

**CHEMISTRY  
CYCLICAL REVIEW - FINAL ASSESSMENT REPORT & IMPLEMENTATION PLAN  
PROGRAM QUALITY ASSURANCE COMMITTEE (PQAC)**

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<b>DEGREE PROGRAMS:</b>	<b>BSc Chemistry BSc Biochemistry and Molecular Biology BSc Environmental Chemistry</b>
<b>REVIEWERS:</b>	<b>Dr. Anne Johnson, Ryerson University Dr. Costa Metallinos, Brock University Dr. Richard Hurley, Trent University</b>
<b>DATE OF REVIEW VISIT:</b>	<b>February 4-5, 2013</b>
<b>OVERALL ASSESSMENT:</b>	<b>Good Quality with Report – for all three degree programs</b>
<b>SUBMITTED FOR SENATE APPROVAL:</b>	<b>January 2014</b>

**EXECUTIVE SUMMARY**

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During the academic year 2012-2013, the Department of Chemistry completed a review of the BSc in Chemistry, BSc in Biochemistry and Molecular Biology, and BSc in Environmental Chemistry. The Chemistry degree is a comprehensive, foundational program that is similar to programs at other Ontario institutions, except that the small size of the Trent department limits specialization areas. The Biochemistry & Molecular Biology degree is a joint offering, in conjunction with the Department of Biology, while the Environmental Chemistry degree is offered jointly with the Environmental & Resource Studies (ENRS) program.

The reviewers conducted a site visit on February 4-5, 2013, meeting with senior administrators, permanent and contract faculty, staff members, and undergraduate students. Based on the Departmental Self-Assessment and their site visit, the reviewers assessed the Chemistry and the Biochemistry and Molecular Biology programs as being 'of good quality' and the Environmental Chemistry program as being 'of good quality with report'. After a thorough review of the following documents: Self-Assessment, Reviewers' Report, Departmental Response, and Decanal Response, the Program Quality Assurance Committee (PQAC) would concur with this assessment.

In their report, the reviewers remarked on Chemistry's long history at Trent, noting that the Department has "productive and research active" faculty with "very good" research records (Reviewers' Report, section 2.5) and "has spun off a number of other Departments with successful and vibrant programs," some of which "are now world-class in calibre" (Reviewers' Report, section 2.1). They state that the department, despite being "one of the smaller chemistry departments in the province," has "done an admirable job offering a broad spectrum of chemistry courses" (Reviewers' Report, section 4) and praised their "core strength in environmental sciences" and the flexibility in course selection that "allows students to tailor the program to their own interests" (Reviewers' Report, section 2.3). The reviewers were also "very impressed by the large number of laboratories associated with the core required chemistry courses," adding that this is "a unique feature" that helps "build... students' practical skills and [is] beneficial to students' long-term success" (Reviewers' Report, section 2.3). PQAC was pleased to note these Departmental and program strengths.

The reviewers suggested modifications in admissions requirements, designed primarily to ensure that entering students are better prepared in terms of math and especially that Environmental Chemistry students have entry requirements equal to those in the other two degree programs. In terms of curriculum, the reviewers noted that some aspects were difficult to assess, stating that "the learning outcomes are not clear" (Reviewers' Report, section 2.1) and asking that the department work on mapping program-level learning outcomes onto courses. PQAC concurs that this is must be an immediate priority; in the Departmental Response it states that they are prepared to address these concerns in the 2013-14 academic year. The reviewers suggested several changes regarding the amount of available lecture time per course, reducing or eliminating redundancy or overly specialized courses, and the desirability of providing capstone courses for

students; there appears to be general agreement regarding the need to review some curriculum content, although the department will need to work out the specific details of any changes deemed necessary. In addition, the reviewers discussed the importance of accreditation through the Canadian Society for Chemistry, suggesting that the department seek accreditation for the Biochemistry & Molecular Biology and Environmental Chemistry degrees, to help students be more competitive on the job market. The Department is currently seeking accreditation for the former degree.

The reviewers stated that the faculty complement in Chemistry was "the minimum required to support the existing Chemistry program," noting that the small number of faculty was a limiting factor in student course selection at the upper level (Reviewers' Report, section 2.5). They were concerned with the number of temporary faculty in the Biochemistry and Molecular Biology program and strongly suggested that the Department develop a staffing plan that would ensure sufficient faculty to maintain Chemistry's various degree programs. The Department feels that "the recent TT hire in Biology has addressed this concern" (Departmental Response, section 2.5); PQAC acknowledges that additional hires are unlikely in the current economic climate. The reviewers also highlighted what they saw as a lack of funding to maintain existing laboratory equipment or purchase replacements as needed. PQAC noted that the Departmental response states that the need for such funding "is essentially met through the scientific equipment fund" (Departmental Response, section 2.5).

