Faculty Response to External Review Document

Department of Chemistry
College of Science
Weber State University

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Introduction

The WSU Chemistry Department is grateful to the members of the external program review team for their dedication and professional review of the Chemistry Department at Weber State University. The strengths and weaknesses of the Weber State University Chemistry Program as described in their report were formulated after a site visit and interviews with students and faculty. As part of their review, the team generated a Strengths, Weaknesses, Opportunities, and Threats analysis, SWOT, of the WSU Chemistry program and based their recommendations on that analysis. The review team invested significant effort on making specific recommendations to strengthen the Chemistry Program in the areas of 1) Curriculum, 2) Facilities, 3) Faculty, and 4) Pedagogy with a summary of the most critical recommendations that should be addressed through development and implementation of a 3- to 5-year strategic planning cycle. This response provides additional information regarding these recommendations and presents some possible solutions to strengthen the program.

1 – Curriculum

The review team recommends that a major revision of the curriculum is needed to bring it fully inline with the American Chemical Society Committee on Professional Training recently revised *Guidelines and Evaluation Procedures for Bachelor's Degree Programs* and to make the curriculum more flexible and appealing to students considering chemistry degree options.

At the heart of the new ACS-CPT guidelines is a set of foundational courses covering the five core areas of chemistry: analytical, bio-, inorganic, organic, and physical chemistry, that are required for all chemistry majors and are accessible to students who have completed the first year of introductory chemistry. Within the current program, courses currently exist that satisfy the foundation course requirements in all areas except inorganic chemistry. The content of existing courses is being reviewed in order to make them better accomplish the goals of foundation level courses. A thorough departmental review of the curriculum is planned for this summer (2013). It will be necessary for the department to identify ways to provide reassigned time to faculty for the development of a foundational inorganic chemistry course and to make significant revisions where necessary to existing analytical, bio-, organic, and physical chemistry courses so that they can fulfill the role of foundational courses.

The second major aspect of the curriculum revision addresses upper-division coursework and the available chemistry tracks. The current bachelor's programs include two chemistry bachelor's degree tracks plus a chemistry-teaching track. The first chemistry track is ACS certified. Under the new ACS-CPT guidelines, required upper-division coursework is not as rigidly defined as it was previously. The Chemistry Department is working hard to take advantage of this new flexibility by creating an ACS Certified Biochemistry track, introducing greater flexibility in upper-division coursework for all majors, and creating more undergraduate research opportunities for all majors. Accomplishment of these objectives will require that the department identify ways to provide the necessary reassigned time to faculty for upper-division curriculum development where needed. The department must also do a better job of supporting faculty and undergraduate research efforts by assigning load credit at a sensible level that will encourage faculty to put more effort into these activities.

Regarding undergraduate research, the current review team recommends that the minimum number of research credits required of majors be doubled. At the time of the previous chemistry program review (2008) the current two-research-credit requirement had just been added. The previous review team cautioned that the department was already spread too thin to fully implement and support that level of undergraduate research. Since then the department has lost one full time faculty line which makes supporting even more undergraduate research an even greater challenge. Our faculty loads significantly exceed the ACS-CPT 12-contact-hour maximum load requirements. If the department, college, and university value increased undergraduate research involvement among faculty, they must provide the means to support their involvement.

It is recognized that a great deal of time, effort, and thought is required as we implement all of these changes but the department is committed to moving forward with these changes because of the positive impact that they can have on student success.

2 - Facilities

The Chemistry Department agrees with the review teams recommendations regarding the need for improved classroom and laboratory facilities. As we prepare and plan for a new science lab building it is imperative that we design facilities that will improve our ability to provide our students with the learning experiences that they need. The facilities and laboratory spaces must facilitate teaching and support faculty and undergraduate chemical research well into the future.

