

**Assessment Trends Report
Student Learning Outcomes in Chemistry**

November 2009

The goal of this report is to evaluate the assessment of student learning outcomes in Chemistry. The report addresses four key questions to evaluate the quality of our assessment processes.

(1) How have we sustained the assessment effort over a multi-year period of time?

How many years have you completed an annual assessment report?

2006 2007 2008 2009

All Chemistry faculty members are actively involved in the assessment process, first developing the learning goals, and then creating rubrics for assessing each component of undergraduate research: proposal, performance, and presentation.

(2) How do we systematically and comprehensively collect and analyze data about student learning?

The learning goals for majors in Chemistry are:

The Department of Chemistry supports the mission of the university in preparing students for professional success, democratic citizenship in a global community, and a personal life of meaning and value by producing graduates who achieve the following three chemistry-specific learning outcome goals:

1. Demonstrate the skills to solve problems and communicate through writing and speaking.
2. Discover how to integrate and apply knowledge and skills both within the chemistry community and between chemistry and other disciplinary communities.
3. Develop the capacity to address real-world scenarios in which chemistry plays a role.

Data is collected and analyzed by all faculty in the department. Five to 10 students from each class will be randomly selected for evaluation. As a general rule, one-half of a given class will be selected; for classes with fewer than 5 students, all students in the class will be evaluated; for classes with greater than 20 students, 10 will be randomly selected. The number of students chosen ensures that the results of the assessment will be statistically equivalent to assessment of each student, resulting in comprehensive data collection and analysis.

- Department goal 1 is assessed in CH482 using the "Final Presentation" rubric.
- Department goal 2 is assessed in CH254 using the "Proposal" rubric.
- Department goal 3 is assessed in CH391/491 using the "Research" rubric.

The rubrics used to perform the analysis were developed by all faculty in the department. Data is collected via LiveText portfolios, lab notebooks, research reports, and journals, rubrics and evaluations of oral presentations, evaluations by advisors, exit interviews with seniors, and scores from the American Society of Chemists exam and the Major Field Test in Chemistry

	Student Learning Outcome 1	Student Learning Outcome 2	Student Learning Outcome 3	Student Learning Outcome 4
AY 2006-07	GREEN	GREEN	GREEN	GREEN
AY 2007-08	GREEN	GREEN	GREEN	GREEN
AY 2008-09	GREEN	GREEN	GREEN	GREEN

(3) How do we use the analysis to improve curriculum and pedagogy and to inform decisions about budgets and strategic priorities?

While the department chair is in charge of writing the annual assessment report, all of the faculty review the report; because they all work from the same pool of data, they can make informed decisions about how to tell their assessment story. The department chair is responsible for sending an electronic copy of the final annual report to Chemistry faculty and for posting an electronic copy on the web. The Chemistry faculty call a special meeting during the summer both to discuss the report and to assess their assessment process.

Even before the most recent self-study, Chemistry was reviewing student learning in their major, and they made several significant curricular and pedagogical improvements. Building on the success of the block format in CH121,

the department decided to expand it to CH203/205 and CH224. Using what they learning during exit interviews with seniors, the faculty decided to include the history of chemistry in the curriculum. After reviewing students' scores on the MFT, the faculty decided to move the test to the beginning of the course, thereby using the exam as a measure of what the students know and modifying course content to emphasize areas in which the students' scores were low. Chemistry faculty even use the sub-scores—for example, in analytical chemistry—so that they can target specific areas for teaching. Finally, the faculty require that students must pass the test to pass senior seminar.

The Chemistry faculty have also made decisions about budgets and strategic priorities based directly on their assessment analysis. For example, they chose to buy new computers instead of more traditional lab supplies. The department has also bought an NMR, which significantly impacts the ability of the students to “do” chemistry.

(4) How do we evaluate, modify, and continue to improve the student learning assessment process in this program?

As a result of assessment, the Chemistry faculty have confirmed that the learning outcome goals are the right ones for their students. They also built a good system of assessment from the start, and have seen no need to change it. Again, all Chemistry faculty are involved in the entire assessment process, from the development of the learning outcomes, to the collection and analysis of data, to the review of the process itself. They have embedded assessment practices into their teaching and they have ongoing conversations about their students' learning. Because they have been practicing strong assessment for several years, they have reliable data about trends in student learning outcomes:

Evaluation from Focus Visit Leadership Team (includes Academic Deans, Program Leaders, and Focus Visit Report Writers)

Rating: Green

Academic program	Goal 1 (multi-year)	Goal 2 (data collection)	Goal 3 (Use assessment to improve)	Goal 4 (improve assessment)	Total
Chemistry	3	3	3	3	12

Based on the four questions/criteria, the Focus Visit Leadership Team rates Chemistry as Green. The Department of Chemistry has clearly sustained their assessment efforts over a period of years, and the evidence indicates that they will continue to do so. Their data collection and analysis are systematic and comprehensive. The Chemistry faculty use their data to improve curriculum and pedagogy, and to inform decisions they make about budgets and strategic priorities. Their assessment process undergoes continuous review; because they built a strong system from the start, the faculty have seen no reason to make improvements to what they are doing.