



FOR INFORMATION

PUBLIC

OPEN SESSION

TO: UTSC Academic Affairs Committee

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DATE: January 3, 2022 for January 10, 2022

AGENDA ITEM: 5A

ITEM IDENTIFICATION:

Review of Academic Programs and Units: Department of Biological Sciences and its undergraduate programs, UTSC

JURISDICTIONAL INFORMATION:

Under section 5.7 of the Terms of Reference of the University of Toronto Scarborough Academic Affairs Committee (UTSC AAC) provides that the Committee “shall receive for information and discussion reviews of academic programs and/or units consistent with the protocol outlined in the *University of Toronto Quality Assurance Process*. The reviews are forwarded to the Committee on Academic Policy and Programs for consideration.”

GOVERNANCE PATH:

UTSC Academic Affairs Committee [For Information] (January 10, 2022)

PREVIOUS ACTION TAKEN:

- Committee on Academic Policy and Programs (AP&P), October 26, 2021 [For Information]. The Committee was satisfied with the Dean’s Administrative Response.

- Academic Board, November 12, 2021 [For Information]. The Board was satisfied with the Report from AP&P.

HIGHLIGHTS:

The *Cyclical Review Protocol* “is used to ensure University of Toronto programs meet the highest standards of academic excellence” (UTQAP, Section 5.1). The *Protocol* applies to all undergraduate and graduate degree programs offered by the University, and the University’s full complement of undergraduate and graduate degree and diploma programs are reviewed on a planned cycle. Reviews are conducted on a regular basis, and the interval between program reviews should not exceed 8 years.

The external review of academic programs requires:

- The establishment of a terms of reference;
- The selection of a review team;
- The preparation of a self study;
- A site visit (remote or in-person, as appropriate);
- Receipt of a report from the external review team;
- The Vice-Provost, Academic Programs’ formal request for an Administrative Response;
- The Chair/Director’s formal Administrative Response;
- The Dean and Vice-Principal Academic’s formal Administrative Response; and
- The Final Assessment Report and Implementation Plan.

In accordance with the *Protocol*, an external review of the Department of Biological Sciences and its undergraduate programs, was initiated in the 2019-20 academic year. During a remote site-visit held on November 10-13, 2020, the review team met with a wide array of stakeholders, including UTSC senior academic administrators, the Department Chair, and faculty, staff and students in the Department. The reviewers were very impressed by the Department, in particular noting the excellence of the undergraduate programs, an overall high-quality of teaching, innovative pedagogical approaches in delivering course content, a strong sense of community and collegiality among the faculty, staff, and students, and high morale and strong leadership in the Department.

The reviewers recommend the Department explore formalizing research aspects of the curriculum, in particular they feel that a stronger emphasis on upper-level research would be beneficial to undergraduates. In addition, they recommend that teaching stream faculty receive appropriate access to resources to support program quality and undergraduate research. The Department responds that, while undergraduate students are already strongly encouraged to engage in carefully scaffolded research opportunities, including in courses at the B- and C-levels, through thesis projects and

summer research placements in courses at the D-level, and in co-op placements in the Specialist Co-op program in Molecular Biology and Biotechnology, the expansion of course-based research opportunities is an area of potential growth, and they propose to expand the role of, and pedagogical/professional development resources available to, the teaching-stream faculty. Towards this end, the Department will revise their departmental governance documents to recognize the contributions of teaching-stream faculty in the area of pedagogical research, and make explicit that there will be full access to support and resources for teaching-stream faculty led student research. It will further encourage teaching-stream faculty to leverage existing financial, space, and equipment supports. The Dean's Office notes that, while it supports recognition for the pedagogical/professional development activities of teaching stream faculty, including discipline-based research, basic research is not required as a part of the workload of teaching-stream faculty at the University of Toronto, and currently resources and opportunities are more limited at the University to support teaching-stream faculty research, as opposed to pedagogical/professional development.

The reviewers comment on student raised concerns regarding the sequencing and frequency of required courses, and recommend the Department review "critical pinch points" in its course offerings. The Department responds that it has been working steadily to expand course offerings in the summer term to include all core courses in their programs, giving students the opportunity to complete any courses they may have missed during the academic year, particularly as a result of co-op work terms. The Department will also ensure that Calendar information and student advising provide the most current information regarding the ideal pathways through programs, as well as proactively assisting students in their academic planning. The Dean's Office supports these measures, and encourages the Department to develop specific plans regarding the sequence and availability of courses in its programs.

The reviewers recommend the Department explore the development of a Specialist Co-op program in Conservation and Biodiversity. The Department responds that plans to introduce this program have been initiated, and the expectation is that students will be able to begin enrolling in the program as of Fall 2022.

The reviewers recommend that the Department prioritize meeting space needs of new and established researchers in a timely way over maintaining spatial proximity of the Department as a whole. The Department responds that meeting the space needs of new faculty is a priority, however, a central consideration in the allocation of faculty research space is access to research resources and infrastructure. However, there is a recognition that that wet lab capacity in the Science Wing and Science Research Building are not fully utilized, and the Department will consider both proximal and less proximal space as best fits their complement planning priorities. The Dean's Office notes that there is a process at UTSC for identifying space and equipment needs for new faculty. This process, which involves the Offices of the Vice-Principal Academic and Dean, the Vice-Principal Research and Innovation, and the Chief Administrative Officer, enables the

campus to prepare in a proactive way for the needs of new faculty, and also encourages departments to consider the research facility needs of new faculty at the time that they develop their faculty complement plans. The availability of suitable space is taken into consideration when the campus develops its faculty recruitment and complement plans.

The reviewers recommend that the Department develop written complement plans for teaching-stream faculty and for administrative staff. The Department responds that a more coherent approach to complement planning will follow from an explicit recognition of teaching-stream faculty as an integral part of a research cluster that is focused on pedagogy. The Dean's Office notes that Faculty Complement Committee (FCC) was created during the academic year 2019-20 to provide recommendations to the Dean regarding the distribution of teaching-stream and tenure-stream faculty positions sought by academic units in the yearly recruitment cycle, within the context of strategic multi-year departmental and campus faculty complements. The FCC provides a consultative, inclusive and transparent process that involves all academic units in determining the complement submission at UTSC. Plans for hiring teaching-stream faculty will be considered in the review of faculty complements. With regard to complement planning for administrative staff, the Department responds that they are understaffed, and have already requested an additional staff position (dedicated to the management of research funds), which has been provisionally approved. The Dean's Office will continue to work with the Department in assessing its short- and long-term staffing needs.

The reviewers note that there are "structural barriers" to developing effective relationships with cognate departments at the wider University, impacting the Department's faculty complement planning and faculty morale. They recommend that issues of tri-campus graduate program administration be addressed in order to improve relationships. The Department responds that the reviewers may have gained an inaccurate impression of the tri-campus graduate landscape at the University, and notes their complement planning process is not constrained in any way by their relationships with cognate units. However, the Department notes there are other points of tension, including that graduate resources are remote from the Department, and there is a sense of detachment from cognate graduate units among UTSC faculty. The Department believes that a proposal for a new doctoral program in Interdisciplinary and Applied Biology, that is currently under development, is a constructive way to address these issues.

The implementation timeline for departmental action is given in the Dean's Administrative Response. The Dean's Office will monitor the implementation of recommendations through ongoing meetings with the Chair. A brief report to the Office of the Vice-Provost, Academic Programs, midway between the November 2020 site visit and the year of the next site visit, will be prepared. The next external review of the Department has been scheduled for 2027-28.

FINANCIAL IMPLICATIONS:

There are no net financial implications to the campus' operating budget.

RECOMMENDATION:

This item is presented for information only.

DOCUMENTATION PROVIDED:

1. Review Report (December 16, 2020)
2. Provostial Request for Administrative Response (April 8, 2021)
3. Chair's Administrative Response (August 4, 2021)
4. Dean's Administrative Response (September 15, 2021)
5. Provostial Final Assessment Report and Implemental Plan (pending)

Cyclical Review: Report Template

As Commissioning Officer, I confirm that: <ul style="list-style-type: none">✓ The review report addresses all elements of the terms of reference, which reflect the requirements outlined in the University of Toronto Quality Assurance Process (UTQAP), including the program evaluation criteria✓ I have brought to the attention of the reviewers any clear factual errors in the report and the reviewers have corrected these.	
Commissioning Officer: William Gough, Vice-Principal Academic and Dean	Report Accepted as Final on January 4, 2021

Reviewers are asked to provide an Appraisal Report that: Identifies and commends the program's notably strong and creative attributes Describes the program's respective strengths, areas for improvement, and opportunities for enhancement Recommends specific steps to be taken to improve the program, distinguishing between those the program can itself take and those that require external action Recognizes the institution's autonomy to determine priorities for funding, space, and faculty allocation; Respects the confidentiality required for all aspects of the review process; and Addresses all elements of the terms of reference, which reflect the requirements outlined in the University of Toronto Quality Assurance Process (UTQAP), including the program evaluation criteria

Division/unit under review:	University of Toronto Scarborough (UTSC): Department of Biological Sciences
Program(s) under review:	Biology, HBSc: Major; Minor Conservation and Biodiversity, HBSc: Specialist; Major Human Biology, HBSc: Specialist; Major Integrative Biology, HBSc: Specialist Molecular Biology and Biotechnology, HBSc: Specialist and Specialist Co-op Molecular Biology, Immunology and Disease, HBSc: Major Plant Biology, HBSc: Major
Commissioning officer:	Professor William Gough, Vice-Principal Academic and Dean
Date of scheduled review:	November 10-13, 2020 (held remotely)
Reviewers' names and affiliations:	<ul style="list-style-type: none"> • Professor Mark Bernards, Department of Biology, Western University • Professor Michael Caldwell, Department of Biological Sciences, University of Alberta • Professor David Kirkpatrick, Department of Biology Teaching and Learning, College of Biological Sciences, University of Minnesota

1 Review Summary

Summary of Findings:

Undergraduate programs offered by the Department of Biological Sciences at the University of Toronto Scarborough (UTSC) are excellent, and provide a solid foundation in Biology (and its main sub-fields) on par with other Canadian universities. The program content is well thought out and delivered using a range of traditional and innovative approaches well rooted in up-to-date pedagogical methods. We found no serious flaws or deficiencies, and commend the department for their strong efforts in designing and delivering a modern Biology curriculum. Faculty, and especially Teaching Stream faculty, provide high quality classroom and laboratory instruction. The programs are well supported by excellent administrative and technical staff, through top quality library resources and a strong Co-op office. There are, however, areas in which the Department can work to improve their programs and program delivery to further enhance the undergraduate experience. Some ideas are highlighted in recommendations 1, 2, 3, 5, and 18 below, and more fully articulated in the sections of this report that follow.

Notwithstanding the primary purpose of our review, which was to evaluate the various undergraduate programs offered by the Department of Biological Sciences, it was impossible to disentangle some organizational and physical space related issues from the tasks of program development and delivery. Principal amongst these were the relationships between the Department of Biological Sciences at UTSC and cognate departments, Cell & Systems Biology (CSB) and Ecology & Evolutionary Biology (EEB) at the St. George Campus as they relate to graduate program delivery, and the physical constraints (both in total square footage and amenability to renovation) of the Andrews Building. These issues are complex, and our report does not pretend to solve them; however, we provide some outside perspective, and a few specific recommendations (recommendations 7, 10, 11, 12 and 17) to help guide the Department of Biological Sciences forward.

The Department of Biological Sciences is at an important crossroads in its relatively early growth and development. Recent faculty hires, largely driven by strong and growing undergraduate enrolment, have brought the department to a critical tipping point with regard to identity and future growth. There is a strong sense of community and collegiality amongst faculty, staff and students, enhanced through the physical proximity of department members and by virtue of their relatively small size. However, the department has grown to the physical limits of their space allotment within the Science Wing of the Andrews Building, and any future growth will necessitate difficult choices around space. Our remaining recommendations (i.e., recommendation 4, 6, 8, 9, 13, 14, 15 and 16) address more general issues related to future expansion and encouragement for the department to continue to deliver a high-quality program.

Summary of Recommendations:

Note – the rationale for each Recommendation below is more fully articulated in the sections of this report that follow.

1 - That the Department of Biological Sciences explores formalizing research aspects of the curriculum, by setting goals for the percentage of student involvement in research.

2 - That the Department of Biological Sciences further explores the development of a Conservation & Biodiversity Co-op program.

3 - That in addition to creating capacity for new faculty to diversify upper-year (D-level) course offerings, the department reviews critical pinch points in its timetable of course offerings and considers more frequent offerings of required courses that, if missed due to a co-op work term, prevent timely degree progression.

4 - That newly hired Tenure Stream Faculty receive maximal support either in terms of acceleration of renovations, or realistic support for alternative research programs pending completion of laboratory installation of building and research infrastructure.

5 - That Teaching Stream Faculty in the Department of Biological Sciences receive full support (financial, access to laboratory facilities, field equipment, etc.) to maximize the student research experience.

6 - That future site visits include interviews with graduate student stakeholders even if there is no companion review of the graduate program.

7 - That the Department of Biological Sciences either develops its own UTSC-administered graduate program and thus sets/continues on its own path for faculty complement planning (see Self-Study document), or, complement planning evolves to become a joint initiative between UTSC and its two graduate program cognate departments.

8 - That the Department of Biological Sciences develops and articulates a written complement plan for Teaching Stream faculty.

9 - That the Department of Biological Sciences develops and articulates a written complement plan for administrative support and teaching support staff.

10 - That the Department of Biological Sciences makes a decision on what it values more – increasing the size of the faculty, staff and student complement, and thereby requiring a new building or buildings to house Department growth, or downsizing around complement planning and growth via attrition, and thereby remaining where they are currently housed as a single unit with all members in close proximity.

11 - That the Department of Biological Sciences resolves the graduate program issue and either moves to create its own independent program, or seeks to build new relationships with its cognate departments on graduate programming.

12 - That the relationship between the Department of Biological Sciences and the two cognate departments (CSB, EEB), consistent with the issue of morale noted previously, be repaired and made functional.

13 - That the Department of Biological Sciences be strongly encouraged to maintain its high standard of achievement in partnership development and relationship at all levels.

14 - That the Department of Biological Sciences keep up the good work of being locally relevant; this is a good thing, not a bad thing, and builds on that relevance to expand perceptions of UTSC Biological Sciences to a U of T Campus with national social impact.

15 - That the Department of Biological Sciences formally recognizes the Teaching Stream faculty as a Research Cluster within the Department, and encourages and promotes continued curricular innovation that can be shared across all faculty involved in teaching.

