



Biology Final Assessment Report

Faculty / Affiliated University College	Faculty of Science
Degrees Offered	Bachelor of Science (BSc)
Modules Reviewed	Honors Specialization in Animal Behaviour Honors Specialization in Biodiversity and Conservation Honors Specialization in Biology Honors Specialization in Genetics Honors Specialization in Genetics and Biochemistry Specialization in Biology Major in Biology Major in Ecosystem Health Major in Genetics
External Consultants	Dr. Hugh Broders, Professor and Department Chair, Department of Biology, Waterloo University Dr. Patricia Chow-Fraser, Professor and Acting Associate Chair (Undergraduate), Department of Biology, McMaster University
Internal Reviewers	Dr. John Cuciurean, Associate Professor and Associate Dean (Undergraduate Admissions and Programs), Don Wright Faculty of Music, Western University
Date of Site Visit	March 28, 2018
Evaluation	Good Quality
Approval Dates	SUPR-U: May 16, 2018 SCAPA: May 30, 2018 Senate:

Executive Summary

On Wednesday March 28, 2018, the review team met with the Vice Provost (Academic) Dr. John Doerksen and the Vice Provost (Academic Planning, Programs, and Faculty) Dr. Karen Campbell, Faculty of Science Acting Associate Dean (Academic) Dr. Ken Yeung, Associate Chief Librarian Robert Glushko, Head of Research & Instructional Resources Deb Meert-Williston, Chair of the Department of Biology Dr. Mark Bernards, Undergraduate Chair, BUEC, Dr. Anthony Percival-Smith, Manager of Undergraduate Lab Operations Dr. Raihan Uddin (who was accompanied by 5 additional members of the lab operations technical support staff), Academic Counsellor (Biology) Dr. Richard Gardiner, Faculty of Science Academic Advisor Jane Sexsmith, Undergraduate Program Assistant (Biology) Stefani Tichbourne, Undergraduate Secretary (Biology) Beata Malczewski. The committee also met with a group of thirteen faculty members, a second group comprised of fifteen undergraduate students at various levels of the program, and two current graduate students who recently graduated from undergraduate program in Biology. In addition, two separate facilities tours were led by Biology Facilities Manager Vicky Lightfoot (Biological & Geological Sciences Building) and faculty member Dr. Robert Dean (North Campus Building).

The reviewers concluded that the Department of Biology “offers an appropriate and comprehensive undergraduate curriculum in biology that is at least as comprehensive as programs offered in departments at peer institutions. ... The outcomes are comprehensive and appropriate and cover the degree expectations as required by the Ontario Council of Academic Vice Presidents.” The reviewers

cited several noteworthy strengths of the program that are summarized below under “Significant Strengths of the Program.”

The reviewers observed that “the self-study identifies 27 means of assessments of student achievement (p. 55) [which] include conventional assessment methods such as multiple choice, short answer, tests and exams, essays, and original research presentations and problem-solving assignments [as well as] less conventional assessments that include debates, blogging, creation of apps, and online discussions.” In relation to the curriculum mapping completed by the department which correlates the assessment methods noted above to the individual courses offered by the department, the reviewers concluded that the “students receive instruction and are assessed through a variety of means that are appropriate for the programs.

Nonetheless, the reviewers did offer some suggestions to the department to consider as the program evolves, to which the Department responded to all recommendations and concerns indicating that they have given serious consideration to the report and its recommendations. These suggestions (and where appropriate, some explanatory information from the Department) are summarized below under “Suggestions for Improvement & Enhancement.”

As stated in the summary response to the external reviewer’s report by Acting Associate Dean, Ken Yeung, the program assessment was “an overall very positive report provided by the external consultants.” Ken Yeung also observed that the reviewers “highly praised the diversity of additional experiential learning opportunities in Biology, which include summer employment in research labs, Science Internship, and Undergraduate Honors thesis research.”

The Departmental response also acknowledged the reviewer’s report as “very complimentary” and states that “we find that we have little to respond to.” The department response focused on four key points: 1) Addressing strategic priorities; 2) the Biology-Medical Science Double Majors; 3) Biology 2290; and 4) Faculty complement, each of which will be addressed separately below.

1) Strategic Priorities

The external reviewers acknowledge the following: “Biology’s mission, which is consistent with Western University’s mission, is to create, disseminate and apply knowledge for the benefit of society through excellence in teaching, research and scholarship; its vision matches that of the University, which is to see Western as a destination of choice for the world’s brightest minds, and for those who seek the best learning experience in a leading Canadian research university.”