Overall, the reviewers' main concerns related specifically to the program in Environmental Chemistry, which they felt "may not be viable" without "significant improvements" (Reviewers' Report, section 2.3). They said that Environmental Chemistry "should have the cachet of a highly specialized, sought after program," yet found it that it "suffers from low visibility, low entrance requirements and a lack of differentiation from the Chemistry program" (Reviewers' Report, sections 2.3, 4). They suggested that the university needs to decide whether to "revitalize" Environmental Chemistry and make it more attractive to students, change its focus, or discontinue it entirely. PQAC concurs that the future of this degree program needs thoughtful consideration. The Department has indicated that they recognize the need to re-evaluate the program, and the Dean has stated in the Decanal Response that he wishes to see the program redeveloped into a distinct program.

#### **PRIORITIZATION OF RECOMMENDATIONS SELECTED FOR IMPLEMENTATION**

*Please note: Only those recommendations selected for implementation are included in this report. Recommendations that do not require report have not been included.*

##### **Recommendation 1**

**That the program-level learning outcomes be clearly articulated for Chemistry, Biochemistry & Molecular Biology, and Environmental Chemistry. All chemistry courses, teaching methods and assessment should be mapped against the learning outcomes.**

*Approval required by: Science Dean  
Resources provided by: Not Applicable  
Executor: Chairs of CHEM, BIOL, ERS  
Timeline for acting on: March 2014  
Timeline for reporting: March 2014*

##### **Recommendation 2**

**That the content of the current organic chemistry courses be thoroughly revised.**

*Approval required by: USC; Senate  
Resources provided by: Not Applicable  
Executor: Dean (Sciences), CHEM Chair  
Timeline for acting on: in place for September 2015  
Timeline for reporting: September 2014*

##### **Recommendation 3**

**That the lecture hours in chemistry courses be increased from two hours to three hours; seminars are used for tutorial-type activities. This would bring the chemistry courses into alignment with other chemistry programs.**

*Approval required by: USC; Senate  
Resources provided by: Not Applicable  
Executor: Dean (Sciences), CHEM Chair  
Timeline for acting on: March 2014  
Timeline for reporting: September 2014*

### **Recommendation 6**

**That the Department of Chemistry seek CSC accreditation of the Biochemistry & Molecular Biology program.**

*Approval required by:* Canadian Society for Chemistry  
*Resources provided by:* Dean (Sciences)  
*Executor:* Dean (Sciences); Chairs of BIOL, CHEM  
*Timeline for acting on:* September 2015  
*Timeline for reporting:* September 2014

### **Recommendation 7**

**That the Department of Chemistry seek CSC accreditation of the Environmental Chemistry program.**

*Approval required by:* Canadian Society for Chemistry  
*Resources provided by:* Dean (Sciences)  
*Executor:* Dean (Sciences); Chairs of CHEM, ERS  
*Timeline for acting on:* September 2015  
*Timeline for reporting:* September 2014

### **Recommendation 8**

**That the Department, in coordination with the Faculty of Sciences and the Provost, determine the future of the Environmental Chemistry program and act on their decision. In particular, a decision must be made regarding whether the program will be revitalized through increased visibility and clear differentiation from the Chemistry program, whether parts of the program can be used to establish a post-graduate certificate or a professional masters program, or if the existing undergraduate Environmental Chemistry program be discontinued.**

*Approval required by:* Dean (Sciences)  
*Resources provided by:* Dean (Sciences)  
*Executor:* Dean (Sciences); Chairs of CHEM, ERS  
*Timeline for acting on:* in place for September 2015  
*Timeline for reporting:* September 2014

### **Recommendation 9**

**That the Department establish the minimum qualifications for sessional instructors for each course. At other institutions, this is a PhD in the same discipline as the course.**

*Approval required by:* Dean (Sciences)  
*Resources provided by:* Not Applicable  
*Executor:* Chairs of BIOL, CHEM, ERS  
*Timeline for acting on:* September 2014  
*Timeline for reporting:* September 2014

### **Recommendation 10**

**That the Department and University retain a technician to run and maintain the NMR facility for the long-term.**

*Approval required by:* Dean (Sciences)  
*Resources provided by:* Dean (Sciences)  
*Executor:* Dean (Sciences), CHEM Chair  
*Timeline for acting on:* as budget permits  
*Timeline for reporting:* as budget permits

### **Recommendation 12**

**That the admission requirements for the Chemistry, Biochemistry and Molecular Biology programs be consistent with and appropriate to the required courses in first year.**

*Approval required by:* Senate; Undergraduate Academic Policy Committee (UAPC)  
*Resources provided by:* Not Applicable  
*Executor:* Dean (Sciences); Chairs of BIOL, CHEM; University Registrar  
*Timeline for acting on:* in place for September 2015  
*Timeline for reporting:* September 2014