16 - That the Department of Biological Sciences ensures that staff complement growth keeps pace with faculty complement growth and graduate program development.

17 - That the Department of Biological Sciences prioritizes quality of research space, ensuring the needs of new and established researchers are met, over proximity.

18 - That, if not already part of their development strategy, the Department of Biological Sciences be encouraged to include donor-funded scholarships and/or bursaries in their fundraising plans.

2 Program Evaluation Criteria

Undergraduate Programs Overview:

The Department of Biological Sciences has eleven undergraduate programs arranged in three distinct categories – Majors, Minors, and Specialist programs, with one of the Specialist programs also being offered with a Co-op option. Each of the types has a different emphasis. The Specialist programs have the highest credit level for completion – 14.5 to 15.0 credits – and are structured similarly to Honours BSc programs at other Canadian universities. They provide a solid core curriculum in Biology with a series of higher-level courses in a sub-discipline. The Majors programs have fewer credits (i.e.,

8.0 to 8.5) and build on the same core curriculum as the Specialists programs, albeit to a more limited and less focussed extent. They are typically combined with a second Major (usually from a different Department/program), and less frequently with a combination of two distinct Minors. The Minor in Biology (4.0 credits) provides a basic core Biology curriculum designed to be blended with other Majors and/or Minors programs. In general, all programs are highly consistent with the University's undergraduate goals, align well with the department's teaching mission and faculty research efforts, and deliver an excellent undergraduate experience to the students enrolled in them.

The programs are:

- Specialist in Conservation & Biodiversity
- Major in Conservation & Biodiversity
- Specialist in Human Biology
- Major in Human Biology
- Specialist in Integrative Biology
- Specialist in Molecular Biology & Biotechnology
- Specialist (Co-op) in Molecular Biology & Biotechnology
- Major in Biology
- Major in Plant Biology
- Major in Molecular Biology, Immunology & Disease
- Minor in Biology

We also note that the department participates in a Specialist Joint program in Paramedicine with Centennial College in Scarborough, Ontario.

Admission Requirements:

Each of the Biological Sciences programs have well-defined admission criteria for students, and the criteria appear to be appropriate for them. Speaking to the success of recruitment efforts, entering undergraduates have been consistently strong, with a slight upward trend recently in entering students' high school average (~85%). Incoming students are particularly drawn to the Human Biology and the Molecular Biology and Biotechnology options, with the other programs showing lower but consistent enrolments. Over the last decade there has been a significant enrolment trend toward the Majors programs; all of the undergraduate growth for the Department of Biological Sciences has been in the Majors category, while the Specialist and Minor categories have seen a 1/3 reduction in enrolment. The reasons behind this shift are not immediately apparent, though flexibility and customized degrees are likely contributing factors. The demographic shift in student program enrolments is consistent with changes at other institutions in Ontario and Canada. A significant proportion of the students in Biological Sciences receive a double major in conjunction with a second department, often Psychology, Physical & Environmental Sciences, or Health and Society (Health Studies programs). These cross-discipline studies indicate a healthy program that provides students with sufficient flexibility to tailor their scholarship towards their

personal goals. In general, students in the programs administered by the Department of Biological Sciences have an excellent educational experience. Student survey results presented in the Self-Study document indicate general satisfaction with the programs, and we were pleased to note a steady year-over-year increase in the number of students on the Dean's Honours list.

Curriculum & Program Delivery, Assessment of Learning, and Quality Indicators:

The materials that were provided to us for review of each program's curriculum were extensive, detailed, and clearly organized. The courses of study laid out for each program are rigorously developed, with comprehensive Program Learning Outcomes detailed for each. These are accompanied by curriculum maps and an overview of the assessments for each program. Since the previous review of the Department of Biological Sciences many of the programs have undergone revisions, including programmatic additions and modifications, in response to the prior review. The courses that we reviewed and/or discussed with members of the department cover material that is appropriate for the level of the student and fits well within the program's scope. The teaching-stream faculty have developed assessments that will track the outcomes of the changes to the PLOs, a necessary step to ensure that the programmatic changes they have implemented produce the desired outcomes in student knowledge gains. It is expected to take three to five years for enough undergraduates to complete modified courses to allow the Department to assemble sufficient assessment data and evaluate the impact of their modifications.

Discussions with the teaching stream faculty responsible for much of the undergraduate program material contained in the review documents indicate that they are aware of current best-practices approaches to content delivery and are actively implementing them in their courses. A significant amount of discussion centered on the various teaching labs within the Department; the recently-begun renovations promise to significantly elevate learning in those courses. Other innovations were apparent in their materials, such as the cross-course poster project.

One highlight of our conversations with faculty were the discussions about student research experience opportunities, which begin for some students with the B-level Integrative Research Poster Project (BIOB90H3). Further introducing students to elements of research in C-level courses provides them with a strong base for subsequent research opportunities (e.g., undergraduate thesis projects, summer research placements, Co-op placements). Upper level undergraduate research appears to be variable in its availability, based primarily on faculty willingness, capacity and involvement. Some faculty can work with up to 20 students per semester, while others have a much lower involvement. A stronger emphasis on upper level research would be beneficial to the undergraduates in each program.

Recommendation 1: That the Department of Biological Sciences explores formalizing research aspects of the curriculum, by setting goals for the percentage of student involvement in research.

Quality Enhancement:

A significant strength of the Department of Biological Sciences' programs is the use of Facilitated Study Groups (FSGs). During our discussion with 21 undergraduates from across most of the programs within the department and all levels of study, many of the students cited FSGs as being central to their study process and to their success. The central role of FSGs increased dramatically in 2020 in response to the shift to online remote education due to the COVID-19 pandemic. Students informed us that many aspects of their extracurricular social interactions with their peers were occurring through the FSGs that they were involved with, and these study groups appear to be responsible for maintaining a sense of community within the Department of Biological Sciences' undergraduate population.

The Co-op option of the Specialist in Molecular Biology & Biotechnology program represents a successful enhancement of the standard Specialist in Molecular Biology & Biotechnology program. The program appears to be well supported and administered. The Co-op administrators we met with provided additional data on the institutional level of success of placing students in relevant work areas, as well as the parallel success of Molecular Biology & Biotechnology students gaining appropriate placements. We learned that there used to be a conservation biology-focused Co-op option, albeit with comparatively low uptake by students. Nevertheless, we were encouraged by the talk of introducing a new Conservation & Biodiversity Co-op option, especially in light of more recent connections to relevant partner organizations and growing student interest.

Recommendation 2: That the Department of Biological Sciences further explores the development of a Conservation & Biodiversity Co-op program.

Specific Concerns:

A significant concern raised by some of the undergraduate students we met with was the sequencing of classes and the frequency of their availability, especially of core courses. Students in the Co-op and Paramedicine programs were particularly affected by this issue – some core courses required for degree progression are only offered once a year, and if a core course overlaps with their co-op period they may lose up to a year in their progression towards a degree. This issue should be carefully considered as the department determines how to allocate departmental teaching resources.

Another issue, raised by faculty as well as in the Self-Study document, concerned the relatively limited number of D-level courses that truly differentiated the distinct Specialist programs offered by the Department. Some faculty discussed the possibility of

expanding the number of unique upper-level undergraduate courses, while others were interested in devoting resources to expanding the number of sections of core lower-level courses. Since the department is considering whether to bolster their Co-op programs (e.g., with a new program in Conservation & Biodiversity), they need to be mindful of changes that may impact degree progression and take steps to reduce time-to-graduation, while providing a wider range of topics for their D-level students, or implementing moderate changes in both these areas.

Recommendation 3: That in addition to creating capacity for new faculty to diversify upper-year (D-level) course offerings, the department reviews critical pinch points in their timetable of course offerings and considers more frequent offerings of required courses that, if missed due to a co-op work term, prevent timely degree progression.

The number of undergraduates opting to enroll in the Department of Biological Sciences' programs has expanded significantly over the last decade, and judging from the data provided to us it seems likely to continue to grow. A continued increase will require support from the department and the University in a number of key areas. Additional teaching-stream faculty will be needed, along with teaching lab support staff. Student advising, which is currently done internally (except for programs such as the Co-op programs which are part of a larger University initiative) will likely also require added support. No mention was made in any of the documents we received for review of any undergraduate scholarships or similar monetary support mechanisms; development of donor-funded scholarships would provide financial relief for students, increase the attractiveness of the department's programs, and address an area of concern that was expressed by a number of students. These issues are considered in more detail in **Section 6 Long Range Planning Challenges**.

3 Faculty/Research

Scope, quality and relevance of faculty research activities:

Professors at all ranks in the Department of Biological Sciences conduct the expected "full scope and breadth" of research in the science of biology (i.e., faculty members conduct research on problems in evolutionary biology, ecology and ecosystems at multiple levels [conservation and biodiversity], plant and animal cell and molecular biology, physiology, neurobiology, microbiology [viruses and prokaryotes/pathogens], molecular genetics, and developmental biology).

Based on our assessment, quality is judged here, relative to core research funding as measured against NSERC DG successes, as high (only two professors at all ranks do not hold NSERC DG's). Our assessment of relevance is that it too is high. Research programs by professors at all ranks are highly subscribed by graduate students, and by

undergraduate students seeking research learning opportunities. As clients, these two groups are good predictors of the currentness and thus relevance of research programs.

Appropriateness of the level of activity relative to national and international comparators:

Our assessment of submitted materials, i.e., CV's of professors at all ranks, and self-study data, was significantly informed by our conversations with stakeholders and the VP Research & Innovation, Dr. Heinz-Bernhard Kraatz. The discussion, and documents supplied to us by Dr. Kraatz, clearly placed UTSC professors at all ranks in a favourable position with small campus research intensive universities in Canada; for example, UTSC professors at all ranks compare favourably with UTM faculty members at all ranks (however, neither UTSC nor UTM compared as well with faculty members in EEB and CSB at the St. George Campus).

With only two exceptions, UTSC Biological Sciences professors at all ranks hold NSERC DG grants; in addition, there are a number of professors at all ranks that hold other external trust funds to support their research programs. Several faculty members have extremely high H-indices judged within their disciplines and without. Junior faculty members, i.e., those hired within the last 5 years are uniformly high achieving academics who are positioned for national and international success.

We consider the "level of activity" to be excellent, and in fact escalating in light of the potential research outcomes of new faculty appointments at the level of Assistant Professors. However, concerns around lab renovation timelines and subsequent delays in productivity and outcomes, as expressed by Assistant Professors and highlighted by Full Professors, serve as an asterisk to our assessment, and warn of potential future problems.

Recommendation 4: That newly hired Tenure Stream Faculty receive maximal support either in terms of acceleration of renovations, or realistic support for alternative research programs pending completion of laboratory installation of building and research infrastructure.

Appropriateness of research activities for the undergraduate and graduate students in the Faculty:

We met with three groups that provided insight on research activities for undergraduate students: Tenure Stream faculty at all ranks, Teaching Stream faculty at all ranks, and Undergraduate Students (group of 21 across all four years of study).

Professors at all ranks indicated that they supervised undergraduate students in research courses, capstone courses for Majors students, and as paid lab and summer field assistants. Our assessment, based on coauthoring as indicated in professorial CV's,

and from feedback obtained from professors at all ranks, is that they are succeeding in mentoring undergraduate research; however, we did note that professors at all ranks indicated they did not have enough time to meet all requests for research mentoring from undergraduate students, particularly in supervised research courses.

Teaching Faculty indicated that they too directly supervised undergraduate research courses and capstone courses for specialist programs. This is revealing in that they admitted to having severely limited resources but were proud of their efforts and student successes and outcomes in mentoring research course work. We found Teaching Faculty research activities surprising considering they do not have the same supports available for mentoring research courses as do tenure-stream faculty. Teaching Stream Faculty are to be commended for their efforts; however, for Teaching Stream faculty to rely on “making do” with minimal support is sub-optimal if they are to continue their excellent effort in support of undergraduate experiential learning.

Recommendation 5: That Teaching Stream Faculty in the Department of Biological Sciences receive full support (financial, access to laboratory facilities, field equipment, etc.) to maximize the student research experience.

The *Undergraduate students* we met with seemed aware of research opportunities available to them. We did not get the sense that students felt excluded from research opportunities, though our sample size was small (21 students). Co-op opportunities through the Specialist in Molecular Biology & Biotechnology program seem to fill some of the gap identified by faculty.

A fourth group, *Graduate students*, also contributes to research activities. However, we did not interview graduate students during the e-site visit. As such, it is difficult to comment on the appropriateness of research activities for graduate students in the Department, let alone the Faculty of Arts and Sciences. Part of the reason for this omission appears to stem from the tri-campus arrangement of the graduate programs in biological sciences, which are administered through the St. George campus departments of Cell & Systems Biology (CSB) and Ecology & Evolutionary Biology (EEB). This means that the graduate programs most UTSC Biological Sciences faculty associate with are not technically part of the suite of programs within the Department of Biological Sciences, and therefore not assessed. We view the lack of opportunity to meet with graduate students a missed opportunity in our assessment of the strength of the research activities in the Department and the quality of the research environment.

Recommendation 6: That future site visits include interviews with graduate student stakeholders even if there is no companion review of the graduate program.

Our rationale for the above recommendation reflects the value and insight of graduate students on the successes, as well as areas of potential improvement, of professors and their research programs. Graduate students as highly qualified personnel (HQP) are the

key rationale for research support by Tri-Council funds such as NSERC DG's and should be a key component of a review of a research-intensive department such as UTSC.

Faculty complement plan – I:

In the Self-Study document, the Department of Biological Sciences notes that it is, "...committed to a strategy of balanced faculty recruitment in order to maintain a breadth of research experience...to this end, the department has developed research groups that include faculty with complementary interests and expertise to serve as foci for program and complement planning." (pg. 68). At the level of Tenure Stream faculty recruitment, the Department of Biological Sciences presents a well thought out plan for developing strength in its seven identified research clusters.

From our assessment of submitted materials and interviews with Tenure Stream faculty at all ranks, we note that "Complement Planning" is complex for UTSC. For example, the Department writes in their self-study document on page 84: *"Currently there is some expectation that complement planning in Biological Sciences should be rationalized with one or the other of the two cognate departments that are the default graduate "homes" of our faculty."* In our interviews with Full Professors among Tenure Stream faculty, we noted discontent with the graduate programs linked to cognate departments and a desire by some faculty to develop their own graduate program. We note there is a direct relationship between the cognate departments, graduate programs, and the independence of complement planning. We interpret the statement above from the Self-Study document to mean that UTSC has had a history of not developing its academic complement plan around its own goals and initiatives, but rather in the context of which St. George Campus department (EEB and CSB) they feel is the home of their individual graduate students. This of course means the UTSC complement planning is sensitive to, if not motivated by, the need to ensure their new hires meet the standard set by the cognate department in assessing suitability of a UTSC hire to supervise graduate students linked to that cognate department. With such strictures mitigating UTSC complement planning, independence is limited by the direction taken by the cognate department. We do note however, that the Self-Study document also provides evidence of UTSC Biological Sciences moving to establish its own independent complement planning goals.

