

Two-Year Progress Report

Biology (BSc, MSc, PhD)

November 2021

Background

The most recent Biology Final Assessment Report was approved by Senate Undergraduate Council on November 13, 2018. The review included the following programs:

- Honours Biology (co-op & reg, 6 specializations: Animal Biology, Biotechnology, Environmental Biology, Microbiology, Molecular Genetics, Plant Biology. Note: Specializations were discontinued in 2020) and Biology Minor
- Honours Biochemistry (Joint with the Chemistry Department, co-op & reg, Biotechnology specialization available) and Biochemistry Minor
- Honours Biomedical Sciences (reg)
- Honours Environmental Science (Ecology), (co-op & reg)
- Honours Life Physics (joint with the Physics Department, co-op & reg, Specializations available in Biophysics and Medical Physics. Note: Replaced with single program, Honours Biological and Medical Physics (regular and co-op) effective Sept. 1, 2023
- Bioinformatics Option
- MSc and MSc (Water)
- PhD and PhD (Water)

The Department of Biology has recently undergone a complete change in leadership: Chair (January 2021), Associate Chair for Undergraduate Studies (September 2020), Associate Chair for Graduate Studies (January 2021). As a result of this leadership change, this report has been revisited and some elements that were previously noted as complete or rejected have been re-evaluated or will be, as we move forward to our next program review.

The Biology Department convened an ad hoc committee to conduct a thorough review of the undergraduate curriculum and make recommendations for curricular changes. This committee presented its final report in the winter of 2019, and recommendations from this report have been integrated into the reviewer responses below. Briefly, the recommendations of the ad hoc include integration of 4th year capstone courses, a common first year across programs, increased minimum grade requirements, elimination of specializations, and restructuring of the Biomedical Sciences program. Details of these proposed changes provide a basis for responses to reviewers listed below. Taken together, these recommendations above represent a significant overhaul to the Biology undergraduate curriculum. At present, they are being discussed by the curriculum committee with the objective of preparing a road map that will be presented to the Department for consideration in the 2021-22 academic year. If the Department is supportive, a re-structuring and transition plan will be developed and implemented. If adopted, the full re-structuring and transition is expected to take several years.

Progress on Implementation Plan

Undergraduate Program Recommendations

1. The external reviewers recommended that the Department review the criteria for continuance in their Honours programs. The minimum 60% average needed to continue seems low. Alternatives would be to increase the overall average required to continue in a program or require minimum grades (e.g., 70%) in key courses that define the program (e.g., plant course electives in the Plant Biology program, microbiology courses in the Microbiology program, etc.).

Status: Ongoing

Details: The Biology Department is currently addressing this recommendation in the context of the Special Major Average (SMAV) and possible minimum grades for capstone courses which are being integrated into our curriculum. The ad hoc committee recommended that there be a requirement for higher minimum grades in the key courses that define a program (e.g., Special Major Average) to reflect competencies expected for that program. The committee also recommended that capstone courses require minimum grades in their pre-requisites for enrollment. Implementation of a Special Major Average requirement is a measure that can improve rigour; however, it may also have an adverse impact on program enrollment so the department will take a balanced and well-considered approach.

2. The external reviewers recommended that the Department consider including undergraduate representation on their curriculum committee (if it doesn't already exist), and to include student bodies such as the Biology Undergraduate Society in their curriculum decision making.

Status: Complete

Details: The curriculum committee agrees and sees merit in getting input from undergraduate student representatives, and towards this goal the curriculum committee will meet each term with representatives from undergraduate student groups. To date, representatives from the Biology Undergraduate Society (BUGS), the Biomedical Sciences Student Association (BMSA), and the Biochem Student Association (BSA) have been invited to attend. In this format undergraduate representatives will not be required to attend every curriculum meeting but will have a voice on the committee and the opportunity to provide input to curriculum.

3. The external reviewers recommended that the degree credit level remain unchanged, and that the program not be forced to reduce the credit load to 20. The current number of lecture content courses is appropriate, and the "artificial" inflation of degree credits created by splitting some labs away from the lecture courses they were traditionally associated with does not represent additional work that students must complete to meet degree requirements. Removal of lecture content courses to accommodate lab credits would represent a reduction in program content, relative to similar programs at other Canadian universities.