Where appropriate, we must also obtain modern, sophisticated research instrumentation and provide for its ongoing maintenance. The Chemistry Department notes that while some of the department's instrumentation, while not always the latest model, remains functional and is used extensively by chemistry

students in various lab and research projects. The basic operation of much of the laboratory instrumentation remains relatively consistent from generation to generation. For example, the latest gas chromatograph does not really provide for a significantly superior student experience than one that is two or three generations older. The most important requirement for instrumentation from a teaching perspective is that it is available for student use. We feel that in most cases the chemistry department is maintaining a good balance between hands-on access to instruments and maintaining appropriate modern instrumentation. With that being said, there are several instruments that would be very helpful in supporting faculty and undergraduate research such as a research level NMR instrument or an ICP-MS. The high cost of ownership of these and other instruments is a big reason that we do not currently own them. We do not feel that it is always a wise use of our scarce resources to insist on the replacing instrumentation that continues to serve our needs well. The Chemistry Department has been requesting an instrument maintenance staff member for thirty years. We agree with the review teams recommendation that the instrument support person could fill a shared position that serves the needs of the entire College of Science.

3 - Faculty

The review team recognizes that the chemistry faculty, with their dedication to teaching and supporting student learning, is a strength of the department. However, they list faculty load as a significant departmental weakness. Faculty presently receive one-half teaching credit for laboratory courses. The ACS teaching load guidelines are based on actual clock contact hours and recommend that 12 contact hours be the maximum normal teaching load with substantially fewer contact hours assigned to faculty that are heavily involved with undergraduate research. Under the current load model, chemistry faculty teach about 15 contact hours regardless of undergraduate research efforts and some teach much more. The loss of a faculty line has worsened rather than improved faculty loads during the last five years, and has made it more difficult to provide the necessary courses for our majors in the semesters that they need them in order to facilitate progress toward graduation. The inflexibility of the chemistry program has also made it difficult to ensure that all faculty have the opportunity to develop and teach courses in their fields of expertise. The opportunity provided by the ACS-CPT guidelines to develop foundation level courses is helping to address that issue and the flexibility of the new curriculum could also help somewhat with teaching loads, but a new faculty line is required if we are to maintain or grow our programs while offering greater support for student undergraduate research.

Related to faculty load, the review team identifies the extensive overload taught by faculty as a threat in the SWOT analysis. The department depends on overload teaching to address student needs in our service courses. The university incentivizes overload teaching. No real support exists for summer undergraduate research and the faculty load model does not provide meaningful support for

undergraduate research. Resources are needed to make the department less dependent on overload teaching.

The chemistry department agrees with the review team's assessment that at least one new faculty hire in the area of biochemistry with a strong analytical chemistry background is needed in the short term. They further recommend an additional instructor to teach introductory courses and labs while the department develops and brings on line the new ACS-CPT compliant curriculum. The review team recommends that this second position convert to a tenure-track position in Chemical Education when the new curriculum is implemented. Because of the benefit that a tenure track faculty member with expertise in chemical education could provide in the redesign of the chemistry curriculum as well as the long-term development of the department, the chemistry department would prefer to create this second position initially as a tenure-track position rather than rely on a temporary position.

The review team's recommendation that leaves and sabbaticals only be granted for activities that are directly related to undergraduate research is unnecessarily restrictive. The Dean of the College should continue to grant sabbaticals and leaves based on faculty and departmental needs and merit of the related project.

Related to new faculty hire, the expectations regarding faculty involvement in undergraduate research and peer reviewed publication require a much larger commitment from the university to assure the success of new faculty hires. To date, little or no startup funding has been available for new faculty as they try to set up research programs that will engage students and create a meaning research experience that will result in significant peer reviewed publications and successful grant applications. Not only is this necessary for the success of new faculty, but it is crucial if the department hopes to hire the high-quality new faculty that will move the department forward.

4 – Pedagogy

Faculty members within the department are actively developing the review team recommendations regarding pedagogy. Several chemistry faculty are using or are actively developing inquiry-based learning methods in both introductory and advanced courses. Teaching pedagogy is also influenced by the available lecture and laboratory facilities; therefore the new building presents an important opportunity to make improvements in our teaching. Undergraduate research provides another effective teaching environment and has been addressed in other parts of this response.

Summary

The review team has identified many strengths, weaknesses, opportunities, and threats related to the chemistry program at Weber State University. The

department agrees with much of the team's analysis and is excited to move forward with redesigning the chemistry curriculum to provide greater flexibility and more fully serve student needs. The success of the department depends on the vision, dedication, and ingenuity of the chemistry faculty and on the support of the college and university. We are optimistic that we can make real and substantial progress toward accomplishing our goals to improve and transform the chemistry program at Weber State University.