Recommendation 7: That the Department of Biological Sciences either develops its own UTSC-administered graduate program and thus sets/continues on its own path for faculty complement planning (see Self-Study document), or, complement planning evolves to become a joint initiative between UTSC and its two graduate program cognate departments.

Faculty complement plan – II:

From the Self-Study document, the Department of Biological Sciences did not present a clearly articulated complement plan for either the Teaching Stream Faculty or Staff at any level within the Department. We note that such complement plans are important components of a healthy academic department as they recognize current staff value, and in addition, express a unit's value system by recognizing the need to plan for future hires in non-tenure stream positions within the unit.

Recommendation 8: That the Department of Biological Sciences develops and articulates a written complement plan for Teaching Stream faculty.

Recommendation 9: That the Department of Biological Sciences develops and articulates a written complement plan for administrative support and teaching support staff.

The above two recommendations are further explored in **Section 6 Long Range Planning Challenges**.

Appropriateness and effectiveness of the academic unit's use of existing human resources:

Based on our interviews with Department units and groups, and from our consideration of the Self-Study document and submitted materials, it is our assessment that as a collective, the Department is effectively utilizing its "human resource" to realize their departmental mission and vision to excel in research and teaching as a Department of Biological Sciences. Morale, which is addressed further below in **Section 4 Relationships**, is extremely high. We interpret this high morale to mean that everyone has a role, a purpose and a function, and feels rewarded for their contribution to a common goal. Our assessment, in sum total, is that the human resources of the Department are being effectively and appropriately deployed to realize the common goals of the Unit.

4 Relationships

Strength of the morale of faculty, students and staff:

It is a pleasure to report here that, across all interviewed stakeholder groups, we confirm that morale is very high and the perspective of the Department's successes, past, present and future, is extremely positive. Naturally, some stakeholder groups had specific concerns that were indicative of potential morale declines if not addressed, most of which were focused on space, though not all: 1) Assistant Professors were concerned about the long-term impacts of renovations and lab start up timelines, ranging from many months to a maximum as we heard, of 3 years from their start date; 2) Full Professors were split around the value of a UTSC-administered graduate program,

relative to the graduate programs of the cognate departments at the St. George Campus; 3) All stakeholder groups expressed concerns around general Departmental “space”: these revolved around a new building to house the entire Department, or a fragmented Department split between two or more separate buildings; renovations to teaching lab spaces; renovations to research lab spaces; Assistant Professors were not concerned about space and the fragmentation of the Department into different buildings (so long as they had appropriate space for their research programs), while Administrative staff thought everyone needed to be together, as did a variety of other stakeholder groups; 4) Undergraduate students – this stakeholder cohort is diverse, with specific morale issues affecting various subgroups, i.e., 1st to 4th year students, students with research interests, students in specialty programs (e.g., Paramedicine) and Co-op. None of the morale issues we heard or identified were unusual and specific to existing problems within the Department; rather all were general issues linked to the uncertainties faced by all students, with the exception of Co-op students who had problems with course sequence and course selection arising from their time away on the Co-op terms. Overall, we conclude that morale is currently extremely high and maintaining a positive slope; however, there are, as expected, a number of potential issues that will affect overall Department morale, and the morale of specific stakeholder groups if left unattended.

Recommendation 10: That the Department of Biological Sciences make a decision on what it values more – increasing the size of the faculty, staff and student complement, thereby requiring a new building or buildings to house Department growth, or to downsize around complement planning and growth via attrition, and to remain where they are currently housed as a single unit with all members in close proximity.

Recommendation 11: The Department of Biological Sciences must resolve the graduate program issue and either move to create its own independent program, or seek to build new relationships with its cognate departments on graduate programming.

We note that the circumstance leading to the above recommendation is clearly a “structural problem” within the U of T tri-campus system and will require active decision-making by Deans and the Provost to assist the UTSC units to achieve parity with their cognate units.

Scope and nature of relationships with cognate Faculties, academic departments and units:

From our site visit assessment and from the materials made available to us, we note there are structural barriers to UTSC Biological Sciences developing an effective relationship with its graduate program cognate departments, in particular EEB. This was made clear to us as a recognized problem in our e-site visit with the Decanal group, and from our interviews with, in particular, the Full Professors (this issue was not raised as a significant one by the Assistant and Associate Professors, though it was discussed).

Some Full Professors indicated they were treated formally and informally as “Adjunct Professors”, in particular by EEB’s Department Council, and not invited to vote or participate in decisions being made by that cognate unit on graduate student programs, procedures and policies. We conclude that this dysfunctional relationship affects the scope and nature of other relationships for UTSC and its cognate departments that go beyond just the graduate program concerns. We also recognize that resolution may require the directed efforts of management above the level of UTSC Biological Sciences.

Recommendation 12: That the relationship between the Department of Biological Sciences and the two cognate departments (CSB, EEB), consistent with the issue of morale noted previously, be repaired and made functional.

Extent to which the unit has developed or sustained fruitful partnerships with other universities and organizations in order to foster research, creative professional activities and to deliver teaching programs, and, Scope and nature of the unit’s relationship with external government, academic and professional organizations: We are addressing the above two requests for information with a single answer as both seem, to us, to ask essentially the same question.

Our assessment of all provided materials, inclusive of research, teaching, outreach, the Co-op program, etc., is that UTSC Biological Sciences, has developed extensive local, national and international partnerships, and thus relationships, with academic units in numerous universities and colleges, and with external government agencies at the local, provincial and national level. We conclude such broad successes from our assessment of: 1) the undergraduate and graduate student successes we noted through metrics such as fruitful careers and further schooling outside of UTSC; 2) from our observation that professors at all ranks are collaborating internationally and nationally on high impact research projects with their HQP at all levels of training; 3) that UTSC staff and students at all levels work with and on government-driven activities in local, provincial and national parks, on projects linked to Fisheries and Oceans, etc.; 4) that numerous professors at all ranks, the Co-op program, etc., have linkages to numerous NGO’s for experiential learning opportunities as well as career opportunities; 5) that the current undergraduate programming is effective and effectively deployed by an extremely efficient teaching stream faculty complement; 6) that undergraduates are superbly supported in numerous major and minor and specialized programs by all staff at all levels; and 7) that UTSC professors at all ranks are actively involved in creative professional activities benefiting the entire UTSC Campus community and the Department as a whole.

Recommendations 13: That the Department of Biological Sciences be strongly encouraged to maintain their high standard of achievement in partnership development and relationship at all levels.

Social impact of the unit in terms of outreach and impact locally and nationally:

Our assessment of this criterion is directly linked to the above two criteria as all relationships developed and promoted above will build on the perception of what we consider here to be “Social Value” as opposed to assessing it in terms of impact. There are numerous tangibles addressed in the Self Study report, but we note that “impact” is difficult to assess without our e-site visit interviewing stakeholders from outside of the U of T system, e.g., a random sample of Scarborough residents, members of Scarborough City Council, etc.

Instead, we have elected to assess “Social value” around the more obvious metric of undergraduate registrations from a wide variety of local Scarborough neighbourhoods. This point was made to us during our entry e-site visit with the Decanal group – that a significant proportion of undergraduates at UTSC are from the local neighbourhoods and boroughs. Our assessment here is that the local student composition indicates a critical and important recognition from the local community (a key stakeholder group in assessing social value and concluding significant social impact) that UTSC and UTSC Biological Sciences have developed “high social value” in their local community. We conclude that this means that UTSC has significant social impact.

Recommendation 14: That the Department of Biological Sciences keep up the good work of being locally relevant; this is a good thing, not a bad thing, and build on that relevance to expand perceptions of UTSC Biological Sciences to a U of T Campus with national social impact.

5 Organization and Financial Structure

The appropriateness and effectiveness of the unit’s organizational and financial structure, and its use of existing human, physical and financial resources in delivering its program(s):

The Department of Biological Sciences has a straightforward departmental organization structure that functions smoothly. The tenure-stream faculty have self-assorted into non-exclusive research clusters whose members interact constructively. The teaching-stream faculty also form a cohesive unit, and should be recognized as such. Their knowledge and expertise in curriculum development and delivery represent a significant resource within the Department.

Recommendation 15: That the Department of Biological Sciences formally recognize the Teaching Stream faculty as a Research Cluster within the Department, and encourage and promote continued curricular innovation that can be shared across all faculty involved in teaching.

All members of the administrative staff are well-supported, based on information supplied in the Self-Study document and from our virtual meeting with them. The various members have enough familiarity with each other's responsibilities to provide temporary backup if needed, but each person's role is distinct and well-defined. The administrative staff roster has not grown as quickly as the rest of the department, and further departmental growth will necessitate recruitment of additional support staff. The Self-Study document indicated a need for further support in grants preparation and administration; addition of such staff could lead to an increase in grant dollars to the research faculty. Finally, a graduate program administrator will be necessary if the department is successful in establishing a doctoral graduate program.

Recommendation 16: That the Department of Biological Sciences ensures that staff complement growth keep pace with faculty complement growth and graduate program development.

The budget is primarily devoted to salaries, as expected for this type of unit. There is some supplemental income, such as ancillary lab fees and user fees for the Centre for Neurobiology of Stress, that make up a minor portion of the budget. Funding support for research initiatives has remained strong, with a trend recently towards more external funding, most notably governmental agencies and non-profit organizations.

The appropriateness with which resource allocation, including space and infrastructure support, has been managed:

The Department of Biological Sciences, on the whole, has managed its allocated space very well. Notwithstanding challenges associated with renovating the Science Wing of the Andrews Building (the architecture of which is affectionately referred to as brutalist, and the construction of which limits renovation possibilities), including inordinately long completion times for research space for new faculty recruits, the allocation of space seems reasonable. However, the department has grown to the physical limits of their space allotment within the Science Wing of the Andrews Building, and any future growth will necessitate difficult choices around space.

A significant portion of the review committee's meeting time with faculty and staff was spent discussing the department's perceived need for an increased departmental space footprint. Various options were reviewed, including moving some groups into buildings currently under construction, taking over space vacated by other units moving into new space, or longer-term development of a new life sciences building. The various departmental groups differed in their relative enthusiasm for each option, but all felt constrained by their current space footprint – research faculty, teaching-stream faculty, and administrative staff.

As part of our discussions, the essential role of core facilities emerged many times by multiple departmental groups. It became clear that a number of the core facilities need

renovation, most notably the greenhouse and aquatics facilities. Discussion of core facilities location was also an integral part of the conversations about departmental space. The success of the movement of research groups to new locations, should this be part of the Department's decision regarding future space use, is likely to be correlated with easy access to appropriate core facilities.

Another recurring space issue was the state of the undergraduate teaching labs, both their physical state and limiting footprint. However, the recently initiated renovation (and expansion) of the teaching labs was universally viewed as a welcome change and is absolutely essential to the department's ability to deliver high-quality undergraduate lab courses.

We address the issue of space further in **Section 6 Long Range Planning Challenges**.

Opportunities for new revenue generation:

The review committee did not discuss specific plans for new revenue generation with the department. However, we did observe some areas of opportunity for revenue generation during our meetings: 1) Possible expansion of core facilities, especially as part of new space, could lead to an increase in external users; 2) A focus on obtaining external support through endowments and scholarships; and 3) Increased involvement in revenue-generating Masters programs.

6 Long-Range Planning Challenges

Consistency with the University's and UTSC's Academic Plans:

Insofar as we can tell, the undergraduate programs offered by the Department of Biological Sciences align well with the UTSC academic plan, especially two of the main objectives: innovative research and learning outside the classroom. We note, with some satisfaction, the prominence of Biological Sciences-focussed images throughout the UTSC Strategic Plan public document.

Complement plan, including balance of tenure-stream and non-tenure stream faculty:

The Department of Biological Sciences is at an important crossroads in its relatively early growth and development. Recent faculty hires, largely driven by strong and growing undergraduate enrolment, have brought the department to a critical tipping point with regard to identity and future growth. During our virtual visit, we encountered a strong sense of community and collegiality amongst faculty, staff and students. This sense of community was, in part, enhanced through the physical proximity of department members and by virtue of their relatively small size. However, the department has

grown to the physical limits of their space allotment within the Science Wing of the Andrews Building, and any future growth will necessitate difficult choices around space. Here we encountered a range of opinions, with staff and more senior faculty being committed to keeping the department together in one physical space, and more junior faculty being inclined to prefer access to the space they needed to establish their research labs, even if not physically located in the immediate vicinity of other departmental spaces. Assuming that future growth is inevitable, (i.e., given the relatively high FCE/TC ratio for the department), the space issue is high priority.

Recommendation 17: That the Department of Biological Sciences prioritizes quality of research space, ensuring the needs of new and established researchers are met, over proximity.

The current complement of faculty in the Department of Biological Sciences stands at approx. 82% Tenure Stream and 18% Teaching Stream. This represents a reasonable distribution, given the extent of the undergraduate teaching demands on the Department. It is of particular note that the Teaching Stream Faculty are largely responsible for driving teaching innovation within the Department, including a number of unique and effective initiatives (e.g., cross-course poster project, C-level team research projects). The excellence of the Teaching Stream faculty is noted. Future faculty growth should maintain and enhance this specific faculty-group within the Department; their contribution to pedagogy (and the pedagogic literature) demonstrates an inherent value beyond course instruction.

Notwithstanding having one of the highest FCE/TC ratios on the UTSC campus, the Department of Biological Sciences seems poised to expand course offerings to provide more flexibility and options to students, and more differentiation between Specialist programs. However, the Co-op program and joint Paramedicine program present unique challenges to student progression. Some of the students we spoke with identified the required laboratory course, BIOC23H3, which is only offered in the Winter semester, as a complication to progression for students that opted for a Winter Semester co-op placement. There may be other courses that present similar impediments.

Recommendation 3 (re-iterated): That in addition to creating capacity for new faculty to diversify upper-year course offerings, the department reviews critical pinch points in its timetable of course offerings and considers more frequent offerings of required courses that, if missed due to a co-op work term, prevent timely degree progression.