Status: Complete.

Details: The Biology Department agrees with this recommendation and will not set a specific target for credit load. As of Fall 2021, the credit load of each of the programs is above 20.0 credits (e.g. Biology: 21.5; Biochemistry: 22.0; Biomedical Sciences: 22.5). We also note that ongoing curriculum

review and discussions with Dean may result in alterations of number of degree credits and balancing this with student mental health.

4. The external reviewers recommended that the Department find a way to incorporate a requirement for university level mathematics (e.g., Calculus) into their degree programs, rather than leaving this as an option.

Status: Ongoing

Details: The Biology ad hoc committee and the Biomedical working group have considered a mathematics requirement, but a specific requirement has not been implemented to date. The Biomedical Sciences program currently requires two Physics courses and associated laboratories instead of a mathematics requirement. The Physics courses provide quantitative skills and some mathematics content while also meeting admission requirements for the Waterloo Optometry program. The current Biology program includes the option of either a math or physics credit in first year. The undergraduate curriculum committee is reviewing first year course requirements including discussion of a potential mathematics requirement.

5. The external reviewers recommended that program requirements be reviewed with an eye to requiring a minimum number of 400-level courses.

Status: Complete

Details: At the time of the program review requirements for a minimum number of 400-level courses were in the process of being implemented. Each undergraduate program offered by the Biology Department now includes a minimum number of 400-level courses. Current minimum 400 level course requirements are 2.5 units (5 courses) for Honours Biology, 2.5 units for Honours Biomedical Sciences, 1.5 units for Honours Biochemistry (joint with Chemistry Department), and 1.5 units for Honours Environmental Science, Ecology specialization (joint with Earth and Environmental Sciences Department). The minimum number of 400-level course requirements may change in the updated programs but a minimum requirement will be retained.

6. The external reviewers recommended that the Department, in conjunction with the Faculty of Science, explore mechanisms to increase the number and quality of Co-op placements for Biology students.

Status: Ongoing

Details: We agree that this is an important goal. The management and support for the co-op program is not handled within the Biology department but we are developing mechanisms for the Department to improve the number and type of co-op positions for our students. Biology and co-op education are working together to match Biology undergraduates with jobs requiring specific skill sets, and we are developing our curriculum to ensure that skills are being introduced at appropriate times within our curriculum. Lastly, faculty that have ongoing collaborations with industrial and government partners are able to refer employers to the co-op program, helping develop suitable positions for co-op students.

7. The external reviewers recommended that the Department make a concerted effort to more overtly expose undergraduate students to the breadth and extent of on-going research amongst Biology faculty. This could be achieved through an active "in-reach" program that includes promotional posters and the involvement of the Biology Undergraduate Society.

Status: Ongoing

Details: This is being addressed through the integration of 4th year capstone courses to be developed during the 2021-2022 academic year. These courses should foster higher level learning, further develop writing and communication skills, and provide increased exposure of our undergraduates to on-going research amongst Biology faculty. Additional mechanisms for exposure to faculty research areas are also being considered as part of a 'skills' course to be introduced early in our undergraduate programs.

8. At risk of interfering with internal university personnel structure, the external reviewers strongly recommended that consideration be given to converting "Instructor" roles in the Department into "Lecturer" (i.e., faculty) positions. The current instructors are carrying out a lot of what are traditionally faculty roles.

Status: Ongoing

Details: The job descriptions for our instructors were reviewed and updated in January 2015 and the instructors have expressed satisfaction with their current role in the Department. Although our instructors do some lecturing, their roles and responsibilities differ substantially from those of lecturers. However, in the future we expect that these roles may shift towards a Lab Instructor model where individuals in these roles are active within undergraduate laboratories and do not play a role in teaching courses. This would align us with other units in Science such as Chemistry and provide expertise beyond TAs in our undergraduate laboratories.

9. The external reviewers recommended that the Department put in place a clear communication strategy to ensure lab equipment needs are coordinated between course instructors/lecturers and the technical staff in place to support them.