They then state, however, that, “According to the Vice-Provost (Academic), Dr. John Doerksen, there are three strategic priorities: 1) enhancing internationalization (both with respect to increasing international students, and increasing participation of Canadian students in overseas exchange); 2) increasing experiential learning opportunities; and 3) promoting indigenous research, scholarship and education at Western.” They recognize that “there was ample evidence of Biology’s efforts to address experiential learning,” but “internationalization and indigeneity have not been addressed as priorities in the self-study [and that] information provided following the site visit indicated very low participation in international exchange, and there are no courses or programs devoted to indigeneity.”

The Departmental response to this issue provided detailed data on the number of Western Biology students on exchange over the past four academic years; a total of 29 students. The Department then conceded that they “do not have data on the number of students doing an exchange in the Biology program,” nor on the number of indigenous students in their program.

The Acting Associate Dean’s response addressed the concern noted by the consultants regarding the fact that the university’s priorities on internationalization and indigeneity have not been addressed as priorities of the Department of Biology. He asserted that “the Faculty of Science will continue to work with departments in promoting international exchanges in the future. Likewise, we encourage and support departments to initiate curriculum development that promotes indigenous research, scholarship and

education. In Biology, I am hopeful that they will consider incorporating discussion and/or case studies related to the indigenous communities in their courses in the future.”

2) Biology-Medical Science Double Majors

The reviewers were specifically concerned that students pursuing the Biology-Medical Science Honors double major might be disadvantaged by electing this module pair. The reviewers noted that “the rigor of this degree may be compromised by the fact that one can meet the requirements of the program without having to complete senior courses, including a capstone course (i.e. 4000-level low-enrolment seminar course (20 students) or an honours thesis). Further there was at least some concern regarding students being able to take similar-content courses in each of the Schulich School of Medicine and Dentistry and in the department of biology, thereby potentially receiving double credit for the same material. We recognize this is a university-level issue, but would encourage the department of Biology to maintain communication with the Schulich School of Medicine and Dentistry to manage this.”

Elsewhere in the external report, the reviewers observe that “only 10% of the 70 graduates in the Biology Major opt for a capstone course. This comparison highlights the disparity between students in the Honours specialization and Major programs with respect to advanced experiential training.”

The response to this concern by the Department indicates that they “will keep in contact with the Schulich School of Medicine and Dentistry about the issue surrounding the Biology-Medical Science Double Major. The biggest concern for us (Biology), and hopefully the university, is graduating students with a degree of restricted future use. The worry is that students, whose prime mission is entry into Medical School, see the Biology Medical Science Double Major as the easiest route to getting high marks because it allows them not to have to take many higher level courses or complete an undergraduate thesis.” Given the high rejection rate of Medical School applicants, the Biology-Medical Science Double Major students who do not gain entrance to Medical School may have limits on the applicability of their degree. However, they note that “the double majors program can create some interesting combinations (Biology and Music) and we do not propose that the double majors be removed as an option.”

The Acting Associate Dean’s response summarized the issues surrounding the double major concern as twofold: “(1) the rigor of double major degrees may be compromised by the fact that one can meet the requirements of two major modules without having to complete senior courses, including a capstone course or Honor Thesis course; and (2) students may select different courses from two modules with similar or overlapping content, thereby receiving double credit on the same materials.”

He points out that, “the first concern was acknowledged by the consultants as a university-level issue, but perhaps one that is unavoidable due to nature of a double-major in favoring breadth over depth. In my opinion, it is a potential issue for those wishing to pursue a graduate degree, but it is not necessarily limiting for others pursuing careers in industries. The issue occurs when students encounter prospective graduate programs that require 4000-level courses that they do not have, requiring them to return for a fifth year to pursue the missing courses.” His conclusion, which agrees with the Department’s conclusion, is that “an effort should be made to ensure that all first and second year students are aware of the potential limitation with the double-major option, as per recommendation by the consultants.” Concerning the second issue, he suggests that it “may be addressed by the departments involved, by identifying the overlapping courses and declaring them as anti-requisites.”

3) Biology 2290F/G:

The reviewers commented on the strength and innovations of some of the course offerings, paying particular tribute to Biology 2290F/G, as well as a breadth of sub-discipline courses in level 2 which “ensures that all students gain at least some level of exposure to the breadth of biology while maintaining sufficient flexibility within program requirements to delve deeper in a particular area of specialization in levels 3 and 4.” They went on to compliment the course by stating “that the department is able to offer this course to so many students is a feat; that they have been able to do it so efficiently speaks highly of the

team of dedicated people associated with its design and delivery. The course offers skill development in several disciplines, and an opportunity to practice critical thinking and scientific writing.”