As noted elsewhere in this report, the staff complement of the Department of Biological Sciences is adequate for the current level of Department activity. However, there is little, if any, slack, and future growth on the faculty side will need to be balanced with staff growth (especially technical support and research infrastructure staff). The development of a new graduate program (see below) must be linked with new administrative staff.

Recommendation 16 (re-iterated): That the Department of Biological Sciences ensures that staff complement growth keep pace with faculty complement growth and graduate program development.

Enrolment Strategy:

We did not discuss enrolment strategies directly with members of the Department or Decanal team. From the data provided in the Departmental Self-Study document, however, it is clear that overall enrolments have increased by over 50% in the past decade. The vast majority of this growth has been with program Majors, at the expense of Specialists (which have declined by approx. 1/3 in the same timeframe). It was not clear from our discussions whether this trend was of concern, aside from having less control over ensuring graduates meet overall institutional Degree-level Learning Outcomes. Regardless, enrolments are strong, and show no sign of abating.

As part of our visit, we spoke with 21 students from across the various programs and at different levels of degree completion. One universal message from the students was the strong sense of community they experienced, both broadly at UTSC, and within the Biological Sciences programs. We got the impression that students were very satisfied with their experiences in programs administered by the Department of Biological Sciences, which we assume contributes to retention and degree completion (i.e., two key components of any enrolment strategy).

Student financial aid:

We did not discuss Student Financial Aid with members of the Department or Decanal Team. Further, there was no information available in either the Department Self-Study document or on the Department website regarding available aid. However, it was pointed out that a majority of UTSC students relied on OSAP support for their studies. Therefore, while it was not immediately clear what internal or institutional support (i.e., scholarships, bursaries) were available to students in the Biological Sciences programs, there is likely need.

Development/fundraising Initiatives:

We did not discuss Development/fundraising Initiatives with members of the Department or Decanal Team beyond noting the need for some critical infrastructure improvements (e.g., the greenhouses). Similarly, we did not see any evidence of named scholarships or bursaries, though these may exist.

Recommendation 18: If not already part of their development strategy, the Department of Biological Sciences is encouraged to include donor-funded scholarships and/or bursaries in their fundraising plans.

Management and leadership:

The Department of Biological Sciences has benefited from strong leadership since its inception. The current chair has fostered a collegial environment within the Department, and successfully recruited excellent junior faculty. The incumbent Chair, Prof. Andrew Mason, will come to the end of his second term in approx. 1.5 years, and is precluded from further service. The faculty complement in the Department of Biological Sciences is rich enough to be confident that a new chair can be identified.

The main challenge facing the Department of Biological Sciences in the near future is the continuing high FCE/TC ratio. In addition to innovations in curriculum delivery (in which the department is fully engaged), the main solution to this challenge is faculty (and staff) complement growth. However, faculty complement growth presents two additional major challenges: space and graduate program autonomy. As noted elsewhere in this report, faculty and staff in the Department of Biological Sciences will have to come to terms with the reality of having to either split themselves over more than one building, or remain constrained by the limitations of the Andrews Building. Here it is worth noting that all three reviewers hail from institutions where their respective Departments are spread out over multiple buildings, without any significant impact on collegial interaction or departmental unity. It is the people that make the department a great place to be, not the buildings.

The issue of space, and whether members of the Department of Biological Sciences can remain in close physical proximity stems from the awkward intersection of building capacity and department growth. As noted above, the Department of Biological Sciences is at a crossroads, and to move forward will have to modify some aspects of the way they operate. This must include a shift in mindset regarding space and what it takes to remain a cohesive academic unit. While being spread out in several buildings poses its own challenges, regularly scheduled departmental activities (already in place), such as seminars and coffee chats, can go a long way to maintain unity.

Establishment of the Department of Biological Sciences, and growth of the faculty complement over the past few years has brought with it a stronger sense of autonomy. Whereas the robust and successful undergraduate programs offered by the Department have always been stand-alone (within the context of the U of T tri-campus structure), the same cannot be said for the graduate program. And while this report is primarily focussed on undergraduate programs, the impact of the structure of graduate programs in the biological sciences on the faculty in the UTSC Department of Biological Sciences cannot be ignored. Indeed, this was a major topic of discussion with the Decanal team and at all levels of faculty rank, and a significant part of the Department's Self-Study document. Based on our discussions with faculty, we identify three issues: 1) lack of involvement in governance and decision-making regarding graduate programs in CSB and EEB administered by the cognate departments on the St. George Campus, 2) the

inconvenience of travel between UTSC and UT St. George necessary to meet program requirements, and 3) opacity around graduate student funding. These appear to be long-standing issues, and stem in part from a sense amongst UTSC faculty of being considered as adjunct members of the CSB and EEB programs, rather than full participants. This has been brought more into focus in recent years because of graduate program enrolment growth. During our meetings, there was much talk about the development of a stand-alone graduate program in biological sciences at UTSC. And while such a program would indeed solve many problems associated with the current reliance on recruitment through CSB and EEB programs, establishment of a new program is complicated by a number of factors. These include Provincial regulations around program duplication and insufficient administrative capacity.

The Department of Biological Sciences has already taken steps to explore development of a proposal for a new graduate program. To differentiate from existing programs in CSB and EEB, a focus on Applied Biology and/or Integrative Biology has emerged; however, not all faculty feel their research needs are adequately met within these broad categories. It should be noted that development of a new program, whether in Applied Biology or Integrative Biology, would not preclude faculty from participating in either the CSB or EEB programs. In choosing between the status quo and development of a new graduate program, the Department of Biological Sciences could consider exploring a third, middle ground option wherein they negotiate a greater role in program administration. For example, local control of program admissions for students planning to work with a professor at UTSC, subsequent tracking of milestones, and local completion of them, are three areas where some autonomy would likely go a long way to relieve tensions between UTSC Biological Sciences faculty and EEB and CSB programs administered solely through the St George campus departments. However, we are not in a position to advise in detail, as graduate program details were not included in our review materials. It may be that other constraints (e.g., existing governance rules) preclude a greater involvement in program administration and even semi-autonomy; however, insofar as it is possible, this alternative may satisfy program needs. Regardless, the department is mature enough and with adequate critical mass to administer their own version of a graduate program in house.

7 International Comparators

Assessment of the unit and the program(s) under review relative to the best in Canada/North America and internationally, including areas of strength and opportunities:

Within the Ontario and Canadian contexts, the Specialist programs offered by the Department of Biological Sciences at UTSC are amongst the very best. Graduates are well prepared for future activities be they graduate school or workforce (either Government or private sector). The broad-based core program in the first two years of

study provide a solid grounding in the discipline of Biology, while hands-on and research activities in upper year courses, along with a focussed set of sub-disciplinary courses, provide a good depth of knowledge. For students in one of the Specialist programs, learning objectives (degree and program) are readily mastered.

Similarly, the majors offered by the Department of Biological Sciences are well grounded in a core biology curriculum and provide a solid foundation. They are excellent programs, on par with any in Ontario and Canada. As with any program that combines elements from more than one area, it is harder to evaluate whether students combining a Major in Biology, Conservation & Biodiversity, Human Biology, Molecular Biology, Immunology & Disease or Plant Biology with another from another discipline meet all degree and program learning objectives. However, given that 90% of double Majors degrees combine one of only three Majors (Health Studies, Physical & Environmental Science and Psychology) with a Major from Biological Sciences, it should be possible to confirm whether most (if not all) double Major combinations yield programs that meet all degree and program learning objectives.

Insofar as our expertise and experience allows, we conclude that the Department of Biological Sciences and the undergraduate programs it offers are competitive on a global stage.



April 8, 2021

Professor William Gough
Vice Principal Academic and Dean
University of Toronto Scarborough

Dear Professor Gough:

Thank you for forwarding the report of the November 2020 External Review of the Department of Biological Sciences and its programs. The following programs were reviewed: Biology (H.B.Sc.) Major, Minor; Conservation and Biodiversity (H.B.Sc.) Specialist, Major; Human Biology (H.B.Sc.) Specialist, Major; Integrative Biology (H.B.Sc.) Specialist; Molecular Biology and Biotechnology (H.B.Sc.) Specialist, Specialist Co-op; Molecular Biology, Immunology and Disease (H.B.Sc.) Major; Plant Biology (H.B.Sc.) Major.

As indicated in our *Statement of Institutional Purpose*, the University of Toronto is committed “to being an internationally significant research university, with undergraduate, graduate and professional programs of excellent quality.” This quality is assessed through the periodic appraisal of programs and units, which considers how our research scholarship and programs compare to those of our international peer institutions and assesses the alignment of our programs with established degree-level expectations. The University views the reports and recommendations made by external reviewers as opportunities to celebrate successes and identify areas for quality improvement.

The reviewers observed excellent, globally competitive undergraduate programs that provide students with a solid foundation in Biology and its main sub-fields; they commended the department for strong efforts in designing and delivering a modern Biology curriculum, noting that many programs have undergone revisions since the last review, and that courses of study for each program are rigorously developed, with comprehensive Program Learning Outcomes; the reviewers observed that faculty – particularly in the teaching stream – provide high quality classroom and laboratory instruction; programs are well supported by excellent administrative and technical staff, through top quality library resources and a strong Co-op office; the local student composition indicates critical and important recognition from the local community; overall morale within the department was described as very high, with students reporting an excellent educational experience and strong sense of community; and finally, the department’s use of Facilitated Study Groups in many programs was noted as a significant strength, and commended as key for maintaining a sense of community among students after the shift to online learning in response to COVID-19.

I am writing at this time:

1. to request your administrative response to this report, which should include a plan for implementing the recommendations;
2. to request your feedback on the review summary component of the draft *Final Assessment Report and Implementation Plan*; and
3. to outline the next steps in the process.

1. Request for Administrative Response and Implementation Plan:

In your **Administrative Response**, please address the following areas raised by the reviewers and their impact on academic programs, *along with any additional areas you would like to prioritize*.

For each area you address, please provide an **Implementation Plan** that identifies actions to be accomplished in the immediate (six months), medium (one to two years) and longer (three to five years) terms, and who (Department, Dean) will take the lead in each area. If appropriate, please identify any necessary changes in organization, policy or governance; and any resources, financial and otherwise, that will be provided, and who will provide them.

- The reviewers recommended that the department explore formalizing research aspects of the curriculum, and that teaching stream faculty in particular receive appropriate access to labs and other resources to support program quality and undergraduate research.
- The reviewers noted significant student concerns regarding the sequencing and frequency of required courses, and recommended that the department review “critical pinch points” in its course offerings to enable timely degree progression.
- The reviewers recommended that the department explore the development of a Co-op program in Conservation and Biodiversity.
- The reviewers observed that recent faculty hires, driven by increasing undergraduate enrolments, have brought the Department to an “important crossroads” with regard to identity and future growth. They note that the Department has reached the limits of its current space, and recommend that meeting the space needs of new and established researchers in a timely way be prioritized over maintaining spatial proximity of the department as a whole.
- The reviewers recommended that the Department develop written complement plans for Teaching Stream faculty and administrative staff.
- The reviewers noted that there are “structural barriers” to developing effective relationships with cognate departments, impacting the Department’s faculty complement planning and faculty morale. They recommend that issues of tri-campus graduate program administration be addressed in order to improve relationships.

Please prepare this response in consultation with the unit under review. As part of this consultation, please request a brief administrative response from the unit that focuses on items

within their control. Please reflect this consultation and respond to the key elements of the unit's response in your response.

Finally, please confirm the **date of the next review** and your plans for **monitoring the implementation of recommendations** until then. I will ask you to provide a brief report to me midway between the 2020-21 review and the year of the next site visit.

2. Draft of Final Assessment Report (including Review Summary)

In April 2021, my office will provide a draft version of the *Final Assessment Report and Implementation Plan* (FAR/IP), which will include a summary of the review of the Department of Biological Sciences and its programs. At that time we will request your feedback regarding tone or accuracy of the summary component, and your response to any information that is requested in the comments. This document becomes part of the governance record.

3. Next Steps

Reviews of academic programs and units are presented to University governance as a matter of University policy. Under the University of Toronto Quality Assurance Process (UTQAP), the Vice-Provost, Academic Programs prepares a report on all program and unit reviews and submits these periodically to the Committee on Academic Policy and Programs (AP&P).

The review of the UTSC Department of Biological Sciences will be considered by AP&P at its meeting on **Tuesday, October 26, 2021. Please plan to attend this meeting, and ensure that the unit leadership also attends.** Your presence is important and will allow you to respond to any questions the committee may have regarding the report, and your administrative response and implementation plan. An overview of what happens at AP&P is [available on our website](#).

I would appreciate receiving your completed administrative response and plan for implementing recommendations, as well as a copy of the unit's response, and any comments on the draft FAR/IP by **September 15, 2021**. This will allow my office sufficient time to prepare materials for the AP&P meeting.

The review summary and the Dean's administrative response are the two key components of the FAR/IP, which will be finalized after the AP&P meeting and distributed to you, the unit leads, the Governing Council secretariat, and the Quality Council, and posted on our [website](#), as required by the UTQAP.

Please feel free to contact me or David Lock, Coordinator, Academic Planning and Reviews, should you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mark Schmuckler'. The signature is fluid and cursive, with the first name 'Mark' being more prominent than the last name 'Schmuckler'.

Mark Schmuckler
Acting Vice-Provost, Academic Programs

cc.

Annette Knott, Academic Programs Officer, University of Toronto Scarborough
Daniella Mallinick, Director, Academic Programs, Planning and Quality Assurance
David Lock, Coordinator, Academic Planning and Reviews
Emma del Junco, Assistant Coordinator, Academic Planning and Reviews



DEPARTMENT OF BIOLOGICAL SCIENCES

OFFICE OF THE CHAIR

August 4, 2021

Professor William A. Gough
Vice-Principal Academic and Dean
University of Toronto Scarborough

Chair's Administrative Response: External Review of the Department of Biological Sciences

Dear Bill,

I am pleased to provide the Chair's administrative response to the external review of the Department of Biological Sciences. I want to thank the review team – Professor Mark Bernards, Department of Biology, Western University; Professor Michael Caldwell, Department of Biological Sciences, University of Alberta; and Professor David Kirkpatrick, Department of Biology Teaching and Learning, College of Biological Sciences, University of Minnesota – for their consultation with us during the remote site visit, held from November 10-13, 2020, and for their report, which was finalized on January 4, 2021 and shared with our faculty, staff and students.