Status: Complete

Details: Once the Science Teaching Complex (STC) was built and completed, lab equipment became less of an issue. Currently, the technicians meet with the Associate Chair for Undergraduate Studies once a term and as needed to address any issues that may arise around courses and equipment. Technicians are also encouraged to put in budget requests to the Department and to WatSef to obtain resources as needed. It is our current belief that we are not experiencing any significant problems with respect to the communication of equipment needs. To ensure robust communication channels are in place however, we have altered the composition of our curriculum committee to require technician representation and have implemented regular meetings between the technicians and the Associate Chair undergraduate. We are also taking action to ensure, insofar as possible, that equipment used in our undergraduate labs is standardized across labs to facilitate part replacement and equipment maintenance.

Graduate Program Recommendations

10. The external reviewers recommended that clarity on prioritizing domestic or international graduate student recruitment would be beneficial to articulate a common goal understood by the Department and administration.

Status: Complete

Details: The Department follows the approach taken by all the departments in the Faculty of Science, namely prioritizing domestic students. This policy was articulated by the Faculty of Science several years ago and thus aligns both the admissions goals and budgeting on a Faculty-wide basis. Our enrolments over the last 3 years have consistently seen about 89% of our MSc students being domestic, while our PhD student body is approximately 80% domestic. Having a larger contingent of international students amongst our PhD cohort is merely a reflection of the international stature of our research faculty.

11. The external reviewers recommended that supervisory committees have authority to recommend waiver of one or more PhD course requirements, for approval by the Graduate Chair, following assessment of courses completed in a previously completed MSc program, including programs completed at another institution.

Status: Ongoing

Details: There is a mechanism in place to waive PhD course requirements, which requires approval at the departmental level through the Associate Chair (Graduate Studies) and approval at the faculty level through the Associate Dean (Graduate Studies). However, given that this possibility is not widely recognized by either faculty or students, a discussion at the Biology Graduate Studies Committee will likely be followed by dissemination of this information to the wider department. As we will be doing for a number of other policies, we will create a process document that will provide details on the procedure to be followed and will be posted on the departmental SharePoint site, where it will be accessible to all faculty members. This information will also be provided in the Graduate Student Handbook, which is provided as a PDF to all incoming students and posted on the Graduate Studies portion of the departmental website.

12. The external reviewers recommended that supervisors and students draft an agreement of mutual expectations and timelines soon after the student enters the program and that timelines be updated in each progress report presented to the supervisory committee and that these timelines be approved by the committee.

Status: Complete

Details: While there is no formal 'contract' between graduate students and their supervisors, at our termly Orientation we strongly encourage incoming students to have these discussions with their supervisors. The timelines associated with the program are clearly provided in the Graduate Student Handbook and the Graduate Coordinator sends students reminders on a per-term basis regarding

milestones that have not yet been completed. In the case that compliance is not forthcoming, the students receive a further reminder from the Graduate Officer, which usually resolves the situation.

13. The external reviewers recommended that the comprehensive exam procedure be reviewed, and consideration given to alternative models such as inclusion of a literature review or a mock grant proposal (such as a NSERC Discovery Grant) that is evaluated by the examination committee (written and oral components).

Status: Ongoing

Details: Comprehensive exam regulations are set at the University level by GSPA but do provide individual departments with considerable latitude to tailor their exams to best suit the academic needs of the program. As we have done with other aspects of our graduate program, we will survey the department to get a sense of the strengths and weaknesses of our current approach for the comprehensive exam. We will then be able to approach the department and propose changes to our comprehensive exam format that could better serve the purpose of this milestone, which is to ensure that all PhD candidates have sufficient depth in their area of specialization and sufficient breadth in the broader biological sciences.

14. The external reviewers recommended that a committee meeting in the later stages of the student's program be designated to determine if the student has completed data collection and be given formal permission to begin writing a thesis. At this meeting, the student could submit a table of contents of the proposed thesis.

Status: Complete

Details: We now have a "permission to defend" meeting as a required milestone in the graduate program, both at the MSc and PhD levels. This includes a Pre-Defence Advisory Committee Report form, which was developed by the Biology Graduate Studies Committee in 2017 and provides a check box for whether (or not) the student can proceed towards completion of their thesis. The form also requires comments to provide students with feedback from their committee. The form is signed by committee members and the student, with subsequent review by the Associate Chair, Grad Studies.

