

CHEMISTRY DEPARTMENT

Risks and Recommendations

Excerpted from the 2017 Self-Study

As a measure to improve our offerings and mitigate any potential risks, the Chemistry Department has developed two consecutive three-year plans, 2012-2015 and 2016-2019 (appended below). The most recent plan began with a retreat held June 20, 2016. Accountable time activities have been partly focused around implementing the three goals of this plan. The three goals of the 2012-2015 plan have all been accomplished, through the implementation of the new CHEM 1100 Chemistry of Cooking course, the launching of two new second year courses, 2330 and 2360, and on-going lab development.

The working session of the 2016 retreat also included a review of the three themes of the Douglas College Strategic Plan 2015-2020, and strategies to align with these. Highlights were:

1. Inspiring and Relevant

- To improve engagement of new students and retention of first year students, we planned on hosting contests and prizes, particularly during National Chemistry Week. Formation of a Chemistry Club was proposed, with the possibility of fund raising events and invited speakers. This has subsequently been accomplished, with several fund raising events taking place in Fall and Winter terms.
- We noted the importance of developing critical thinking skills to future student success. Ideas were to develop more challenging labs, as opposed to the traditional “cookbook chemistry” approach. We have begun incorporating this initiative through revising our Chemistry 1110 program.
- Modernizing lab skills would keep the program relevant. For example, we planned to incorporate “Green Chemistry” in the labs to make students aware of current academic and industrial practice in chemistry. The concept of “percent atom economy” will be introduced in some of our synthetic labs.

2. Grounded and Flexible

- We continue to attempt to respond to diverse backgrounds of students beginning Chemistry from high school background. Any limitations, for example in Math or lab skills, are addressed on an individual basis by consulting with students and checking for changes in high school curriculum
- We are currently reviewing a lab survey, conducted among faculty and staff in the winter 2017 term, to assess views on changing our labs to respond to changes at university and to improve student’s retention of the material.
- Given the development time needed, we planned to design new labs which are better applied to current issues in Chemistry

3. Practical and Applied

- We intend to continue to affiliate with local schools, as an outreach mechanism to make students and teachers aware of the quality of Chemistry offered at Douglas and the success of our students. For example, we continue to host Riverside Co-op students each winter term.
- Labs will be revised to ensure better transfer where possible
- Students will continue to be provided hands on experience in the lab to ensure future success both in industry and academia.

A notable weakness, as described in the three year plans below, is our outdated laboratory. Renovating the lab space at the New West campus would improve safety by removing the asbestos lined fume hoods and cabinets. Likewise, the multipurpose room would be reconfigured so that the full time Tech II would have an office space separate from the chemical preparation area. It would also improve student access to facilitators as new office spaces would be added and access to existing offices would be improved. A renovation would also lower operating costs as furniture and equipment is failing piecemeal and having to be repaired or replaced. We have yet to apply for funding to conduct this renovation.

Chemistry Department Plan 2016-2019

Executive Summary

- Increase collaboration on teaching and learning within the department
- Build community amongst the students
- Overhaul the lab program for 1000 level courses

Rationale and Outcomes

The chemistry Department at Douglas College is a thriving department that continues to build upon past successes and is growing to meet current demand. For example, we achieved the goals for the department set out in our 2013-2016 plan:

- Offer two new second year courses, Spectroscopy and Inorganic Chemistry
- Continue updating the lab program, introducing new experiments in 1104, 1108, 1110, 2321, 2330 and 2360
- Offer a new course for non-science majors, the Chemistry of Cooking

The department's strengths lie in its people who support a well-established lab program and a suite of courses that allow students to transfer smoothly to both UBC and SFU. The process for assigning chair, selection committee, capital requests and accountable time duties are well established and members of the department have been and continue to be seconded in College wide and administrative roles, serve on College and Faculty wide committees and support the activities of the Faculty and department.