We deeply appreciate the reviewers very positive assessment of Biological Sciences, noting in particular the excellence of the undergraduate programs, the high quality of teaching overall, as well as the innovative pedagogical approaches in delivering course content, the strong sense of community and collegiality among the faculty, staff and students, and the high morale in the Department. They also give attention to some of the challenges the Department currently faces and make a number of recommendations; where changes are within departmental control, a response is given below.

- *The reviewers recommended that the Department explore formalizing research aspects of the curriculum, and that teaching stream faculty in particular receive appropriate access to labs and other resources to support program quality and undergraduate research.*

In their report, the review team makes two recommendations, and it will be helpful, here, to address each of them separately:

First, they recommend that the Department begin to formalize research aspects of the curriculum “by setting goals for the percentage of student involvement in research.” The impetus for this recommendation is the reviewers’ understanding that undergraduate research at the upper level “appears to be variable in its availability, based primarily on faculty willingness, capacity and involvement.” Given this variability, they feel that a stronger emphasis on upper-level research would be beneficial to undergraduates in each program. It should be noted that, as the review team suggests in the report, undergraduate students in the Department of Biological Sciences are strongly encouraged to engage in research activities, and are provided with many opportunities to do so. For example, students begin building their research experience at the B-level (e.g., BIOB90H3), continue with courses at the C-

level (e.g., BIOC90H3), and have access to rich array of opportunities at the D-level, including undergraduate thesis projects, summer research placements, and (for students in the Specialist Co-op program in Molecular Biology and Biotechnology) co-op placements. Building further on these course elements, in the 2019-20 academic year, the Department established an undergraduate, in-program Certificate in Biological Sciences Research Excellence, which encourages students to engage in research, and formally recognizes, on their transcripts, students' research accomplishments.

From the Department's perspective, and we believe from the review team's perspective as well, these carefully scaffolded research opportunities are a highlight of the Department's programs and research culture. However, it is important to acknowledge that undergraduate student access to upper level research is, of necessity, limited by faculty capacity. The ability of some faculty to involve larger numbers of undergraduates in their research is due to the nature of the research (e.g., field work involving relatively large-scale surveys and data collection), and not a reflection of the faculty commitment to supporting undergraduate research. All faculty in the Department of Biological Sciences are highly invested in undergraduate research, but most can only realistically support a small number of students each year. This is in accordance with the nature of independent research projects, since they require significant resources and investment by faculty (although the Department does provide limited financial reimbursement in support of D-level projects). Nevertheless, the expansion of course-based research opportunities is an important area of potential growth, and we believe this could be facilitated by expanding the role of, and resources available to, the teaching-stream faculty. For example, some members of the teaching stream faculty already engage work-study students in the summer months to develop and pilot mini experiments that are then incorporated into the Biology introductory course labs. In coming years, with more reliable use of renovated teaching lab space, this model will be adapted into course-based undergraduate research experiences (CUREs) that includes an added biology education focus for the results of their experimentation.

Second, the review team recommends that: (a) teaching-stream faculty in the Department "receive full support (financial, access to laboratory facilities, field equipment, etc.)" to maximize the student research experience; and (b) the Department "formally recognizes the Teaching Stream Faculty as a Research Cluster within the Department, and encourages and promotes continued curricular innovation that can be shared across all faculty involved in teaching."

The Department thanks the review team for their recommendations around formally recognizing the teaching-stream faculty as a research cluster. We agree that explicit recognition of our cohort of teaching-stream faculty as an integral part of a research cluster that is focused on pedagogy would bring a number of benefits to the Department and the teaching-stream faculty. We therefore intend to revise the departmental governance document to clarify their status as follows: 1) integration of teaching-stream faculty, with a focus on pedagogy, into the section describing the organization of departmental research; and 2) making explicit that this entails access to full support and resources for teaching-stream faculty-led student research. We note that financial, space, and equipment supports are currently available and teaching-stream faculty will be encouraged to leverage them. In addition, we have developed flexible options for newly hired faculty to maintain productivity while their labs are under development, including access to temporary space combined with earlier initiation of the design and renovation process for new labs.

- *The reviewers noted significant student concerns regarding the sequencing and frequency of required courses, and recommended that the Department review “critical pinch points” in its course offerings to enable timely degree progression.*

We thank the review team for this recommendation. The Department of Biological Science has been working steadily over the past several years to significantly expand course offerings in the summer term to include all core courses in our programs, including courses at the D-level. This initiative is intended to ensure students have the opportunity to complete any courses they may have missed during the academic year, particularly as a result of co-op work terms. In this way, students should be able to maintain the recommended sequence of courses for their program(s). However, it must be acknowledged that some students will want, or need, to deviate from the recommended course sequences. To support these students, the Department regularly updates the undergraduate *Academic Calendar* to clarify the ideal program planning, and we have also created incentives for students to follow the recommended sequences. In addition, we have recently added more program advising sessions with our departmental Program Coordinator that occur prior to registration deadlines in order to proactively assist students in their academic planning. In terms of the number of upper-level courses available to students, the Department has been working steadily on broadening the selection of these courses (e.g. BIOC35H3, BIOD07H3, BIOD63H3, BIOD13H3 all added within the past three years, and BIOD29H3 proposed for the 2021-22 academic year) to more efficiently stream students to graduation. The effectiveness of these measures is demonstrated by time-to-completion rates in the Department, which compare favourably with institutional norms.

- *The reviewers recommended that the Department explore the development of a Co-op program in Conservation and Biodiversity.*

The Department thanks the review team for this recommendation. Plans to introduce a Specialist (Co-operative) program in Conservation and Biodiversity have already been initiated, and consultations with the Arts & Science Co-op Office, who are responsible for securing appropriate co-op work term placements for students, are in progress. The necessary major modification proposal is also in development; it has been submitted to the Dean’s Office as part of the 2021-22 curriculum cycle, and we anticipate that students will be able to begin enrolling in the program in Fall 2022.

- *The reviewers observed that recent faculty hires, driven by increasing undergraduate enrolments, have brought the Department to an “important crossroads” with regard to identity and future growth. They note that the Department has reached the limits of its current space, and recommend that meeting the space needs of new and established researchers in a timely way be prioritized over maintaining spatial proximity of the Department as a whole.*

We thank the review team for their recommendation. Meeting the space needs of new faculty is a priority in the Department of Biological Sciences. A central consideration in the allocation of faculty research space is access to research resources and infrastructure. The dispersed model of departmental growth imposes different constraints on complement planning because some areas of research cannot be supported in lab space that is removed from core facilities. We appreciate that the reviewers also recognized this point in the review Report: “The success of the movement of research groups to new locations, should this be part of the Department’s decision regarding future space use, is likely to be correlated with easy access to appropriate core facilities (pg. 18),” and note that wet lab capacity in the Science Wing and Science Research Building are not fully utilized. The Department will consider both proximal and less proximal space as best fits our complement planning priorities.

- *The reviewers recommend that the Department develop written complement plans for Teaching Stream faculty and administrative staff.*

We thank the review team for this recommendation. With regard to teaching-stream faculty, the Department of Biological Sciences recognizes the important contributions our teaching-stream faculty make to the academic mission. As previously discussed, a more coherent approach to complement planning for teaching faculty follows from an explicit recognition of our cohort of teaching-stream faculty as an integral part of a research cluster that is focused on pedagogy. There is already broad recognition that teaching-stream faculty hiring is an important part of complement planning and teaching-stream faculty do participate in the annual campus-wide complement planning process. But they have not, in the past, brought hiring proposals to planning discussions in the same way that other research clusters normally do. The proposed changes to departmental governance will address this.

With regard to complement planning for administrative staff: recognizing that we are understaffed relative to other comparable departments, we have already requested an additional staff position (dedicated to management of research funds). Development of a more comprehensive staff hiring plan will be incorporated in the next departmental academic plan.

- *The reviewers noted that there are “structural barriers” to developing effective relationships with cognate departments, impacting the Department’s faculty complement planning and faculty morale. They recommend that issues of tri-campus graduate program administration be addressed in order to improve relationships.*

We thank the reviewers for their recommendation, but feel they may have gained an inaccurate impression of the tri-campus graduate landscape at the University. The Department’s complement planning process is not constrained in any way by our tri-campus graduate relationships with cognate units on the St. George campus; indeed, the only expectation is that a graduate chair must be represented on each hiring committee and is required to co-sign a letter of offer. These requirements are not a source of tension.

Having said that, it should be acknowledged that there are other points of tension. First, graduate resources are remote from the Department. This issue, which is more a question of geography rather than administrative organization, is somewhat mitigated by campus-level graduate support via the Office of the Vice-Dean Graduate and Postdoctoral Studies, but it nevertheless remains true that this reality can undermine Department cohort building. Second, the sense of detachment from cognate graduate units among faculty is largely a consequence of distance and therefore largely inevitable in disciplines like biology where faculty are tied to physical infrastructure for their work. We also note that some faculty do maintain strong ties with their affiliated graduate unit. Our faculty primarily identify as members of UTSC Biological Sciences, with complement planning, undergraduate curriculum development and graduate training taking place in that context. Only graduate programming and administration are dispersed.

A proposal for a new graduate program that is currently under development is a constructive way to address these issues. The proposed program in Interdisciplinary and Applied Biology, which is in the very early stages of development, is designed to provide PhD-level training in the biological sciences, with an emphasis on cross-disciplinary training, hands-on experience, and the applicability of basic science to real-world problems. Our expectation is that most faculty will not change their primary graduate

affiliation, but rather that the new program would be an alternative intake; as such, it will create significant opportunities, for example: the development of more graduate course offerings would alleviate the requirement for graduate students to travel to the St. George campus for courses; the proposed program would address, by design, recent priorities across the University of Toronto for diversified career training for graduate students; and the program would directly advance the campus strategic goals of inclusivity, access, and graduate growth, because it is likely to have broader appeal among students who might not initially consider traditional academic careers.

Regards,



Professor Kenneth C. Welch
Acting Chair, Department of Biological Sciences
University of Toronto Scarborough

Implementation Plan

Action	Timeline	Lead
Revisions to departmental governance document to: 1) integrate teaching-stream faculty, with a focus on pedagogy, into the section describing the organization of departmental research; and 2) make explicit that this entails access to full support and resources for teaching-stream led student research.	Short term [6 months] – to be completed in Fall 2021	Acting Chair, Department of Biological Sciences
Introduce a new Specialist (Co-operative) program in Conservation and Biodiversity	Short to medium term [6 months to 1 year] – anticipated start date is Fall 2022	Ivana Stehlik, Associate Professor, Teaching Stream, Department of Biological Sciences
Expansion of course-based undergraduate research experiences (CUREs).	Medium to long term [1 to 5 years]	Associate Chair, Teaching and Undergraduate Affairs, Department of Biological Sciences
Development of a more comprehensive staff hiring plan as part of the next departmental academic plan.	Medium to long term [2 to 3 years] – to be completed by Spring 2023	Chair, Department of Biological Sciences
Introduce a new PhD in Interdisciplinary and Applied Biology	Medium to long term [2 to 3 years] – earliest anticipated start date is Fall 2023	Mauricio Terebiznik, Associate Professor, Department of Biological Sciences Nate Lovejoy, Professor, Department of Biological Sciences

September 15, 2021

Professor Susan McCahan
Vice-Provost, Academic Programs
Office of the Vice-President and Provost
University of Toronto

Dean's Administrative Response: External Review of the Department of Biological Sciences

Dear Susan,

Thank you for the April 8, 2021 letter requesting my administrative response to the external review of the Department of Biological Sciences. We want to thank the review team – Professor Mark Bernards, Department of Biology, Western University; Professor Michael Caldwell, Department of Biological Sciences, University of Alberta; and Professor David Kirkpatrick, Department of Biology Teaching and Learning, College of Biological Sciences, University of Minnesota – for their consultation with us during the remote site-visit, held from November 10-13, 2020, and for their report, which was received on December 16, 2020, and finalized on January 4, 2021.

I appreciate the seriousness with which the reviewers approached the external review process, as well the thoughtful consideration given to Biological Sciences and its undergraduate programs. I am very pleased by the overall positive review of the Department. In particular, the reviewers noted the excellence of the undergraduate programs, the high-quality of teaching overall as well as the innovative pedagogical approaches in delivering course content, the strong sense of community and collegiality among the faculty, staff and students, the high morale, and the consistently strong leadership in the Department.

The external review report was sent to the Chair of the Department, Professor Andrew Mason, on January 5, 2021, with a request to share it widely among the faculty, staff and students. The decanal group, including myself, the Vice-Dean Teaching, Learning and Undergraduate Programs (VDTLUP), Vice-Dean Graduate and Postdoctoral Studies (VDGPS), Vice-Dean, Recruitment, Enrolment and Student Success (VDRESS), Vice-Dean Faculty Affairs, Equity, and Success (VDFAES), Interim Associate Dean Undergraduate Programs and Curriculum (ADUPC), the Director of the Office of the Vice-Principal Academic and Dean, and the Academic Programs Officer, met with the Chair of Biological Sciences and the current Associate Chair Teaching and Undergraduate Affairs, Associate Chair Research and Graduate Studies (now Acting Chair), and the former Associate Chair Teaching and Undergraduate Affairs, on May 5, 2021 to discuss the external review report and administrative response; I am pleased with the depth of the discussion that took place.

My administrative response to the points raised in your letter is given below. This response has been developed in close consultation with both the Chair and Acting Chair of Biological Sciences and reflects the key elements of the unit response letter, dated August 4, 2021. It also includes responses to points raised in the Request for Administrative Response that are outside departmental control.

Let me address the specific points raised in your letter:

- *The reviewers recommended that the Department explore formalizing research aspects of the curriculum, and that teaching stream faculty in particular receive appropriate access to labs and other resources to support program quality and undergraduate research.*

As the Chair outlines in his Response letter, these recommendations from the review team are related to undergraduate research. First, they recommend that the Department begin to formalize research aspects of the curriculum “by setting goals for the percentage of student involvement in research.” The impetus for this recommendation is the reviewers’ understanding that undergraduate research at the upper level “appears to be variable in its availability, based primarily on faculty willingness, capacity and involvement.” Given this variability, they feel that a stronger emphasis on upper-level research would be beneficial to undergraduates in each program. Second, the review team recommends that: “(a) teaching-stream faculty in the Department “receive full support (financial, access to laboratory facilities, field equipment, etc.)” to maximize the student research experience; and (b) the Department “formally recognizes the Teaching Stream Faculty as a Research Cluster within the Department, and encourages and promotes continued curricular innovation that can be shared across all faculty involved in teaching.”