15. The external reviewers recommended that the graduate course curriculum more accurately map to the research fields and that courses be modified to provide a balance between specific training with their programs and broad training within the field (possibly through common graduate courses in the subfields) and for professional development.

Status: Ongoing

Details: Graduate courses offered in the Department have typically reflected the faculty complement, leading to a greater number of courses in the ecology/environmental area; students in the cell and molecular biology sub-discipline have fewer courses to choose from. As for the comprehensive exam format, we will be surveying the departmental stakeholders regarding the perceived strengths and weaknesses of our grad curriculum. This will provide a starting point for adjusting the current

offerings. One of the possible changes would include a more modular approach to our courses (see below). Since professional development courses are offered elsewhere on campus (CTE, GSPA), we will not address this aspect of the curriculum until we have overhauled the fundamental grad curriculum for Biology.

16. The external reviewers recommended that a human resource appointment within the Faculty of Science be attached to the Department to provide support related to graduate student TA appointments, files for postdoctoral positions, etc.

Status: Ongoing

Details: A Graduate Management System has recently been developed for the Physics Department by the Science Computing group. The program, in its current format, appears to be based on early discussions with the Biology Graduate Coordinator, but has been customized for Physics. It is helping Physics to automate a portion of the administrative work around Teaching Assistant appointments in terms of generating letters and payment information, as well as tracking the progress of all graduate students in the program. The Biology Graduate Coordinator has started working with Science Computing to adapt the program for Biology's needs. Postdoctoral appointments are now being managed through the GSPA and the Chair's Office in the Department of Biology.

17. The external reviewers recommended that the Vice President Research commit to a subsidy to support a renovated aquatic facility, which could be included in a potential CFI application.

Status: Complete

Details: The renovation of the WATER facility is complete. The Department has ongoing discussions with the Faculty of Science on continued technical support for operating the facility and currently there are discussions occurring between the Faculty and the Office of Research regarding the future management of this facility. In addition, a CFI for support of the facility was submitted and awarded.

18. The external reviewers recommended that the Department work with the Faculty of Science to provide matching funds to support a CFI proposal to improve the aquatics facility.

Status: Complete

Details: A CFI was awarded to the WATER facility and matching funds were provided by the institution to replace the aging aquatic facility in the Biology department. The new WATER facility has been rebranded as the Waterloo Aquatic Threats and Environmental Research (WATER) Facility and opened this year. This state-of-the-art aquatic facility represents over \$9M in institutional investment, and most recently Brian Dixon and Paul Craig, as co-PIs, were awarded ~\$2M CFI 2020 Infrastructure grant, along with a team of researchers (Katzenback, Servos, Rooney, Swanson).

19. The external reviewers recommended that the Committee of Research Fellows create clear and transparent guidelines for provision of equipment maintenance funds.

Status: Ongoing

Details: The Faculty of Science now has a “Dean of Science Emergency Infrastructure Repair Fund” with details available at <https://uwaterloo.ca/science/research/resources-researchers/dean-science-emergency-infrastructure-repair-fund>. In addition, there are discussions regarding the centralization of Core equipment within the Faculty of Science. This will continue in collaboration with other units in Science and the Dean.

20. The external reviewers recommended that the Department work with the Faculty of Science to firmly establish a risk-funding program for faculty facing grant renewal. If this funding was guaranteed, it would allow researchers to develop longer term plans for their programs.

Status: Complete

Details: The Office of Research has a Research Incentive Fund which a number of faculty in Biology have taken advantage of when their application for an NSERC Discovery was not successful.

21. The external reviewers recommended that the Department work with the Graduate Studies Office to determine campus-wide quota system for scholarships that doesn't disadvantage strong departments, such as Biology.

Status: Complete

Details: The University, through the GSPA, has worked with Faculties and Departments to improve the access to scholarships. The quota system once applied to Departments has been replaced with an open competition within the Faculty of Science. In addition, the Faculty has extended the scientific writing support, offered to faculty members for their tri-council grant applications, to the graduate students, which has further improved the quality of their applications. In the 3-year period from 2018-19 to 2020-21, our success rates have improved to the extent that approximately 1/3 of all our tri-council scholarship applications were funded. In addition, while our OGS/QEII success rates were approximately 1/4, this was due to many of these students declining the OGS awards in favour of the more prestigious NSERC scholarships, since they were successful in both competitions.