A key weakness that has been identified is a lack of Tech II support for the lab program as the number of courses and instruments continues to grow. We currently have one full time and one part time Tech II's who work at a superhuman pace to keep up with the demands of the department. For example, the number of courses that are offered in the summer has grown to seven, from four in 2007. This means that what was once a quieter time for annual equipment inventory and maintenance, digitizing and updating preparation notes, waste inventory and disposal and testing new experiments is now consumed with the operational needs of the courses.

Also of note is that the physical infrastructure of the labs has not been renewed and is likely original to the building, making it 45 years old and decaying. Some items are of minor significance, such as dinged and timeworn bench tops, but replacing asbestos lined fume hoods with plumbing and sashes that cannot be properly repaired will be a major capital project. Likewise, the lab staff does not have adequate office space. One Tech II works from a desk in a chemical prep room, a second Tech II does not even have a desk, filing cabinet or computer and the lab supervisor and facilitators have offices that are inaccessible to students and some of the facilitators work from desks in the multipurpose room and must regularly work elsewhere when meetings or experiments are going on.

The chemistry department trains students to use a number of instruments: FT-IR, UV-Vis, NMR spectrometers as well as HPLC, GC and GC-MS instruments. To continue to train students on these types of instruments, the department will need to have our capital requests granted.

The main threat to the chemistry department is that shared by all of University Transfer, namely, that as the economy improves and the number of graduating high school students falls there may be less demand for University Transfer courses. Thus, the department needs to take a three pronged approach to meet these changes: 1) increase collaboration on teaching and learning

within the department 2) build community amongst the students to increase engagement 3) overhaul the lab program for 1000 level courses.

1) Increase collaboration on teaching and learning within the department

Currently, most of the faculty members of the department spend much of class time lecturing. However, each faculty member uses other teaching methods, such as flipped classrooms, tutorials, in class problems, class presentations and demonstrations to name few. However, we recognize the need to better share these practices with each other and discuss pedagogy in order to better engage students in the classroom. It is hoped that this will lead to improved learning and satisfaction amongst students.

2) Build community amongst the students

One of the challenges for open enrollment programs is that students may feel lost in the crowd as they may not have a cohort of students to bond with. The chemistry department is interested in creating opportunities for students to stay on campus and get to know other students. This will need further discussion within the department (and possibly within Science and Technology), but could include such things as a chemistry student society, special events (Pumpkin carving contests, mole day), hiring student assistants in the lab and better connecting students to existing services, such as Peer tutoring. It is hoped that these efforts will help recruit and retain students in chemistry courses.

3) Overhaul the lab program for 1000 level courses

This item is not unrelated to item 1), which was a discussion of teaching and learning. The current lab program is based on lab experiments in which students follow a set procedure to obtain a known result. While this can be an efficient way to teach specific skills and techniques, this needs to be balanced with broader critical thinking skills. Preliminary discussions within the department have identified many possible alternate approaches such as inquiry, guided inquiry, play based, green chemistry, citizen science, fieldwork and projects. The department will also need to review what skills students need to be successful citizens such as critical thinking, teamwork, digital data analysis as well as written and verbal communication skills. A key barrier to developing new labs is a lack of lab staff time for testing new procedures and in order for these improvements to be made in a timely fashion, the department will need support for additional staff hours.

Contingency

As part of the Chemistry Department's ongoing unit review, we have asked Institutional Research about the labour market demand for either a two year credential based largely on our existing first and second year courses or a post-baccalaureate degree based on third and fourth year lab courses intended for international students. If there is substantial demand for either of these options we would need to re-evaluate the department's priorities.

From: Lee Hanlan <hanlan@sfu.ca>
Sent: June 7, 2017 12:41:01 PM
To: Addison-Jones, Brenda
Subject: program review

Hi Brenda

When we met on Friday I asked about the materials portion of the Inorganic and Materials Chemistry (your chem 2330). I now see from the website that materials is a small portion of the course and most of what is covered in the course mirrors nicely with our Chem 230 (lecture) and Chem 236 (lab) -including some of the recent changes that we have made to Chem 230 topics; so no concerns there.

I had a brief discussion with Evon Khor our advisor and she had no concerns at all about the transfer credits given for any of the Douglas chem courses.