With regard to the first recommendation, it is important to note that undergraduate students in the Department of Biological Sciences are already strongly encouraged to engage in research activities and have access to many opportunities to do so. Indeed, students begin building their research experience at the B-level (e.g., BIOB90H3), continue with courses at the C-level (e.g., BIOC90H3), and have access to rich array of opportunities at the D-level, including undergraduate thesis projects, summer research placements, and (for students in the Specialist Co-op program in Molecular Biology and Biotechnology) co-op placements. Building further on these course elements, in the 2019-20 academic year, the Department established an undergraduate, in-program Certificate in Biological Sciences Research Excellence that encourages students to engage in research, and formally recognizes, on their transcripts, students’ research accomplishments. These carefully scaffolded research opportunities are a highlight of the Department’s programs and research culture.

All faculty in the Department of Biological Sciences are highly invested in undergraduate research, but they believe strongly that they can only realistically support a limited number of students each year, dependent on the nature of the research (e.g., field work involving relatively large-scale surveys and data collection). This is in accordance with the nature of independent research projects, which require significant resources and investment by faculty (although the Department does provide limited financial reimbursement in support of D-level projects). Nevertheless, the expansion of course-based research opportunities remains an important area of potential growth. The Department proposes to expand the role of, and pedagogical/professional development resources available to, the teaching-stream faculty. For example, some members of the teaching stream faculty already engage work-study students in the summer months to develop and pilot mini experiments that are then incorporated into the Biology introductory course labs. In coming years, with more reliable use of renovated teaching lab space, this model will be adapted into course-based undergraduate research experiences (CUREs) that include an added biology education focus for the results of their experimentation.

In response to the second recommendation, the Department agrees that explicit recognition of pedagogical research and student research supervisions, largely led by teaching-stream faculty, would be beneficial. They plan to revise the departmental governance document to clarify their status as follows: 1) recognizing the contributions of teaching-stream faculty in the area of pedagogical research as integral to the department; and 2) making explicit that this entails access to full support and resources for teaching-stream faculty led student research. The Department further notes that financial, space, and equipment supports are currently available and teaching-stream faculty will be encouraged to leverage them. Finally, the Department has developed flexible options for all newly hired faculty to maintain

productivity while their labs are under development, including access to temporary space combined with earlier initiation of the design and renovation process for new labs.

While the Dean's Office strongly supports recognition for the pedagogical/professional development activities of teaching stream faculty, including discipline-based research, it is important to note that basic research is not required as a part of the workload of teaching-stream faculty at the University of Toronto. As a result, there are currently more limited resources and opportunities at the University to support teaching-stream faculty research, as opposed to pedagogical/professional development. It would be possible for the Department to provide resources to teaching stream faculty to allow them to supervise student research conducted as part of coursework, and the Dean's Office would certainly consider requests to enhance the teaching budget to permit this kind of research activity. While the Dean's Office supports the long-term development of research opportunities and related resources for teaching-stream faculty as part of their teaching and pedagogical/professional development activities, particularly given the growing emphasis on the scholarship of teaching and learning, changes to departmental governance and any related workload expectations for teaching-stream faculty research would raise issues of policy that would need to be addressed in dialogue with the Provost's Office.

- *The reviewers noted significant student concerns regarding the sequencing and frequency of required courses, and recommended that the Department review "critical pinch points" in its course offerings to enable timely degree progression.*

In his Response letter, the Chair notes that the Department of Biological Science has been working steadily to expand course offerings in the summer term to include all core courses in their programs; this initiative gives students the opportunity to complete any courses they may have missed during the academic year, particularly as a result of co-op work terms. Although the Department prefers that students maintain the recommended sequence of courses for their program(s), they recognize that some students will want, or need, to deviate from this pathway. To support these students, the Department regularly updates the undergraduate *Academic Calendar* to clarify the ideal program planning, and they have also created incentives for students to follow the recommended sequences. In addition, the Department provides advising sessions with the departmental Program Coordinator, prior to registration deadlines, with the goal of proactively assisting students in their academic planning. In terms of the number of upper-level courses available to students, the Department has been working steadily on broadening the selection of these courses (e.g. BIOC35H3, BIOD07H3, BIOD63H3, BIOD13H3 all added within the past three years, and BIOD29H3 proposed for the 2021-22 academic year) to more efficiently stream students to graduation. The effectiveness of these measures is demonstrated by time-to-completion rates in the Department, which compare favourably with institutional norms. The Dean's Office supports the Department in these endeavours and has suggested that the Department develop specific plans regarding the sequence and availability of courses in its programs. This will be supported and informed by strategic enrolment management led by the Dean's Office.

- *The reviewers recommended that the Department explore the development of a Co-op program in Conservation and Biodiversity.*

The Chair reports that plans to introduce a Specialist (Co-operative) program in Conservation and Biodiversity have already been initiated, and consultations with the Arts & Science Co-op Office, who are responsible for securing appropriate co-op work term placements for students, is currently ongoing. The Department notes that a major modification proposal is in development, and it has been submitted to the Dean's Office as part of the 2021-22 curriculum cycle. The expectation is that students will be able to begin enrolling in the program in Fall 2022.

- *The reviewers observed that recent faculty hires, driven by increasing undergraduate enrolments, have brought the Department to an "important crossroads" with regard to identity and future growth. They note that the Department has reached the limits of its current space, and recommend that meeting the space needs of new and*

established researchers in a timely way be prioritized over maintaining spatial proximity of the Department as a whole.

The Chair emphasizes that meeting the space needs of new faculty is a priority in the Department of Biological Sciences; however, a central consideration in the allocation of faculty research space in the Department is access to research resources and infrastructure. The Chair observes that the dispersed model of departmental growth imposes different constraints on complement planning because some areas of research cannot be supported in lab space that is removed from core facilities, and points out that the reviewers also seem to recognize this point in the review Report: “The success of the movement of research groups to new locations, should this be part of the Department’s decision regarding future space use, is likely to be correlated with easy access to appropriate core facilities (pg. 18).” The Chair acknowledges that that wet lab capacity in the Science Wing and Science Research Building are not fully utilized, and the Department will consider both proximal and less proximal space as best fits their complement planning priorities.

It may be helpful here to note that there is a process at UTSC for identifying space and equipment needs for new faculty. This process, which involves the Offices of the Vice-Principal Academic and Dean, the Vice-Principal Research and Innovation, and the Chief Administrative Officer, enables the campus to prepare in a proactive way for the needs of new faculty, and also encourages departments to consider the research facility needs of new faculty at the time that they develop their faculty complement plans. The availability of suitable space is taken into consideration when the campus develops its faculty recruitment and complement plans.

- *The reviewers recommend that the Department develop written complement plans for Teaching Stream faculty and administrative staff.*

In his Response, the Chair emphasizes that Department of Biological Sciences recognizes the important contributions the teaching-stream faculty make to the academic mission, and he reiterates that more coherent approach to complement planning will follow from an explicit recognition of teaching-stream faculty as an integral part of a research cluster that is focused on pedagogy. He further notes that, while teaching-stream faculty do participate in the annual campus-wide complement planning process they have not, in the past, brought hiring proposals to planning discussions in the same way that other research clusters normally do. The Department believes that their planned changes to departmental governance will address this.

It should also be noted that the Faculty Complement Committee (FCC) was created during the academic year 2019-20 to provide recommendations to me regarding the distribution of teaching-stream and tenure-stream faculty positions sought by academic units in the yearly recruitment cycle, within the context of strategic multi-year departmental and campus faculty complements. The FCC provides a consultative, inclusive and transparent process that involves all academic units in determining the complement submission at UTSC. Plans for hiring teaching-stream faculty will be considered in the review of faculty complements.

With regard to complement planning for administrative staff, the Department notes they are understaffed relative to other comparable departments, and they have already requested an additional staff position (dedicated to management of research funds), which has been provisionally approved. Development of a more comprehensive staff hiring plan will be incorporated in the next departmental academic plan, and the Dean’s Office will continue to work with the Department in assessing its short- and long-term staffing needs.

- *The reviewers noted that there are “structural barriers” to developing effective relationships with cognate departments, impacting the Department’s faculty complement planning and faculty morale. They recommend that issues of tri-campus graduate program administration be addressed in order to improve relationships.*

The Chair believes that the review may have gained an inaccurate impression of the tri-campus graduate landscape at the University, and notes that the Department's complement planning process is not constrained in any way by their tri-campus graduate relationships with cognate units on the St. George campus. As he notes in his Response, the only expectation is that a graduate chair must be represented on each hiring committee and is required to co-sign a letter of offer, and these requirements are not a source of tension.

However, the Chair does acknowledge that there are other points of tension. First, graduate resources are remote from the Department. While this challenge is somewhat mitigated by campus-level graduate support via the Office of the Vice-Dean Graduate and Postdoctoral Studies, the Department believes it can undermine department cohort building. Second, the sense of detachment from cognate graduate units among faculty, which is largely a consequence of distance is somewhat inevitable in disciplines like biology where faculty are tied to physical infrastructure for their work. In this instance, the Department notes that some faculty do maintain strong ties with their affiliated graduate unit, but they primarily identify as members of UTSC Biological Sciences, with complement planning, undergraduate curriculum development and graduate training taking place in that context. Only graduate programming and administration are dispersed.

The Department believes that a proposal for a new graduate program, that is currently under development, is a constructive way to address these issues. The proposed program in Interdisciplinary and Applied Biology, which is in the very early stages of development, is designed to provide PhD-level training in the biological sciences, with an emphasis on cross-disciplinary training, hands-on experience, and the applicability of basic science to real-world problems. The Department anticipates that most faculty will not change their primary graduate affiliation; instead, the new program would be an alternative intake. Moreover the new program will require the development of more graduate course offerings that will alleviate the requirement for graduate students to travel to the St. George campus for courses; this will address a University of Toronto priority for diversified career training for graduate students; and the program will directly advance the campus strategic goals of inclusivity, access, and graduate growth, because it is likely to have broader appeal among students who might not initially consider traditional academic careers.

The Dean's Office will monitor the implementation of recommendations through ongoing meetings with the Chair. A brief report to the Office of the Vice-Provost, Academic Programs, midway between the November 2020 site visit and the year of the next site visit, and no later than Fall 2024, will be prepared. The next external review of the Department has been scheduled for 2027-28.

Regards,



Professor William A. Gough
Vice-Principal Academic & Dean

cc.

Professor Kenneth C. Welch, Acting Chair, Department of Biological Sciences, UTSC

Implementation Plan

Action	Timeline	Lead
Revisions to departmental governance document to: 1) recognize the contributions of teaching-stream faculty in the area of pedagogical research as integral to the department; and 2) make explicit that this entails access to full support and resources for teaching-stream led student research.	Short term [6 months] – to be completed in Fall 2021	Acting Chair, Department of Biological Sciences
Introduce a new Specialist (Co-operative) program in Conservation and Biodiversity	Short to medium term [6 months to 1 year] – anticipated start date is Fall 2022	Ivana Stehlik, Associate Professor, Teaching Stream, Department of Biological Sciences
Expansion of course-based undergraduate research experiences (CUREs).	Medium to long term [1 to 5 years]	Associate Chair, Teaching and Undergraduate Affairs, Department of Biological Sciences
Development of a more comprehensive staff hiring plan as part of the next departmental academic plan.	Medium to long term [2 to 3 years] – to be completed by Spring 2023	Chair, Department of Biological Sciences
Introduce a new PhD in Interdisciplinary and Applied Biology	Medium to long term [2 to 3 years] – earliest anticipated start date is Fall 2023	Mauricio Terebiznik, Associate Professor, Department of Biological Sciences Nate Lovejoy, Professor, Department of Biological Sciences

UTQAP Cyclical Review: Final Assessment Report and Implementation Plan

1. Review Summary

Program(s) Reviewed:	Biology, HBSc: Major; Minor Conservation and Biodiversity, HBSc: Specialist; Major Human Biology, HBSc: Specialist; Major Integrative Biology, HBSc: Specialist Molecular Biology and Biotechnology, HBSc: Specialist and Specialist Co-op Molecular Biology, Immunology and Disease, HBSc: Major Plant Biology, HBSc: Major
Unit Reviewed:	Department of Biological Sciences
Commissioning Officer:	Vice-Principal, Academic and Dean, University of Toronto Scarborough
Reviewers (Name, Affiliation):	<ol style="list-style-type: none"> 1. Professor Mark Bernards, Department of Biology, Western University 2. Professor Michael Caldwell, Department of Biological Sciences, University of Alberta 3. Professor David Kirkpatrick, Department of Biology Teaching and Learning, College of Biological Sciences, University of Minnesota
Date of Review Visit:	November 10-13, 2020
Date Reported to AP&P:	October 26, 2021

Previous UTQAP Review

Date: December 19 and 20, 2011

Summary of Findings and Recommendations

1. Undergraduate Programs

The reviewers observed the following **strengths**:

- Outstanding commitment to providing laboratory and experiential learning opportunities
- High levels of student satisfaction
- Thoughtful combination of programs that respond to students' needs

The reviewers made the following **recommendations**:

- Enhancing the quantitative and computational aspects of biological science to develop skills in the organization and management of large data sets
- Expanding participation in the co-op program
- Delivering several large enrolment courses in web-based format

2. Faculty/Research

The reviewers observed the following **strengths**:

- Research success of the faculty

3. Administration

The reviewers observed the following **strengths**:

- High morale of staff, faculty, and students

The reviewers made the following **recommendations**:

- Highlighting distinct areas of strength to assist with recruitment
- Addressing space challenges (especially laboratory space)

Current Review: Documentation and Consultation

Documentation Provided to Reviewers

1. About the University and UTSC: UTSC Academic Plan (2015-20); UTSC Admissions Viewbook (2020-21); Campus Virtual Tour.
2. About the Review: Terms of Reference; Review Report Template; Remote Site Visit Schedule.
3. About the Department: Previous External Review Report (2011); Previous External Review Final Assessment Report; Unit Academic Plan, April 2015; Unit Self Study, February 2020;

- Department Video; Program Videos for Conservation & Biodiversity and Human Biology.
4. About Programs and Courses: Description of all programs (2019-20 Academic Calendar); and description of all courses (2019-20 Academic Calendar); Course Enrolments from 2009 to 2019.
 5. Course Syllabi (all courses).
 6. Faculty CVs (all faculty).

Consultation Process

The reviewers met with the following: the decanal group, including the Vice-Principal Academic and Dean, Vice-Dean Recruitment, Enrolment and Student Success, Vice-Dean Teaching, Learning and Undergraduate Programs, Vice-Dean Graduate and Postdoctoral Studies, Acting Associate Dean Undergraduate Programs and Curriculum, and Academic Programs Officer; the Vice-Principal Research; the Chair of the Department of Biological Sciences; Biological Sciences faculty – tenure- and teaching-stream (all ranks); the Director and staff from the Arts & Science Co-op Office; UTSC Chief Librarian and library staff; technical staff; departmental administrative staff; and undergraduate students.

