



UNIVERSITY OF CALGARY | FACULTY OF SCIENCE

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BSc in PLANT BIOLOGY  
DEPARTMENT OF BIOLOGICAL SCIENCES

EXECUTIVE SUMMARY  
DECEMBER 2016

# Overview and Context of the Program

## Overview of the Plant Biology Program

The Plant Biology Program offers students a broad and flexible program that covers topics that range from Plant Biochemistry and Biotechnology to Anatomy and Systematics. The program emphasizes the role of plants in the environment, the diversity of plants, and the complex molecular and biochemical processes that take place within plants. Students will be exposed to the current experimental approaches that are used to study plants in their lecture and lab experiences, and they will understand how plants with enhanced traits can be developed for agriculture and industry. Graduates of the program will recognize how plants are able to thrive under harsh environmental conditions, and will appreciate the role of plants in human health and as a source of food, fibre and medicines. Plant Biology as it pertains to climate change, world hunger, renewable energy, sustainability and environmental protection is also a focus of the program.

## History, current status, and relevance of the Plant Biology program

The Botany/Plant Biology program has been a component of the Biological Sciences Department since the inception of the University of Calgary in 1966. Course enrollments in the program have been consistently high, and the cohort of instructors has included internationally recognized researchers that have studied a range a plant biology disciplines. Plant Biology graduates possess skills that allowed them to move directly from a BSc degree into the workforce in positions that included environmental consulting, agronomy and forestry, among others. Although the Program had high course enrollments and provides students with a strong plant biology background, the number of majors was usually low (less than ten) compared to that of other specialty programs within the department.

The Botany/Plant Biology program has undergone a transformation in the past few years. This transformation was the result of several strategic changes to the program. These included a name change (formerly the Botany program - now Plant Biology), an external review of the program by internationally recognized Plant Biologists, a re-evaluation of course requirements, changes to course prerequisites, and changes to course content. Our efforts aimed at enhancing the quality of the program and increasing the number of program majors has had a significant level of success. The program now produces a well-trained cohort of graduates into the workforce, to graduate schools, and to other higher levels of education. These changes have resulted in an historic high number of PLBI majors (25 majors in each of the past two years) that places this program among the top three Plant Biology programs in Canada. The program was also received a significant endowment that provides seven annual scholarships to the Plant Biology majors worth approximately \$4000 each. These awards allow PLBI majors a break in their tuition fees and living expenses, and allow them to put more focus on their education.

Revitalization of the Plant Biology program comes at time when our world is recognizing more than ever the effects of climate change, global warming, elevated CO<sub>2</sub> levels and

environmental pollution. Plant biology training and research will have an essential and important role in the sustainability of our environment and ecosystems, and in increasing the production of food, fibre and medicine. This period will require that humankind impose impactful measures that involve green technologies to produce carbon neutral fuels as well as stress tolerant, higher yielding and value-added crops. Plant breeding and Ag-biotech will continue to play a prominent role in achieving these goals. Additionally, maintaining plant diversity and understanding plant interactions with the environment will be essential in order to preserve the vastness and sustainability of plant species. Faced with these important issues, it is essential that Plant Biologists are leaders in our undergraduate teaching and research initiatives so that we can effectively train our next generation of highly qualified students.

# Guiding Questions

The following critical questions and concerns were used to guide the curriculum review process: Questions 1 and 2 were formulated by the Undergraduate Programs Curriculum Committee of the Biological Sciences Department, and approved by Department Council. Questions 3 and 4 are questions asked by all programs in the Faculty of Science.

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

(The BioCore courses refer to a common set of first- and second-year core courses completed by students in all programs).

**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

To address the guiding questions, data were collected from academic staff's teaching in the Plant Biology program as well as from both current students and alumni. We also used data from the 2014 National Survey of Student Engagement, as well as data provided by the Office of Institutional Analysis, University of Calgary. The action plan below was developed based on information from those sources, and outlines how the Plant Biology program will address the findings of this review, to enhance student learning and strengthen the program in the interval between curriculum reviews.

The following chart outlines the recommendations, specific action items, the individual/team responsible, and the timeline for implementation.

<b>Recommendation</b>	<b>Action Item</b>	<b>Who is Responsible?</b>	<b>Due Date</b>
Monitor student satisfaction	<ul style="list-style-type: none"> <li>Survey upper year Plant Biology majors and alumni for their input on overall program satisfaction, comments on gaps in the program, course improvement ideas and effectiveness of preparing students for the work force or higher level learning</li> </ul>	Plant Biology program chair and instructors	Annual ongoing
Generate data on career path of graduates	<ul style="list-style-type: none"> <li>Survey alumni to determine career paths</li> </ul>	Plant Biology program chair and instructors	Ongoing
Inform student about career opportunities	<ul style="list-style-type: none"> <li>Organize an annual career workshop for Plant Biology majors</li> <li>Invite young alumni into high enrollment Plant Biology courses to discuss their career path and successes</li> </ul>	Plant Biology program chair and instructors	Annual ongoing
Enhance focus on applied aspects of agriculture, forestry, biotechnology and environmental biology	<ul style="list-style-type: none"> <li>Implement enhanced emphasis on applied aspects in lecture material and discussion</li> <li>Continue to have our most effective instructors in the introductory Plant Biology course and emphasize the importance of plants in our world</li> <li>Provide students with resources that provide information on job opportunities in plant biology</li> </ul>	Plant Biology Instructors	Ongoing
Enhance emphasis on the societal impacts of plant biology	<ul style="list-style-type: none"> <li>Incorporate additional lecture material on genetically modified plants, food security and environmental sustainability</li> <li>Emphasize the role of plants and forestry in challenges that our world faces in the 21<sup>st</sup> century</li> </ul>	Plant Biology Instructors	Ongoing
Further develop high impact practices	<ul style="list-style-type: none"> <li>Increase the emphasis on independent research projects in our research laboratories</li> <li>Advocate for financial support for independent research projects and for additional hiring of faculty members</li> </ul>	Plant Biology Instructors	Ongoing