriculum and contain a commitment to explore the possibility of a common Life Sciences program. These actions should also better support the student learning experience.

It is pleasing that the action items under the graduate program are focused on attracting a diverse and high-quality student body and has identified additional strategies to assist students to complete their programs in a timely manner.

MBB is known for the quality of its research. However, there has been a recent trend of reduction in research income from external sources. The Faculty will work closely with the Department to support faculty to become more competitive in research funding applications.

The Department has identified a number of actions that require new resources. The Faculty of Science is committed to working with MBB to identify opportunities to implement these actions.

Faculty Dean	**Date**
	**21.10.2019** .....

Assessment of Education Goals

Over the last several years MBB has developed educational goals at the program level and specific goals for individual MBB courses. Below are the general assessment methods utilized for the core MBB courses, which are the 200 and 300 level courses required for all MBB majors.

A. Assessing success of the Educational Goals for the core MBB lecture courses.

- No-stakes: optional textbook questions
- Low-stakes: practice questions/problem sets/quizzes
- Medium-stakes: required problem sets for review in tutorials
- High-stakes: in-class midterm exams testing factual knowledge and application as well as the understanding of concepts
- Highest stakes: a cumulative final exam. Questions on the final will test whether students have met specific learning outcomes for the course
- Additional assessments may include oral presentations or term papers

B. Assessing success of the Educational Goals for the core MBB lab courses.

- Low-stakes: short quizzes testing student preparation for labs
- Medium-stakes: Assessment of lab performance
- Medium-stakes: Assessment of lab notebooks
- High-stakes: midterm and final exams testing students' ability to solve technical/practical laboratory problems, select appropriate experimental techniques, and address experimental troubleshooting
- High-stakes: lab reports and/or written assignments
- All assessments directly test the course specific learning outcomes

C. Assessing success of the Program Educational Goals

At the end of a degree in Molecular Biology and Biochemistry, students should be able to:

1. Articulate testable hypotheses and design experimental or sampling protocols to test them
2. Apply molecular biology and biochemistry experimental techniques and interpret experimental results
3. Use appropriate analytical and statistical methods for quantitative analysis and graphical representation of data
4. Use databases and bioinformatics tools (molecular database searching, sequence similarity searching, protein databases and modeling)
5. Search the primary literature and critically analyze and interpret scientific studies
6. Develop coherent arguments supported by relevant and credible evidence

7. Communicate effectively using oral, visual, and written communication, including scientific writing for a scientific, government, industry or general audience
8. Work safely, effectively, cooperatively, collaboratively, and ethically in a lab or other professional setting
9. Demonstrate an understanding of the language, body of knowledge, methodology, and significance of molecular biology and biochemistry.
10. Critically evaluate news/information/current events related to molecular biology or biochemistry topics and explain them in lay terms to family/friends/acquaintances.

The assessments for the core MBB courses will provide a direct measure of our student's ability to meet our program specific goals. In addition, MBB will develop an exit survey for our undergraduate students to provide a self-assessment of their ability to meet the program goals. They will be provided with an opportunity to specifically comment on any program goals they felt that their MBB degree did not fully meet. This feedback will then inform the DUCC to review and potentially modify course content.