Current Review: Findings and Recommendations

1. Undergraduate Program

Unless otherwise noted, all bulleted comments apply to all programs reviewed.

The reviewers observed the following **strengths**:

- Overall quality
 - ▶ Undergraduate programs are excellent, and provide a solid foundation in Biology and its main sub-fields, on par with other Canadian universities
 - ▶ Within the Ontario and Canadian contexts, the Specialist programs are among the very best
 - ▶ Majors are well grounded in a core biology curriculum and provide a solid foundation
- Objectives
 - ▶ All programs highly consistent with the University's undergraduate goals, align well with the department's teaching mission and faculty research efforts, and deliver excellent undergraduate experience to students
- Admissions requirements
 - ▶ All programs have well-defined admission criteria
 - ▶ Significant enrolment increase over past decade, which seems likely to continue
 - ▶ Incoming students particularly drawn to Human Biology, Molecular Biology and Biotechnology options; other programs show lower but consistent enrolments
 - ▶ Significant recent enrolment trend towards Major programs

- Curriculum and program delivery
 - ▶ Program content is well thought out and delivered using a range of traditional and innovative approaches
 - ▶ Department to be commended for strong efforts in designing and delivering a modern Biology curriculum
 - ▶ Courses of study for each program are rigorously developed, with comprehensive Program Learning Outcomes
 - ▶ Many programs have undergone revisions in response to previous review
 - ▶ Teaching Stream faculty implementing current best-practice approaches to content delivery in their courses
 - ▶ Student research opportunities noted as highlight of conversations with faculty
 - ▶ Co-op option of Specialist in Molecular Biology & Biotechnology program represents a successful enhancement of the standard Specialist program, and is well supported and administered
- Innovation
 - ▶ Popularity of cross-disciplinary studies indicates healthy programs, providing students sufficient flexibility to tailor scholarship towards their personal goals
 - ▶ Recently-begun renovations to teaching labs promise to significantly elevate learning in impacted courses
 - ▶ Teaching Stream Faculty largely responsible for driving teaching innovation, including a number of unique and effective initiatives (cross-course poster project, C-level team research projects)
- Assessment of learning
 - ▶ Teaching Stream faculty have developed assessments to track outcomes of the changes made to PLOs
- Student engagement, experience and program support services
 - ▶ In general, students in programs administered by the department have an excellent educational experience
 - ▶ Student survey results indicate general satisfaction with the programs
 - ▶ Students commend Facilitated Study Groups (FSGs) as being central to their study process and success, and key for maintaining a sense of community after shift to online learning in response to COVID-19
- Quality indicators – undergraduate students
 - ▶ Entering undergraduates consistently strong, with a slight recent upward trend in incoming students' high school average (~85%)
 - ▶ Steady year-over-year increase in number of students on Dean's Honours list
- Quality indicators – alumni
 - ▶ Graduates are well prepared for future activities be they graduate school or workforce (either Government or private sector)

The reviewers identified the following **areas of concern**:

- Admissions requirements
 - ▶ Specialist and Minors have seen 1/3 enrolment reduction over past decade
- Curriculum and program delivery
 - ▶ Concerns raised by some students around sequencing of classes and the frequency of their availability, especially with regard to core courses
 - ▶ Co-op program and joint Paramedicine program present unique challenges to student progression
 - ▶ Relatively limited number of D-level courses that truly differentiate the distinct departmental Specialist programs
 - ▶ Professors at all ranks indicate they do not have enough time to meet all requests for UG research mentoring, particularly in supervised research courses
 - ▶ Teaching Stream faculty directly supervise undergraduate research courses, however note severely limited resources compared to Tenure Stream colleagues
- Student funding
 - ▶ No evidence of undergraduate scholarships or similar monetary support mechanisms

The reviewers made the following **recommendations**:

- Curriculum and program delivery
 - ▶ Explore formalizing research aspects of curriculum, by setting goals for the percentage of student involvement in research; a stronger emphasis on upper level research would benefit students
 - ▶ Provide Teaching Stream faculty with full support (financial, access to laboratory facilities, field equipment, etc.) to maximize the student research experience
 - ▶ Create capacity for new faculty to diversify upper-year course offerings
 - ▶ Review critical points in timetable of course offerings and consider offering required courses more frequently
- Student funding
 - ▶ Development of donor-funded scholarships would provide financial relief for students and increase programs' attractiveness

2. Faculty/Research

The reviewers observed the following **strengths**:

- Overall quality
 - ▶ Faculty – Teaching Stream in particular – provide high quality classroom and laboratory instruction; their knowledge and expertise in curriculum development and delivery represent a significant departmental resource
 - ▶ UTSC faculty compare favourably with other small campus research intensive universities in Canada
 - ▶ Junior faculty members are uniformly high achieving academics, positioned for national and international success

- Research
 - ▶ Professors at all ranks conduct the expected “full scope and breadth” of research
 - ▶ Quality judged relative to core research funding measured against NSERC DG successes is high
 - ▶ Faculty research programs are highly subscribed to by graduate students and by undergraduate students seeking research learning opportunities, which reviewers note as indicative of their relevance
 - ▶ Tenure Stream faculty have self-assorted into non-exclusive research clusters whose members interact constructively
 - ▶ At level of Tenure Stream faculty recruitment, the department presents a well conceived plan for developing strength in seven identified research clusters
 - ▶ Funding support for research initiatives has remained strong, with a recent trend towards more external funding, most notably governmental agencies and non-profit organizations
- Faculty
 - ▶ Faculty complement stands at approximately 82% Tenure Stream and 18% Teaching Stream – a reasonable distribution, given extensive undergraduate teaching demands

The reviewers identified the following **areas of concern**:

- Overall quality
 - ▶ While UTSC faculty members at all ranks compared favorably with UTM faculty members at all ranks, neither group compared as well with faculty members in EEB and CSB at the St. George campus
- Research
 - ▶ Concerns expressed around lab renovation timelines, and subsequent delays in faculty productivity and outcomes
 - ▶ Reviewers view the lack chance to meet with graduate student stakeholders a missed opportunity in their assessment of the strength of departmental research activities, and quality of research environment

The reviewers made the following **recommendations**:

- Overall quality
 - ▶ Formally recognize Teaching Stream faculty as a ‘Research Cluster’ within the department, and encourage and promote continued curricular innovation that can be shared across all faculty involved in teaching
- Research
 - ▶ Provide maximal research support to new Tenure Stream faculty, either through accelerated renovations, or support for alternative research programs pending laboratory completion
 - ▶ Prioritizes quality of research space over proximity, ensuring needs of new and established researchers are met

- ▶ Include interviews with graduate student stakeholders in future review site visits

3. Administration

The reviewers observed the following **strengths**:

- Relationships
 - ▶ High morale, strong sense of community and collegiality amongst faculty, staff and students
 - ▶ Department has benefited from strong leadership since its inception and current chair has fostered a collegial environment
 - ▶ Local student composition indicates critical and important recognition from the local community
 - ▶ Tenure Stream faculty have self-assorted into non-exclusive research clusters whose members interact constructively; Teaching Stream faculty also form a cohesive unit
 - ▶ Department has developed extensive local, national and international partnerships with academic units in numerous universities and colleges, and with external government agencies at the local, provincial and national level
- Organizational and financial structure
 - ▶ Straightforward departmental organization structure that functions smoothly
 - ▶ Programs are well supported by excellent administrative and technical staff, through top quality library resources and a strong Co-op office
 - ▶ Department is effectively utilizing its “human resource” to realize their departmental mission and vision to excel in research and teaching
 - ▶ Recently initiated renovation (and expansion) of teaching labs universally viewed as a welcome change, and is absolutely essential to department’s ability to deliver high-quality undergraduate lab courses
- Long-range planning and overall assessment
 - ▶ Programs offered by the department align well with the UTSC academic plan
- International comparators
 - ▶ The Department of Biological Sciences and the undergraduate programs it offers are competitive on a global stage

The reviewers identified the following **areas of concern**:

- Relationships
 - ▶ Some faculty note strained relationships with cognate units (in particular Cell & Systems Biology, and Ecology & Evolutionary Biology), discontent with the graduate programs linked these departments, and a desire to develop their own graduate program
- Organizational and financial structure
 - ▶ Several impacts noted regarding tri-campus structure of graduate programs in biological sciences:
 - Department’s lack of involvement in governance and decision-making regarding graduate programs administered by CSB and EEB

- Inconvenience of the travel between UTSC and UTSG necessary to meet program requirements
 - Opacity around graduate student funding
- ▶ Physical constraints (both in total square footage and amenability to renovation) of the Andrews Building; all stakeholder groups expressed concerns around general departmental space
- ▶ Department has grown to physical limits of allotment in the Andrews Building; any future growth will necessitate difficult choices around space
- ▶ A number of the core facilities need renovation, most notably the greenhouse and aquatics facilities
- ▶ Administrative staff roster has not grown as quickly as rest of department
- Long-range planning and overall assessment
 - ▶ Recent faculty hires, driven by strong and growing UG enrolment, have brought department to a critical tipping point in terms of identity and future growth
 - ▶ UTSC complement planning is sensitive to the need to ensure that new hires meet standards set by cognate departments regarding supervision of tri-campus graduate students

The reviewers made the following **recommendations**:

- Relationships
 - ▶ Repair and make functional relationships with CSB and EEB
 - ▶ Either move to create own independent graduate program, or seek to build new relationships with cognate departments on graduate programming
 - ▶ Maintain department's high standard of achievement in external partnership development and relationships at all levels
 - ▶ Continue and build on excellent work of being locally relevant, to enhance national social impact
- Organizational and financial structure
 - ▶ Prioritize quality of research space over proximity, ensuring the needs of new and established researchers are met
- Long-range planning and overall assessment
 - ▶ Further explore development of a Conservation & Biodiversity Co-op program
 - ▶ Either develop own UTSC-administered graduate program and set own path for faculty complement, or evolve complement planning process to become a joint initiative between UTSC and its two graduate program cognate departments
 - ▶ Develop and articulate written complement plan for Teaching Stream faculty
 - ▶ Develop and articulate written complement plan for administrative and teaching support staff; ensure that staff complement growth keeps pace with faculty growth and any graduate program development
 - ▶ Related to space planning, decide what the Department values more:
 - Increasing the size of the faculty, staff and student complement, thereby requiring a new building/buildings to house growth; **or**

- Downsizing around complement planning and growth via attrition, remaining where they are currently housed with all members in close proximity
- ▶ Regarding complement planning:
 - Either develop own UTSC-administered graduate program and thus set own path for faculty complement planning; **or**
 - Evolve complement to become a joint initiative between UTSC and its two graduate program cognate departments
- ▶ Reviewers note several areas of opportunity for revenue generation:
 - Possible expansion of core facilities could lead to an increase in external users;
 - A focus on obtaining external support through endowments and scholarships
 - Increased involvement in revenue-generating Masters programs
- ▶ Include donor-funded scholarships and/or bursaries in fundraising plans



September 15, 2021

Professor Susan McCahan
Vice-Provost, Academic Programs
Office of the Vice-President and Provost
University of Toronto

Dean's Administrative Response: External Review of the Department of Biological Sciences

Dear Susan,

Thank you for the April 8, 2021 letter requesting my administrative response to the external review of the Department of Biological Sciences. We want to thank the review team – Professor Mark Bernards, Department of Biology, Western University; Professor Michael Caldwell, Department of Biological Sciences, University of Alberta; and Professor David Kirkpatrick, Department of Biology Teaching and Learning, College of Biological Sciences, University of Minnesota – for their consultation with us during the remote site-visit, held from November 10-13, 2020, and for their report, which was received on December 16, 2020, and finalized on January 4, 2021.

I appreciate the seriousness with which the reviewers approached the external review process, as well the thoughtful consideration given to Biological Sciences and its undergraduate programs. I am very pleased by the overall positive review of the Department. In particular, the reviewers noted the excellence of the undergraduate programs, the high-quality of teaching overall as well as the innovative pedagogical approaches in delivering course content, the strong sense of community and collegiality among the faculty, staff and students, the high morale, and the consistently strong leadership in the Department.

The external review report was sent to the Chair of the Department, Professor Andrew Mason, on January 5, 2021, with a request to share it widely among the faculty, staff and students. The decanal group, including myself, the Vice-Dean Teaching, Learning and Undergraduate Programs (VDTLUP), Vice-Dean Graduate and Postdoctoral Studies (VDGPS), Vice-Dean, Recruitment, Enrolment and Student Success (VDRESS), Vice-Dean Faculty Affairs, Equity, and Success (VDFAES), Interim Associate Dean Undergraduate Programs and Curriculum (ADUPC), the Director of the Office of the Vice-Principal Academic and Dean, and the Academic Programs Officer, met with the Chair of Biological Sciences and the current Associate Chair Teaching and Undergraduate Affairs, Associate Chair Research and Graduate Studies (now Acting Chair), and the former Associate Chair Teaching and Undergraduate Affairs, on May 5, 2021 to discuss the external review report and administrative response; I am pleased with the depth of the discussion that took place.

My administrative response to the points raised in your letter is given below. This response has been developed in close consultation with both the Chair and Acting Chair of Biological Sciences and reflects the key elements of the unit response letter, dated August 4, 2021. It also includes responses to points raised in the Request for Administrative Response that are outside departmental control.

Let me address the specific points raised in your letter:

- *The reviewers recommended that the Department explore formalizing research aspects of the curriculum, and that teaching stream faculty in particular receive appropriate access to labs and other resources to support program quality and undergraduate research.*

As the Chair outlines in his Response letter, these recommendations from the review team are related to undergraduate research. First, they recommend that the Department begin to formalize research aspects of the curriculum “by setting goals for the percentage of student involvement in research.” The impetus for this recommendation is the reviewers’ understanding that undergraduate research at the upper level “appears to be variable in its availability, based primarily on faculty willingness, capacity and involvement.” Given this variability, they feel that a stronger emphasis on upper-level research would be beneficial to undergraduates in each program. Second, the review team recommends that: “(a) teaching-stream faculty in the Department “receive full support (financial, access to laboratory facilities, field equipment, etc.)” to maximize the student research experience; and (b) the Department “formally recognizes the Teaching Stream Faculty as a Research Cluster within the Department, and encourages and promotes continued curricular innovation that can be shared across all faculty involved in teaching.”

