Assessment Report AY 2006-2007

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1. What goals or learning objectives/outcomes were assessed in AYs 2006-2007

i) Knowledge of fundamental chemical information and the ability to draw upon factual information obtained in courses throughout the BS curriculum.

ii) Knowledge of basic organic synthetic, purification, and characterization methods.

iii) Knowledge of basic analytical and instrumental techniques and the ability to utilize these techniques to quantitatively analyze unknown samples.

iv) Knowledge of thermodynamic, kinetic and spectroscopic experimental techniques and analysis methods.

v) Ability to retrieve scientific information from the chemical literature including the ability to perform primary journal article searching using information technology tools.

vi) Ability to present scientific information in oral / poster formats.

vii) Ability to critically evaluate scientific information.

2. How did you assess these learning outcomes?

a. Describe the measures you used and the information gathered? (Description, date administered, results)

1) The American Chemical Society standardized exam was administered in CHEM 110, Inorganic Chemistry Fall 2006.

2) Final Projects in CHEM 125 (second semester organic chemistry lab) required students to independently literature research a method and experimentally perform the synthesis, purification and full characterization of an assigned organic compound. Students were graded upon successfully accomplishing the project in the set project time period.

3) Final projects in CHEM 133 (instrumental methods and analytical chemistry) required students to identify the appropriate method and then develop a study utilizing a modern instrumental method to analyze a "real world" unknown sample. Students were graded upon successful correct quantitative analysis of the sample.
4) Final projects in CHEM 141 (physical chemistry laboratory) required students to research an independent project measuring the thermodynamic, kinetic, or structural features of a chemical system or process using the chemical literature. Students were then required to design the experimental method to determine the properties and successfully implement the method and subsequent calculations. Students were evaluated upon successful project completion.

5) CHEM 125, CHEM 133, CHEM 141, CHEM 110L, CHEM 164, CHEM 198 capstone project posters and reports require extensive correct use of the chemical literature searching tools and critical evaluation of identified chemical information for successful project completion. Appropriate identification and evaluation of chemical literature is a graded feature of the final projects in each of the listed courses.

6) CHEM 125, CHEM 133, CHEM 141, CHEM 164, CHEM 198 capstone projects require a poster presentation at the departmental poster session at the end of the fall and spring semesters. Student posters are evaluated by faculty for scientific content, visual presentation, and the ability to orally discuss their work and answer pertinent scientific questions.

7) Standard questions were incorporated in CHEM 1A, and CHEM 1B final exams for continued tracking each semester. The questions test key fundamental learning objectives in these courses.

b. As a result of these assessments what did you learn about the program’s success in helping its students achieve these learning outcomes?

1) CHEM 110 students performed at the national average or above on the Inorganic American Chemical Society Standard Exam. Since chemistry 110 is one of the last courses students take in the undergraduate BS chemistry degree track, this test suggests that our program is preparing students with a solid understanding of chemical principles.

2) Almost all students successfully completed the capstone projects and poster presentations in CHEM 110, 125, 133, 141 and 164. The posters illustrated that both the BS and BA programs are successful in providing students with the ability to independently identify and perform a laboratory based independent project. Successful students illustrated skill in searching for information in the scientific literature and the ability to critically evaluate the identified information. Students illustrated that they could use scientific laboratory techniques learned in courses throughout the undergraduate curriculum on a new and independent problem to obtain desired information. Students showed the ability to use specialized scientific software and computational techniques in the analysis and presentation of their projects. Students illustrated the ability to converse scientifically using correct terminology and to orally answer questions pertaining to their projects. Students illustrated the ability to present their projects in professional appearing posters.
3) Initial analysis of the standardized questions incorporated in the general chemistry final exams suggests that 50% of the students taking the exam successfully met all the learning outcomes desired. These statistics need to be evaluated more carefully examining the correlation between specific learning objectives with course grades and with trends observed by other institutions.

c. In what areas are students doing well and achieving expectations?

1) Students completing the chemistry major are meeting the desired program learning objectives.

d. What areas are seen as needing improvement within your program?

1) The department recognizes the need to improve learning outcomes in the lower division introductory courses. We have been incorporating new teaching methods and student learning tools into these courses.

3. As a result of faculty reflection on these results, are there any program changes anticipated?

a. If so, what are those changes?

The department spent the past year evaluating student retention issues. We now have a draft retention plan which places a heavier emphasis on major advising early in a student’s academic career.

b. How will you know if these changes achieved the desired results?

Improvements in retention statistics are expected.

4. Did your department engage in any other assessment activities such as the development of rubrics, course alignment?

5. What assessment activities are planned for the upcoming academic year?

1) The department will discuss a more extensive use of standardized chemistry exams to assess learning throughout the chemistry curriculum.

2) The department will discuss the formation of a standardized rubric to evaluate course capstone projects for each course containing these independent projects.