22. The external reviewers recommended that the number of Special Topics (i.e., targeted) courses could be reduced.

Status: Ongoing

Details: There are currently two special topics courses, BIOL 680 (MSc) and BIOL 681 (PhD). The apparently large number of special topics courses is because the GSPA currently requires departments to provide a title for each course. As these are target courses for a low number of students and are often specific to a field of study, it results in a large number of titled courses. The BGSC will examine this and could consider a more modular approach, in which each of the Department's identified research fields could be the focus for a special topics course for either the MSc or PhD programs, but with only a general title that serves as a catch-all. While this would result in 10 new courses (5 areas of focus), this will dramatically reduce the visual impact of the number of special topics courses while retaining the course flexibility that a diverse department needs.

23. The external reviewers recommended that common courses could be offered in the Department's newly identified research fields.

Status: Complete

Details: Our course offerings have been modified by deleting a number of out-of-date courses and updating others. These courses are common to broad research areas and would be common to several of our described research fields.

24. The external reviewers recommended creation of a modular-based graduate course that could be tailored across research fields and allow for breadth and flexibility for each student. As an example, this course could contain six modules, of which the student would be required to complete three for credit. Incorporation of the existing BIOL 690 – Scientific Communication into this model could better ensure that students attain important communication skills without making it a full course requirement.

Status: Ongoing

Details: The proposal to create a modular course is very appealing. While the idea of modular offerings was apparently rejected by the previous Associate Chair Graduate Studies, the current Associate Chair and departmental Chair consider such a change to be of tremendous benefit to our very diverse graduate student body. Although we have collaborative programs offered across Departments and Faculties (e.g., Water), which require specific 12-week courses, and a modular course was thought not to fit with those requirements, we will be re-examining the possibilities for a modular course going forward. One possibility for such a course could be methods-based and offer 6 different technical approaches, allowing students to cross apparent sub-discipline barriers to learn a new technique that would broaden their experiential base, better support the students in their roles as Teaching Assistants and serve as an element in their professional development. While the reviewers have suggested that BIOL 690 might better function as a module in such a course, 690 itself is being re-vamped with the transition to a new instructor. There appears to have been considerable addition of content to 690, which has inadvertently diluted some of the more fundamental skills the course was designed to develop. We are currently surveying all Biology graduate students that have taken the course for their impressions of the course and its purported goal in cohort building amongst our students. We will be using the survey results to more specifically tailor the content of 690 and better support a role in cohort building. Taken together, there should be significant changes in the Biology Graduate Curriculum in the coming years.

25. The external reviewers recommended that the Department could regularize when new faculty are expected to begin to teach grad courses, and how they will fit their courses into the program.

Status: Complete

Details: The Department is enforcing the teaching of courses at the graduate level through activities of the Associate Chair Graduate Studies and through the departmental merit committee. At this time faculty are consistently offering graduate courses in their area of specialization, and/or contributing to our general course BIOL 690. New faculty in the Department are eager to teach at the graduate level and are quickly offering courses. The distribution of courses follows our faculty complement and as such addresses demand from our students (see recommendation 6).

Updated Implementation Plan

	Recommendations	Proposed Actions	Responsibility for Leading and Resourcing (if applicable) the Actions	Timeline for addressing Recommendations
Undergraduate Recommendations				
1.	The Department review the criteria for continuance in their Honours programs. The minimum 60% average needed to continue seems low. Alternatives would be to increase the overall average required to continue in a program or require minimum grades (e.g., 70%) in key courses that define the program.	The Department is undergoing a comprehensive review and renewal of our undergraduate curriculum. The Department is considering several solutions that could be explored to facilitate increasing continuing averages in majors programs.	Department Chair and Associate Chair Undergraduate Studies	Ongoing with discussion on the implementation of the recommendations of the ad hoc curriculum report. Curriculum review will be completed by Spring 2022 and is expected to include revised minimum grades.
2.	The Department consider including undergraduate representation on their Curriculum Committee (if it doesn't already exist and to include student bodies such as the Biology Undergraduate Society in their curriculum decision making.	Representatives from the Biology Undergraduate Society, the Biomedical Sciences Student Association, and the Biochem Students Association are invited to attend curriculum meetings once per term in Fall and Winter	Associate Chair Undergraduate Studies	Complete
3.	The degree credit level remain unchanged, and that the program not be forced to reduce the credit load to 20. The current number of lecture content courses is appropriate, and the "artificial" inflation of degree credits created by splitting some labs away from the lecture courses they were traditionally associated	Biology is supportive of this recommendation but expect the conversation may be revisited. Regardless as we consider the implementation of the ad hoc curriculum	Department Chair and Associate Chair Undergraduate Studies	Complete. Credit load may change with curriculum updates.