Having looked through your course offerings I am impressed with the list of experiments that are available for your students both in the general chemistry courses and in the inorganic lab. They appear to be getting a lot of practical lab experience and I especially like what they are doing in your inorganic lab. They'll certainly be well prepared if they come here and take our Chem 336 lab.

I'd mention to you about the "writing in the discipline" aspect that we introduced into the Chem236 lab a while back. I see from the course description for the lab portion of Chem 2330 that most of the lab reports are formal reports so I would be interested to know how much formal instruction students are given for writing these reports; for example are they simply give a basic handout or is there actually instructional time used to go through this in more detail?

I haven't spoken yet to our analytical or physical chem people about instrumentation (I believe you were wondering about strategies for updating instrumentation) but hope to do so before the end of the week.

Let me know if you have any other questions of me and I'll contact you if I have any.

Lee

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DOUGLAS COLLEGE COMPREHENSIVE PROGRAM REVIEW (PR)
RESPONSE FROM THE
OFFICE OF THE VICE-PRESIDENT, ACADEMIC AND PROVOST

Douglas College policy *A18.01.01 Program and Service Review* requires a follow-up plan be developed by the Vice President, Academic as the final step in the PR process.

FACULTY (Lead Dean)	Science and Technology (Brian Chapell, Dean)
Department / Program	Chemistry
Date submitted	June 2017
External Reviewer (ER)	Lee Hanlan, Associate Chair and Senior Lecturer, Department of Chemistry, SFU
Review triggered by	<input checked="" type="checkbox"/> Policy (schedule) or <input type="checkbox"/> Emergent concerns <input type="checkbox"/> Changes in discipline/field/licensing <input type="checkbox"/> New program development <input type="checkbox"/> Demand/enrolment concerns <input type="checkbox"/> Other (specify)
Date of last formal PR	Unknown
RESPONSE/RECOMMENDATIONS	
SUMMARY RESPONSE	<p>The CHEM department is a mature department with well-established practices for maintaining daily operations, for ensuring curriculum currency and for facilitating smooth transfer pathways for students moving on to key local universities. Student satisfaction and student performance measures are sound. Efforts to create community for CHEM students on campus, and to address student needs for learning support and tutoring, are laudable.</p> <p>In future, the CHEM department should include a summary of key recommendations and the ER's written audit of its report when submitting its comprehensive PR to the Office of the VPA.</p>
All PR recommendations accepted?	<input type="checkbox"/> Yes <input type="checkbox"/> No [Note: No clear set of recommendations provided]
All ER's recommendations accepted?	<input type="checkbox"/> Yes <input type="checkbox"/> No [Note: No ER's report provided]
VPA's RECOMMENDATIONS	<ul style="list-style-type: none">Continue to experiment with a variety of scheduling options such as compressed and hybrid delivery, as appropriate and in response to student demand/needsDevelop a specific plan for ensuring that any documented need for supplemental learning support (e.g., tutoring) is met, starting with exploring the possibility of the Learning Centre hiring CHEM-specific tutor(s) within a specified timeframe (e.g., by Summer 2019)
In particular, CHEM should focus on the following:	

	<ul style="list-style-type: none"> • Assess new Ministry of Education gr. 10 – 12 science curriculum for possible implications for CHEM offerings; any required responses to be in place by end of Winter 2020 • Consider approaching BIOL and ENGL departments to join work currently underway to develop science-specific writing course(s); and/or find alternative strategies to support writing in the discipline, in part to strengthen SFU-transfer student readiness • Develop a specific plan for dedicating time (e.g., special purpose meetings or annual one-day retreat) to the sharing of pedagogical best practices and innovations, and to exploring strategies for enhancing critical thinking in labs, as identified in the 2016-19 Departmental Plan • In consultation with the Dean, develop a proposal and budget for a phased-in (2-4 yr.) renewal of key laboratory infrastructure
Next scheduled PR (5 – 7 years):	2023



14th March 2019

Vice-President, Academic and Provost