UNIVERSITY OF CALGARY | FACULTY OF SCIENCE

BSc & BSc Honours in: BIOCHEMISTRY; BIOLOGICAL SCIENCES; CELLULAR, MOLECULAR & MICROBIOLOGY; ECOLOGY; PLANT BIOLOGY; AND ZOOLOGY

BIOLOGICAL SCIENCES DEPARTMENT
EXECUTIVE SUMMARY
DECEMBER 2016

Overview and Context of Programs offered by Biological Sciences Department

The Biological Sciences Department is the largest department in the Faculty of Science, in terms of both undergraduate majors and faculty members. The Department's motto, "From Biomolecules to the Biosphere", reflects the very broad and diverse nature of the undergraduate programs it offers as well as the research interests of department members. We are unique among biological sciences departments in Canada in that our department includes biochemistry, which is typically a separate department at other institutions. The Department offers six undergraduate programs, a general Biological Sciences major and five specialty majors, which allow students to pursue the aspect of the biological sciences that is of greatest interest to them. All programs have a parallel Honours stream open to students with high academic credentials.

- The **Biological Sciences (BISC)** program is a flexible degree program intended to provide students a broad background in disciplines across the field of biological sciences and substantial freedom to customize their program to their interests and needs;
- The **Biochemistry (BCEM)** program explores the chemistry of living organisms and the molecular basis for the changes occurring in living cells. Students obtain the education necessary to unravel the complex chemical reactions that occur in various life forms;
- **Plant Biology (PLBI)** offers students a broad and flexible program that emphasize the role of plants in the environment, the diversity of plants, and the complex molecular and biochemical processes that take place within plants. Students gain an appreciation of the role of plants in human health, as well as in sustainability, environmental protection and climate change;
- The **Cellular, Molecular and Microbial Biology (CMBI)** program provide students with a broad perspective on topics ranging from the function of molecules in cells and the relationships between cell structure and function to the environmental and industrial importance of microbes;
- The **Ecology (ECOL)** program allows students to study both ecology (how organisms respond to all aspects of their environment) and evolutionary biology (how ecological responses cause genetic change in species as well as in the number and variety of species). Students may participate in Co-operative Education as part of their Ecology program;
- The **Zoology (ZOOL)** program introduces students to structure (morphology), function (physiology) and relatedness (systematics) among different groups of animals. Advanced courses emphasize comparative and integrative aspects of animal biology.

Students generally enter the Department as Biological Sciences majors, although some programs allow entry into Honours programs directly from high school. Students can later apply to transfer into a specialty major; transfer among the programs is facilitated by a common set of seven first- and second-year courses, known as the "BioCore". Among third- and fourth-year students, ~60% of students have consistently chosen to remain in the BISC program

In the Unit review conducted in 2015, the external reviewers recommended that "…the department should embark on an audacious review and revision of the undergraduate curriculum". This curriculum review is the first step in our assessment of our current programs.

Guiding Questions

The following critical questions and concerns were used to guide the curriculum review process. Questions 1 and 2 were developed by the Undergraduate Programs Curriculum Committee and approved by the Department; Questions 3 and 4 were Faculty-wide questions.

1. How well do the BioCore courses prepare students for senior courses in each program?

2. In considering courses in each program outside of the BioCore courses: **Is course material properly scaffolded throughout the program to best prepare students to meet requirements?** (i.e., to what extent do the content and expectations of later courses build upon the content and expectations of earlier courses?) Are there gaps in the curriculum, in the order in which material is delivered or in the level of expectations as student progress from one course to another?

3. Are High Impact Practices being used regularly in each program?
High-Impact Practices (HIPs) share several traits: They generally demand considerable time and effort, facilitate learning outside of the classroom, require meaningful interactions between faculty and students, encourage collaboration with diverse others, and provide frequent and substantive feedback. Examples of HIPs include, but are not limited to:

- Learning community or some other formal program where groups of students take two or more classes together
- Courses that included a community-based project (service-learning)
- Work with a faculty member on a research project
- Internship, co-op, field experience, student teaching, or clinical placement
- Study abroad
- Culminating senior experience (capstone course, senior project or thesis, comprehensive exam, portfolio, etc.)

4. If HIPs are not being used regularly in each program, what is preventing these practices from being used?

Action Plan

The action plan below was developed based on analysis of data collected from all sources to address the guiding questions. The plan outlines how the Biological Sciences Department will address the findings of this review, to enhance student learning and strengthen all programs offered by the Department in the interval between curriculum reviews.

The following chart outlines the recommendations, specific action items, the individual/team responsible, and the timeline for implementation (Short-term: One year or less; Medium-term: Two to three years; Long-term: Four to five years).

Recommendation	Action Item	Who is Responsible?	Due Date
1. Continue curriculum review process to obtain a more accurate and in-depth understanding of curriculum issues	• Further review and clarification of curriculum mapping data. • Collect additional student/alumni data to provide larger sample size	Associate Head (Undergraduate); Undergraduate Program Curriculum Committee (UPCC)	Short term; on-going
2. Explore ways to expand opportunities for High-Impact Practices and effective teaching and learning practices (as identified by NSSE) within curricula of all programs	• Evaluate constraints to implementation of HIPs, effective teaching and learning practices • Identify and implement ways to support courses where HIPs and effective practices are currently occurring (teaching relief, Head TAs, etc.) for courses where high impact practices are currently occurring • Work with instructors to identify other HIPs besides independent research projects that could be incorporated into curricula, particularly at the first-year level (e.g. some form of first-year seminars)	Associate Head (Undergraduate); UPCC; Associate Dean (Students) & Associate Dean (Teaching & Learning)	Long term
3. Investigate possible avenues to provide greater structure for BISC program	• Explore the feasibility of adding novel concentrations to the biological sciences program	Associate Head (Undergraduate); Biological Sciences Program Chair	Long term
4. Continue redevelopment of ECOL and ZOOL program curricula	• Work with program faculty to develop curricula that align with program outcomes and provide improved student experiences	Associate Head (Undergraduate); ZOOL and ECOL program chairs; faculty and staff delivering ECOL and ZOOL programs	Short term

5. Explore ways to incorporate more community-building and mentoring events with undergraduate students	• Explore additional ways of involving students in curriculum review/development • Develop/expand program/career advising events for students	Associate Head (Undergraduate); UPCC	Short term