With regard to the first recommendation, it is important to note that undergraduate students in the Department of Biological Sciences are already strongly encouraged to engage in research activities and have access to many opportunities to do so. Indeed, students begin building their research experience at the B-level (e.g., BIOB90H3), continue with courses at the C-level (e.g., BIOC90H3), and have access to rich array of opportunities at the D-level, including undergraduate thesis projects, summer research placements, and (for students in the Specialist Co-op program in Molecular Biology and Biotechnology) co-op placements. Building further on these course elements, in the 2019-20 academic year, the Department established an undergraduate, in-program Certificate in Biological Sciences Research Excellence that encourages students to engage in research, and formally recognizes, on their transcripts, students’ research accomplishments. These carefully scaffolded research opportunities are a highlight of the Department’s programs and research culture.

All faculty in the Department of Biological Sciences are highly invested in undergraduate research, but they believe strongly that they can only realistically support a limited number of students each year, dependent on the nature of the research (e.g., field work involving relatively large-scale surveys and data collection). This is in accordance with the nature of independent research projects, which require significant resources and investment by faculty (although the Department does provide limited financial reimbursement in support of D-level projects). Nevertheless, the expansion of course-based research opportunities remains an important area of potential growth. The Department proposes to expand the role of, and pedagogical/professional development resources available to, the teaching-stream faculty. For example, some members of the teaching stream faculty already engage work-study students in the summer months to develop and pilot mini experiments that are then incorporated into the Biology introductory course labs. In coming years, with more reliable use of renovated teaching lab space, this model will be adapted into course-based undergraduate research experiences (CUREs) that include an added biology education focus for the results of their experimentation.

In response to the second recommendation, the Department agrees that explicit recognition of pedagogical research and student research supervisions, largely led by teaching-stream faculty, would be beneficial. They plan to revise the departmental governance document to clarify their status as follows: 1) recognizing the contributions of teaching-stream faculty in the area of pedagogical research as integral to the department; and 2) making explicit that this entails access to full support and resources for teaching-stream faculty led student research. The Department further notes that financial, space, and equipment supports are currently available and teaching-stream faculty will be encouraged to leverage them. Finally, the Department has developed flexible options for all newly hired faculty to maintain

productivity while their labs are under development, including access to temporary space combined with earlier initiation of the design and renovation process for new labs.

While the Dean's Office strongly supports recognition for the pedagogical/professional development activities of teaching stream faculty, including discipline-based research, it is important to note that basic research is not required as a part of the workload of teaching-stream faculty at the University of Toronto. As a result, there are currently more limited resources and opportunities at the University to support teaching-stream faculty research, as opposed to pedagogical/professional development. It would be possible for the Department to provide resources to teaching stream faculty to allow them to supervise student research conducted as part of coursework, and the Dean's Office would certainly consider requests to enhance the teaching budget to permit this kind of research activity. While the Dean's Office supports the long-term development of research opportunities and related resources for teaching-stream faculty as part of their teaching and pedagogical/professional development activities, particularly given the growing emphasis on the scholarship of teaching and learning, changes to departmental governance and any related workload expectations for teaching-stream faculty research would raise issues of policy that would need to be addressed in dialogue with the Provost's Office.

- *The reviewers noted significant student concerns regarding the sequencing and frequency of required courses, and recommended that the Department review "critical pinch points" in its course offerings to enable timely degree progression.*

In his Response letter, the Chair notes that the Department of Biological Science has been working steadily to expand course offerings in the summer term to include all core courses in their programs; this initiative gives students the opportunity to complete any courses they may have missed during the academic year, particularly as a result of co-op work terms. Although the Department prefers that students maintain the recommended sequence of courses for their program(s), they recognize that some students will want, or need, to deviate from this pathway. To support these students, the Department regularly updates the undergraduate *Academic Calendar* to clarify the ideal program planning, and they have also created incentives for students to follow the recommended sequences. In addition, the Department provides advising sessions with the departmental Program Coordinator, prior to registration deadlines, with the goal of proactively assisting students in their academic planning. In terms of the number of upper-level courses available to students, the Department has been working steadily on broadening the selection of these courses (e.g. BIOC35H3, BIOD07H3, BIOD63H3, BIOD13H3 all added within the past three years, and BIOD29H3 proposed for the 2021-22 academic year) to more efficiently stream students to graduation. The effectiveness of these measures is demonstrated by time-to-completion rates in the Department, which compare favourably with institutional norms. The Dean's Office supports the Department in these endeavours and has suggested that the Department develop specific plans regarding the sequence and availability of courses in its programs. This will be supported and informed by strategic enrolment management led by the Dean's Office.

- *The reviewers recommended that the Department explore the development of a Co-op program in Conservation and Biodiversity.*

The Chair reports that plans to introduce a Specialist (Co-operative) program in Conservation and Biodiversity have already been initiated, and consultations with the Arts & Science Co-op Office, who are responsible for securing appropriate co-op work term placements for students, is currently ongoing. The Department notes that a major modification proposal is in development, and it has been submitted to the Dean's Office as part of the 2021-22 curriculum cycle. The expectation is that students will be able to begin enrolling in the program in Fall 2022.

- *The reviewers observed that recent faculty hires, driven by increasing undergraduate enrolments, have brought the Department to an "important crossroads" with regard to identity and future growth. They note that the Department has reached the limits of its current space, and recommend that meeting the space needs of new and*

established researchers in a timely way be prioritized over maintaining spatial proximity of the Department as a whole.

The Chair emphasizes that meeting the space needs of new faculty is a priority in the Department of Biological Sciences; however, a central consideration in the allocation of faculty research space in the Department is access to research resources and infrastructure. The Chair observes that the dispersed model of departmental growth imposes different constraints on complement planning because some areas of research cannot be supported in lab space that is removed from core facilities, and points out that the reviewers also seem to recognize this point in the review Report: “The success of the movement of research groups to new locations, should this be part of the Department’s decision regarding future space use, is likely to be correlated with easy access to appropriate core facilities (pg. 18).” The Chair acknowledges that that wet lab capacity in the Science Wing and Science Research Building are not fully utilized, and the Department will consider both proximal and less proximal space as best fits their complement planning priorities.

It may be helpful here to note that there is a process at UTSC for identifying space and equipment needs for new faculty. This process, which involves the Offices of the Vice-Principal Academic and Dean, the Vice-Principal Research and Innovation, and the Chief Administrative Officer, enables the campus to prepare in a proactive way for the needs of new faculty, and also encourages departments to consider the research facility needs of new faculty at the time that they develop their faculty complement plans. The availability of suitable space is taken into consideration when the campus develops its faculty recruitment and complement plans.

- *The reviewers recommend that the Department develop written complement plans for Teaching Stream faculty and administrative staff.*

In his Response, the Chair emphasizes that Department of Biological Sciences recognizes the important contributions the teaching-stream faculty make to the academic mission, and he reiterates that more coherent approach to complement planning will follow from an explicit recognition of teaching-stream faculty as an integral part of a research cluster that is focused on pedagogy. He further notes that, while teaching-stream faculty do participate in the annual campus-wide complement planning process they have not, in the past, brought hiring proposals to planning discussions in the same way that other research clusters normally do. The Department believes that their planned changes to departmental governance will address this.

It should also be noted that the Faculty Complement Committee (FCC) was created during the academic year 2019-20 to provide recommendations to me regarding the distribution of teaching-stream and tenure-stream faculty positions sought by academic units in the yearly recruitment cycle, within the context of strategic multi-year departmental and campus faculty complements. The FCC provides a consultative, inclusive and transparent process that involves all academic units in determining the complement submission at UTSC. Plans for hiring teaching-stream faculty will be considered in the review of faculty complements.

With regard to complement planning for administrative staff, the Department notes they are understaffed relative to other comparable departments, and they have already requested an additional staff position (dedicated to management of research funds), which has been provisionally approved. Development of a more comprehensive staff hiring plan will be incorporated in the next departmental academic plan, and the Dean’s Office will continue to work with the Department in assessing its short- and long-term staffing needs.

- *The reviewers noted that there are “structural barriers” to developing effective relationships with cognate departments, impacting the Department’s faculty complement planning and faculty morale. They recommend that issues of tri-campus graduate program administration be addressed in order to improve relationships.*

The Chair believes that the review may have gained an inaccurate impression of the tri-campus graduate landscape at the University, and notes that the Department's complement planning process is not constrained in any way by their tri-campus graduate relationships with cognate units on the St. George campus. As he notes in his Response, the only expectation is that a graduate chair must be represented on each hiring committee and is required to co-sign a letter of offer, and these requirements are not a source of tension.

However, the Chair does acknowledge that there are other points of tension. First, graduate resources are remote from the Department. While this challenge is somewhat mitigated by campus-level graduate support via the Office of the Vice-Dean Graduate and Postdoctoral Studies, the Department believes it can undermine department cohort building. Second, the sense of detachment from cognate graduate units among faculty, which is largely a consequence of distance is somewhat inevitable in disciplines like biology where faculty are tied to physical infrastructure for their work. In this instance, the Department notes that some faculty do maintain strong ties with their affiliated graduate unit, but they primarily identify as members of UTSC Biological Sciences, with complement planning, undergraduate curriculum development and graduate training taking place in that context. Only graduate programming and administration are dispersed.

The Department believes that a proposal for a new graduate program, that is currently under development, is a constructive way to address these issues. The proposed program in Interdisciplinary and Applied Biology, which is in the very early stages of development, is designed to provide PhD-level training in the biological sciences, with an emphasis on cross-disciplinary training, hands-on experience, and the applicability of basic science to real-world problems. The Department anticipates that most faculty will not change their primary graduate affiliation; instead, the new program would be an alternative intake. Moreover the new program will require the development of more graduate course offerings that will alleviate the requirement for graduate students to travel to the St. George campus for courses; this will address a University of Toronto priority for diversified career training for graduate students; and the program will directly advance the campus strategic goals of inclusivity, access, and graduate growth, because it is likely to have broader appeal among students who might not initially consider traditional academic careers.

The Dean's Office will monitor the implementation of recommendations through ongoing meetings with the Chair. A brief report to the Office of the Vice-Provost, Academic Programs, midway between the November 2020 site visit and the year of the next site visit, and no later than Fall 2024, will be prepared. The next external review of the Department has been scheduled for 2027-28.

Regards,



Professor William A. Gough
Vice-Principal Academic & Dean

cc.

Professor Kenneth C. Welch, Acting Chair, Department of Biological Sciences, UTSC

Implementation Plan

Action	Timeline	Lead
Revisions to departmental governance document to: 1) recognize the contributions of teaching-stream faculty in the area of pedagogical research as integral to the department; and 2) make explicit that this entails access to full support and resources for teaching-stream led student research.	Short term [6 months] – to be completed in Fall 2021	Acting Chair, Department of Biological Sciences
Introduce a new Specialist (Co-operative) program in Conservation and Biodiversity	Short to medium term [6 months to 1 year] – anticipated start date is Fall 2022	Ivana Stehlik, Associate Professor, Teaching Stream, Department of Biological Sciences
Expansion of course-based undergraduate research experiences (CUREs).	Medium to long term [1 to 5 years]	Associate Chair, Teaching and Undergraduate Affairs, Department of Biological Sciences
Development of a more comprehensive staff hiring plan as part of the next departmental academic plan.	Medium to long term [2 to 3 years] – to be completed by Spring 2023	Chair, Department of Biological Sciences
Introduce a new PhD in Interdisciplinary and Applied Biology	Medium to long term [2 to 3 years] – earliest anticipated start date is Fall 2023	Mauricio Terebiznik, Associate Professor, Department of Biological Sciences Nate Lovejoy, Professor, Department of Biological Sciences

3. Committee on Academic Policy & Programs (AP&P) Findings

The spokesperson for the reading group reported that the review summary accurately reflected the full review. The reading group found the review very positive with reviewers remarking on the excellence of the undergraduate programs which were rooted in up-to-date pedagogical methods resulting in a modern Biology curriculum.

In response to a question from the reading group, Professor Kenneth Welch, Acting Chair, Department of Biological Sciences, commented that:

- The Department had proposed new course based undergraduate research experiences which were expected to launch in 2023-24 and that work continued in formalizing aspects related to those new offerings.
- Responding to a concern raised that the frequency of offerings in the co-op program could result in delayed in graduation, Professor Ashok, Associate Chair, Undergraduate Affairs Department of Biological Sciences, commented that:
- there was a high degree of confidence that all students were on track to graduate without delay.
- Pre-program advising had been put in place to assist first- and second-year students.

No follow-up report was requested.

4. Institutional Executive Summary

The reviewers observed excellent, globally competitive undergraduate programs; they commended the department for strong efforts in designing and delivering a modern Biology curriculum; they noted that faculty – particularly in the teaching stream – provide high quality classroom and laboratory instruction; programs are well supported by excellent administrative and technical staff, through top quality library resources and a strong Co-op office; the local student composition indicates critical and important recognition from the local community; overall morale within the department was described as very high, with students reporting an excellent educational experience and strong sense of community; and finally, the department's use of Facilitated Study Groups in many programs was noted as a significant strength, and commended as key for maintaining a sense of community among students after the shift to online learning in response to COVID-19. The reviewers recommended that the following issues be addressed: exploring formalizing research aspects of the curriculum, and providing teaching stream faculty with appropriate access to resources to support program quality and undergraduate research; reviewing “critical pinch points” in course offerings to ensure timely degree progression; exploring the development of a Co-op program in Conservation and Biodiversity; prioritizing meeting the space needs of new and established researchers in a timely way over maintaining spatial proximity of the department as a whole; developing written complement plans for Teaching Stream faculty and administrative staff; and finally addressing issues around tri-campus program administration to improve relationships with cognate departments. The Dean's Administrative Response describes the Faculty, unit and programs'

responses to the reviewers' recommendations, including an implementation plan for any changes necessary as a result.

5. Monitoring and Date of Next Review

The Dean's Office will monitor the implementation of recommendations through ongoing meetings with the Chair.

The Dean will provide an interim report to the Vice-Provost, Academic Programs no later than Fall 2024 on the status of the implementation plans.

The next review will be commissioned in 2027-28.

6. Distribution

On January 15, 2022, the Final Assessment Report and Implementation Plan was posted to the Vice-Provost, Academic Programs website and the link provided by email to the Vice Principal Academic & Dean of UTSC, the Secretaries of AP&P, Academic Board and Governing Council, and the Ontario Universities Council on Quality Assurance. The Dean provided the link to the Chair of the Department.