The department responded by reinforcing that “the importance of Biology 2290 F/G in the curriculum is that it introduces students to high-level skills in the first half of their degree. Biology 2290 F/G has a writing component and diverse laboratory components that along with the lab portion of Biology 2601A ensures that students are introduced to communication and practical skills in preparation for third and fourth year level courses. The first two years of their education is not restricted to building knowledge, but also includes fulfillment of other program outcomes.”

Nevertheless, the external report raised a potential concern over the expense of delivering Biology 2290F/G to over 1000 students each year. The department seized on this issue to draw attention to the fact that while “the total expenditures for 2290 is higher than revenue, Biology 2290 was created from the removal of the lab components of the Genetics, Cell Biology and Ecology courses taught prior to 1993. So if 2290, 2382, 2483, 2581, and 2601 are considered together as a unit then for every dollar spent on second year Biology core courses, \$1.50 returns.” They further underscored that the faculty members, teaching assistants, and support staff involved in delivering Biology 2290F/G “make other important contributions to the department outside this course. They handle the allocation of teaching assistants, organize the proctors 2018 for Fall and Winter midterm and Final examinations, and administer marks for the large second year courses. If Biology 2290 was removed, this work would have to be taken on by others.” They conclude that “considering the role that Biology 2290 has in the Biology curriculum and the actual expense to revenue, it is not an expensive course.”

4) Faculty Complement

In his response to the external report, the Acting Associate Dean commented on both the strengths acknowledged by, and recommendations made by, the reviewers. On the issue of resources, Ken Yeung noted that “the consultants commented that ‘all parties expressed satisfaction with the adequacy of resources available for the delivery of the program’, ‘labs and teaching spaces are modern, well maintained, with modern and appropriate equipment and staffed appropriately’, and ‘the department is very well served by its human resource complement - both in quantity and quality’.”

On the issue of adequacy of faculty resources and teaching loads, the reviewers noted that “even though the department is able to meet its teaching obligations with the current complement, there should be a faculty renewal plan to guide the department in the coming years as retirements occur. The long-term stability and maintenance of strength in the department requires that there be an appropriate distribution of faculty across the ranks. It is concerning that at present there is just one tenure track assistant professor in the department.”

The Acting Associate Dean’s response addressed the concern directly when he wrote that “furthermore, they noted that teaching capacity ‘is adequate or near adequate for the delivery of the current suite of courses in support of the program’, but it is critical to continue funding for the contractual positions and fill retirements in a timely manner to maintain strengths of the program.”

The departmental response did not address this concern directly but included a table of all faculty teaching loads (including full-time probationary and tenure track, limited term, standing appointments, and limited duties) illustrating the fact that “for a variety of reasons (e.g., secondment as Associate/Assistant Deans (1.5 FCE), appointment as Associate Chairs (1.0 FCE), contribution to the administration of programs outside of Biology (1.0 FCE), sabbatical/other leaves (4.0 FCE) and other arrangements (2.0 FCE)), for the 2017-18 academic year, the actual contribution to undergraduate teaching by Biology-appointed faculty was 48.75 FCE.” They continued by showing that “during the 2017-18 academic year, the Department of Biology delivered 57.75 undergraduate FCE. The shortfall was made up through the hiring of part-time instructors (referred to as Limited Duties).”

Ken Yeung added to this response by re-affirming that “the Faculty of Science and the Department of Biology have been monitoring the balance between teaching capacities and course offerings and

managing any shortfall with the hiring of Limited Duties instructors. They will continue to do so in the future, as recommended by the external consultants.”

