To: Dr. M. Santos, FOS Associate Dean, Undergraduate Education;
Dr. I. Coe, FOS Dean;
Dr. M. Moshe, Interim Vice-Provost Academic;

From: Kim Gilbride, Biology Program Director;
Steve Wylie, Chair, Chemistry and Biology Department

Re: Periodic Program Review follow up Report for Biology

Date: June 28, 2016

Biology Program follow-up Review – 2016

As requested by the Academic Standards Committee a follow up report on the initiatives outlined in the Departmental Plan of the Department of Chemistry and Biology for the Biology Program Review is being provided. The following section reiterates the departmental plan that was included in the Program Review (2005-2012) with the follow-up update following each section in italics.

Developmental Plan - 2012-2020

The Biology Program has grown significantly over the last seven years. The following departmental plan will focus on four main areas that can be addressed at the program level: curriculum development and delivery, student satisfaction, the learning and teaching environment and research growth. Each of the four areas includes action items that will be addressed at the departmental level.

a) Progress with curricular development and delivery:

The Biology Program currently contains courses in nine fundamental areas of biology with higher level courses offered through the elective package. Courses in all areas will continue to be offered in the program and with strategic faculty hiring in the focus areas, Therefore:

i) the department will strive to continue to hire in our strategic areas: environmental biology, and cell and molecular biology.
ii) the department will offer more higher level electives courses.

FOLLOW UP

In the last 2 years we have 5 new faculty members, 2 in the environmental biology area, 2 in the cell and molecular area and 1 in big data (environmental bioinformatics). This coming year we are hiring a Biological Organic Chemistry. All the new hires allow us to offer more upper year elective courses. The introduction of the Biomedical Program in 2013 has also expanded the elective course offerings to Biology students. (examples of new courses that have been offered: BMS 411, cell biology II; BMS 451, medical microbiology; BLG 667, disease ecology; BLG 678 special topics in biology)

b) **Populating the Options**

The Biology Program also has three options (Bioinformatics and Computational Biology, Biophysics, and Environmental Biology) available to students although 2 of the options (Bioinformatics and Computational Biology, and Biophysics) are not popular with students and enrollment remains low. It is our goal to promote these options as viable alternative career directions and provide support to students that choose these non-conventional options.

iii) the department has recently hired a new faculty member in big data which will enhance our Bioinformatics option.

iv) the department has recently hired two environmentally focused faculty which will enhance the environment Biology option.

FOLLOW UP

Our strategy to promote our options within the Biology Program will initially be based on promotion of individual courses. This year our new faculty member in Big Data ran the Special Topics in Biology course where she taught Ecoinformatics, a course that highly reflects student interest in Bioinformatics and Computational Biology, typically a very unpopulated option. She developed a very good promotional brochure to advertise the course. In the end she had 17 students complete the course, where normally only 1-2 Biology students register for the regular Bioinformatics course. This approach is being adopted for all elective courses, since antidotal evidence suggests that students do not pick these options because they are unfamiliar with the content of the courses or the instructor and therefore promotion material explaining the content should have a positive effect on enrollment. Furthermore, we are looking into promoting our bioinformatics course to the Computer Science Students as electives. We will track the enrollment in the options to assess the effectiveness of the promotion material for the courses and, in the end, the effect of more populated course on the viability of the options.

c) **New options/program**

Future curriculum directions include the consideration of establishing an option in biochemistry or biological chemistry option which would involve collaboration between the chemistry and biology programs.

v) the department will encourage the Biology curriculum committee to explore this option with the biochemistry faculty and design a biochemistry option.

vi) the department will encourage the curriculum committees of the two programs to jointly propose an option in Biological Chemistry.

FOLLOW UP

The Biology Curriculum Committee and the Chemistry Curriculum committee have had a joint meeting to discuss new options. Currently their view is to promote the Biological Chemistry option since it will benefit both programs. To this end, the Departmental Hiring Committee is currently advertising for an organic chemist "who uses synthetic, analytical or physical chemical methods to explore research problems at the interface of chemistry and biology."

d) High student satisfaction:
Students have a large time and financial investment in their education while in university. The Biology Program is committed to provide a productive learning experience to better equip the students for their future careers.

FOLLOW UP
The department is very committed to promoting a positive learning experience for the students. To this end, we have many initiatives that address this experience including both student driven and faculty promoted programs. They include but not limited to the involvement of students in the programs from the Outreach Office, the RyScimatch program, the annual alumni mentoring event, the Ryerson Student spaceflight experiment program in 2015, the new Science Zone learning initiative and our new international Global Science Citizen program.

e) Enhance the learning and teaching environment:
Lastly, delivery of the curriculum currently takes many forms: lectures, on-line readings and assignments, laboratories, presentations, group work, etc. The Biology Program will continue to support the science faculty at Ryerson so that they can continue to explore new ways to engage the students and delivery the material in innovative ways.
The program will continue to support innovation and substance in the classroom and strive to create learning environments both inside and outside of the classroom. More opportunity to learn through workshops, shadowing experiences, and outdoor classrooms would benefit the engagement of the student and the retention of the material.

FOLLOW UP
Engagement of students is happening both within and outside the classroom.

In the classroom, many of our faculty are trying new teaching strategies each year. One indicator of the initiatives and successes of the initiatives are highlighted each year at the Annual Faculty Conference on Teaching and Learning. This year alone, 2016, 7 presentations or posters from Chemistry and Biology were presented at the conference that involved more than 15 faculty, sessional instructors and students.

Outside the classroom, the Science Working Group composed of all the Program Directors in the Faculty are working on the development of for credit course to allow students to work in research labs in the summer and be recognized for their contribution to the research on their transcripts. This hands-on experience will give the students real life skills they can include on their resume upon graduation and aid in obtaining that first job.

Additionally, 'Science at the Interface' is an annual interdisciplinary research symposium hosted by the Department to advance scientific research by facilitating the interchange of ideas

between researchers across Ryerson and the GTA. Registration for 2016 is expected to exceed 200 participants in this diverse symposium that includes faculty, students, staff, alumni and friends of Ryerson University community.

f) Promote Research Growth:

A well rounded and robust Biology Program requires researchers whose research programs advance not only graduate education in the Department but also undergraduate involvement in the research environment. Many undergrads are keen to experience life in a research lab and gain valuable skills that they can include on their resumes and use in their future careers. The Department and the program will continue to strive to support the faculty engaged in biological science research so that more students have the opportunity to use their knowledge in real life research.

x) The department will seek additional support for faculty so that they can increase their ability to take on undergraduate students in their labs as volunteers, fourth year thesis students (BLG 040) and eventually graduate students.

xi) the department will continue to support the student mentoring program

FOLLOW UP

The Department has been successful at supplying a laboratory space for every researcher however the facilities are still tight and lack adequate infrastructure for some of the advanced experimentation. The MARs research facility will be available for 8 of our faculty to move into within the year and the modern facilities will give the researcher not only excellent facilities but also the space to accommodate more students in their labs. This additional student capacity will not only improve the student experience but also their profile as highly qualified personnel once they graduate from Ryerson.

The RySciMatch program supported by our department that allows students in labs to have other students shadow them in order to gain lab experience will also be supported by the expanded research space.

Lastly, a lab-based course, BLG 481, is being run this summer for the first time to allow undergraduate student the opportunity to gain lab experience. They will be required to work 10 hours a week in a research lab, write up weekly reports and present a poster at the departmental research day I August and in return will earn a credit towards their degree.