	with does not represent additional work that students must complete to meet degree requirements. Removal of lecture content courses to accommodate lab credits would represent a reduction in program content, relative to similar programs at other Canadian universities.	report recommendation this will be addressed.		
4.	The Department find a way to incorporate a requirement for university level mathematics (e.g., calculus) into their degree programs, rather than leaving this as an option.	The curriculum renewal process will consider making calculus a requirement in most programs, balanced with Physics requirements	Associate Chair Undergraduate Studies	Ongoing. Curriculum review will be completed by Spring 2022 and programs are likely to include a mathematics requirement.
5.	Program requirements be reviewed with an eye to requiring a minimum number of 400-level courses.	Both our current curriculum and planned revisions will include required 400 level courses in all programs.	Associate Chair Undergraduate Studies	Complete
6.	The Department, in conjunction with the Faculty of Science, explore mechanisms to increase the number and quality of Co-op placements for Biology students.	Faculty of Science has formed a Co-op Committee and Biology will work closely to assist in developing work placements.	Associate Chair Undergraduate Studies and Chair of Department	Ongoing. Creation of a faculty of science co-op committee is complete; other aspects will be ongoing with no fixed end date
7.	The Department make a concerted effort to more overtly expose undergraduate students to the breadth and extent of ongoing research amongst Biology faculty. This could be achieved through an active "in-reach" program that includes promotional posters and the involvement of the Biology Undergraduate Society.	The Department currently has effective channels of engagement, and additional mechanisms such as capstone courses will be implemented as part of curriculum renewal.	Broad departmental responsibility	Ongoing. Some components such as capstone courses are part of Curriculum review and will be completed by Spring 2022. Other components for monitoring and building channels of engagement will have no fixed end date
8.	Consideration be given to converting "Instructor" roles in the Department into "Lecturer" (i.e., faculty)	Following thorough consultation with our	Chair of Department	Ongoing. Timeline for implementation will be

	positions. The current instructors are carrying out a lot of what are traditionally faculty roles.	instructors their job descriptions were reviewed and updated in 2015. They have expressed satisfaction with their roles and job descriptions. Specification of instructor tasks may change for future hires however.		dependent on hiring of new staff and/or faculty. Job specifications for any new hires may be aligned with more traditional Lecturer and Instructor roles.
9.	The Department put in place a clear communication strategy to ensure lab equipment needs are coordinated between course instructors/lecturers and the technical staff in place to support them.	We have altered the composition of our curriculum committee and management structure such that there is increased communication with technicians.	Associate Chair Undergraduate Studies	Complete
Graduate Program Recommendations				
10.	Clarity on prioritizing domestic or international graduate student recruitment would be beneficial to articulate a common goal understood by the Department and administration.	Biology is currently aligned with other departments in Faculty of Science.	Associate Chair Graduate Studies	Complete
11.	Supervisory committees have authority to recommend waiver of one or more PhD course requirements, for approval by the Graduate Chair, following assessment of courses completed in a previously completed MSc program, including programs completed at another institution.	As the mechanism for this is already in place, we will be making this more widely known among Biology faculty and grad students.	Associate Chair Graduate Studies	Complete
12.	Supervisors and students draft an agreement of mutual expectations and timelines soon after the student enters the program and that timelines be updated in each progress report presented to the	Committee meeting procedures and forms have been updated; regular reminders from Graduate Office personnel.	Associate Chair Graduate Studies	Complete

