Form E-1-A for Boston College Core Curriculum

Department/Program Chemistry 2023

1) **Have formal learning outcomes for the department's Core courses been developed? What are they?** (What specific sets of skills and knowledge does the department expect students completing its Core courses to have acquired?)

   The department has developed learning outcomes for chemistry core courses which are consistent with those established by the University Core Committee for all core courses in natural sciences.

   Students completing chemistry core courses will:

   1. Expand their understanding of the principles, body of knowledge, and investigative strategies that comprise chemistry and its applications
   2. Develop a chemical and scientific literacy that will promote curiosity, respect for the scientific method, and general awareness of the limitations of scientific conclusions
   3. Recognize the role of scientific discovery, past, present and future, in interrelated concerns such as human health, societal well-being, and planetary sustainability
   4. Appreciate the role of science and chemistry in defining their relationship with the natural world and their position within the cosmos

2) **Where are these learning outcomes published? Be specific.** (Where are the department's expected learning outcomes for its Core courses accessible: on the web, in the catalog, or in your department handouts?)

   Department website: https://www.bc.edu/content/bc-web/schools/mcas/departments/chemistry/academics/undergraduate/core-courses.html

3) **Other than GPA, what data/evidence is used to determine whether students have achieved the stated outcomes for the Core requirement?** (What evidence and analytical approaches do you use to assess which of the student learning outcomes have been achieved more or less well?)

   In 2022-23 Professor Clarissa Keen, instructor for CHEM1105-6 Chemistry and Society I-II, administered surveys to the students three times over the course of each semester. The surveys were a combination of multiple choice and open-ended questions. In some instances, she utilized course evaluation forms developed by the Boston College administration. A series of "reflection" questions of her own design allowed students to provide feedback about their learning and progress in the course.

4) **Who interprets the evidence? What is the process?** (Who in the department is responsible for interpreting the data and making recommendations for curriculum or assignment changes if appropriate? When does this occur?)

   The instructor for Chemistry and Society, Prof. Clarissa Keen, and the Chair of Undergraduate Chemistry Studies, Prof. Lynne O'Connell, interpret the evidence together. Prof. Keen compiles the results, and

then she and Prof. O'Connell analyze and interpret the data and discuss changes to the curriculum. This occurs during the summer.

5) **What were the assessment results and what changes have been made as a result of using this data/evidence?** (What were the major assessment findings? Have there been any recent changes to your curriculum or program? How did the assessment data contribute to those changes?

When responses to the reflection questions were analyzed, a number of themes emerged. Students appreciated the real-life examples and the connections between chemical processes and societal issues that were illustrated within the curriculum. They cited the analysis and interpretation of real-world data as an acquired skill that contributed to their understanding of science. An end-of-semester project also elicited numerous positive responses related to reading the scientific literature and learning how to assess the reliability of source material.

Comments from some students stated there was a lack of connection from one topic to the next. As a result, the instructor will present the material in a different order in the future. Rather than teaching foundational chemical concepts during the first weeks of the semester and then moving on to the societal issues, the instructor plans to introduce the basic principles on a "need to know" basis within the context of the real world topics.

6) **Date of the most recent program review.** (Your latest comprehensive departmental self-study and external review.)

A Periodic Report is required by the American Chemical Society (ACS) for certification of our majors program every 5 years. Our most recent report was filed in July 2022, and we received notification in August 2022 that our program meets all the requirements of the ACS Guidelines. Several items were cited as strengths, such as our up-to-date instrumentation, robust curricular offerings and laboratory safety training for students. The most significant issue cited was a lack of racial/ethnic and gender diversity at the faculty level.