Significant Strengths of the Program

1. The Department of Biology at Western University offers an appropriate and comprehensive undergraduate curriculum in biology that are at least as comprehensive as programs offered in departments at peer institutions. The Honors Specialization modules are particularly noteworthy in this regard. The learning outcomes are comprehensive and appropriate and cover the degree expectations as required by the Ontario Council of Academic Vice Presidents.
2. 1000- and 2000-level core courses are foundational and introduce basic principles and skills. One of the core courses, Biology 2290F/G (Scientific Methods in Biology), is an excellent example when it comes to providing experiential learning to students early in their programs (and has been used as a model for the development of similar courses at peer institutions). A large number of 3000-level courses in several sub-disciplines, and 4000-level courses cover emerging fields and advances in more conventional fields. There are also capstone courses that allow students to conduct independent studies, or an honours research thesis, as well as a selection of seminar courses. These courses show impressive breadth and are appropriate and desirable in a department offering a comprehensive Biology program.
3. A diversity of experiential learning opportunities including employment within faculty research labs (USRAs, etc.), a Faculty of Science Internship program and undergraduate thesis work which may be conducted under the supervision of faculty from either the Department of Biology or elsewhere.
4. Labs and teaching spaces are modern, well maintained, with modern and appropriate equipment and staffed appropriately. Overall, infrastructure seems appropriate for the delivery of biology programs.
5. There is open and thoughtful communication among the technical staff, the instructors, and TAs and they work effectively as a team. The staff complement appears sufficient under current circumstances as workloads are reasonable and temporary help is available in the event of special circumstances (via support within the complement or from external temporary hires).
6. Students have access to high-quality instructors who engage with them to ensure a high-quality experience. The faculty are passionate, hard-working, and dedicated to the delivery of effective programs. Many students spoke to the influence that faculty have had on their program choices. Overall, the department of Biology is very well served by its human resource complement— both in quantity and quality
7. The website is the primary means of communication of program offerings and requirements for completion of each module. Students should be able to gather all information required to plan their programs from the information available on the website.
8. The department has a dedicated team of staff, academic advisors, and technical support to help students choose programs and courses. In all, there appears to be sufficient academic support available for the programs in the department.
9. The library and information technology support the program well and help ensure a high-quality undergraduate program.
10. Between 2010 and 2017, undergraduates contributed to 95 publications in peer-reviewed publications. This great achievement is evidence that individual faculty members are providing high-quality training to undergraduate students in senior theses and in courses such as the Biodiversity Science course.

11. Opportunities for students to participate in research that undoubtedly made these students competitive for national and international awards, scholarships and opportunities. In all, the Department of Biology appears to be leaving a positive impression on students: 93% of graduating students from biology would recommend Western University to a friend.

Suggestions for Improvement & Enhancement

1. The University's strategic priorities regarding internationalization and indigeneity appear to be different from the Department of Biology's priorities based on the self-study document. There are no courses or programs within the department devoted to indigeneity. Recommend enhancing existing courses or developing new courses that address these strategic priorities.
2. The rigor and appropriateness of the double major program, specifically the double major with the medical science program. The rigor of this degree may be compromised by the fact that one can meet the requirements of the program without having to complete senior courses, including a capstone course. There was also at least some concern regarding students being able to take similar-content courses in each of the Schulich School of Medicine and Dentistry and in the Department of Biology, thereby potentially receiving double credit for the same material. Recommend working with the Schulich School of Medicine and Dentistry to address the overlap in programs and list appropriate courses as anti-requisites. Also consider adding a 4000-level course requirement in the Biology Major portion of the double major degree.
3. Some concern was also expressed by faculty that students graduating with the double major without taking 4000-level courses may not qualify for graduate school, and must return for a 5th year to upgrade their credentials. If steps have not been taken already, the department should ensure that students are made aware of this potential dilemma early in their undergraduate degree. Recommend informing students early in the degree program about this potential shortcoming of the double major degree so that students can make better informed choices.
4. Delivery of 2290F/G to 1000 students each year is expensive, and is rather unique among other universities in southern Ontario. No recommendation was provided for solving this problem. This was addressed by the Department by demonstrating that, when the complete roster of courses in year two are taken into account, this course is, in fact, not expensive.
5. Some concern that the faculty complement is somewhat precarious given the unpredictable nature of retirement and the number of faculty of retirement age, specifically relating to how the experiential learning opportunities and capstone experiences will remain intact if there is a reduction in faculty or staff complement without also a commensurate reduction in student enrolment. There should be a faculty renewal plan to guide the department in the coming years as retirements occur. The long-term stability and maintenance of strength in the department requires that there be an appropriate distribution of faculty across the ranks. It is concerning that at present there is just one tenure track assistant professor in the department. Recommend the adoption of a renewal plan.
6. Concern that, if the university does not continue to fund the Department at the current level, then ensuring that laboratory resources and safety standards are maintained will become untenable, and that staff and instructors will not be able to keep up with changing technologies in the various sub-disciplines. Recommend continuing the same level of funding as is currently in place.

Recommendations Required for Program Sustainability

Recommendation	Responsibility
Consider promoting international exchange initiatives and indigenous course-related materials	Department, Faculty
Develop faculty renewal plan in anticipation of pending retirements	Department