	supervisory committee and that these timelines be approved by the committee.			
13.	The comprehensive exam procedure be reviewed, and consideration given to alternative models	Survey of current PhD students and supervisors re format of exam; followed by deliberation of Grad Studies Committee and broader dept.	Associate Chair Graduate Studies, Associate Dean Graduate Studies, GSPA	Ongoing. Spring 2022
14.	A committee meeting in the later stages of the student's program be designated to determine if the student has completed data collection and can write thesis	Procedure and forms have been developed and are in ongoing use.	Associate Chair Graduate Studies	Complete
15.	Graduate course curriculum more accurately map to the research fields and that courses be modified to provide a balance between specific training with their programs and broad training	Survey grad students and faculty and identify needs for courses; remove courses no longer relevant; consider adopting modular approach that could incorporate number of current courses.	Associate Chair, Graduate Studies; Dean of Science	Ongoing. Fall 2023
16.	That a human resource appointment within the Faculty of Science be attached to the Department to provide support related to graduate student TA appointments, files for postdoctoral positions	Biology Graduate Coordinator is working with Science Computing to adapt the grad students management program developed for Physics.	Associate Chair, Graduate Studies; Dean of Science (Science Computing)	Ongoing, unknown (out of dept hands, dependent on Science Computing)
17.	The external reviewers recommended that the Vice President Research commit to a subsidy to support a renovated aquatic facility, which could be included in a potential CFI application	Advocacy with Dean of Science and Office of Research	Department Chair	Complete

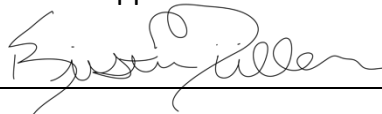
18.	The external reviewers recommended that the Department work with the Faculty of Science to provide matching funds to support a CFI proposal to improve the aquatics facility.	Prepare application and advocate with Associate Dean Research	PIs and Department Chair	Complete
19.	The external reviewers recommended that the Committee of Research Fellows create clear and transparent guidelines for provision of equipment maintenance funds.	Review of existing support and consultation	Research Fellows, Department Chair and Dean of Science	Ongoing with strategic planning around Science Core Facilities. 2022.
20.	The external reviewers recommended that the Department work with the Faculty of Science to firmly establish a risk-funding program for faculty facing grant renewal. If this funding was guaranteed, it would allow researchers to develop longer term plans for their programs.	A fund in support of this is now in place	Dean of Science, Department Chair	Complete
21.	That the Department work with the Graduate Studies Office to determine campus-wide quota system for scholarships	System for awarding scholarships has been modified; grad students now receive scientific writing support.	Associate Dean Graduate Studies Science, Associate Chair Graduate Studies Biology; GSPA	Complete
22.	We recommend that the number of Special Topics (i.e., targeted) courses could be reduced.	Consider developing sub-discipline-specific 'general purpose' course titles that would facilitate repeated use of small number of course titles.	Associate Chair, Graduate Studies; GSPA	Ongoing, Winter 2022.
23.	That common courses could be offered in the Department's newly identified research fields.	Course offerings have been modified and new faculty members in process of	Associate Chair Graduate Studies; GSPA	Complete

		developing expertise-based courses.		
24.	Develop modular based graduate courses	Discussion & planning at Biology Graduate Studies Committee, followed by consultation with faculty and graduate students in Biology, as well as other units and Faculties .	Associate Chair, Graduate Studies; Associate Dean, Graduate Studies, Science;	Ongoing. Fall 2023.
25.	That the Department could regularize when new faculty are expected to begin to teach grad courses	New faculty are eager to teach and implement graduate courses quickly. No action needed.	Associate Chair Graduate Studies	Complete

The Department Chair/Director, in consultation with the Dean of the Faculty shall be responsible for monitoring the Implementation Plan.

Date of next program review: _____ **2023-2024**
Date

Signatures of Approval:

 _____ 2 Nov 2021
Chair/Director Date

AFIW Administrative Dean/Head (For AFIW programs only) _____ Date

Faculty Dean _____ Date

Note: AFIW programs fall under the Faculty of ARTS; however, the Dean does not have fiscal control nor authority over staffing and administration of the program.

 _____ 28 October 2020

Associate Vice-President, Academic _____ Date
(For undergraduate and augmented programs)

 _____ 28 October 2020

Associate Vice-President, Graduate Studies and Postdoctoral Affairs _____ Date
(For graduate and augmented programs)