

**Department of Chemistry, Occidental College**  
**Assessment Plan (Mission, Goals, Outcomes, and Assessment)**

To: APC and Professor Nalsey Tinberg

From: Eileen M. Spain, Chair of Chemistry

Date: April 5, 2007

**Mission Statement for the Chemistry Department:**

The Chemistry Department provides students with a comprehensive education of the principles of chemistry, including a rich laboratory experience within the curriculum and in close collaboration with faculty mentors on original scientific questions. Chemistry students will be equipped with the knowledge and skill set necessary for careers or intellectual endeavors in academic research, applied or industrial research and engineering, medicine and the health professions, education and outreach, as well as in law and government.

**5 Goals for students graduating with a degree in Chemistry:**

Chemistry majors will

1. learn the depth and breadth of the principles of chemistry in lecture, modern laboratory courses, and research. (KNOWLEDGE)
2. acquire the skills to solve chemical problems through coursework and laboratory experience. (SKILL)
3. learn to conduct original scientific research in individual and group settings. (SKILL)
4. acquire the skills necessary to participate in a professional scientific community. (SKILL)
5. discover how chemistry is linked to other disciplines, and appreciate the interdisciplinary nature of science. (VALUE)

## **10 Outcomes for students graduating with a degree in Chemistry:**

Chemistry majors will

- 1: comprehend scholarly scientific journal articles.
- 2: practice chemical safety and evaluate environmental impact of chemicals.
- 3: achieve proficiency in modern chemical instrumentation and techniques.
- 4: present a scientific lecture to a critical audience.
- 5: apply knowledge and skills to be competitive in chemical job market and top graduate and professional schools.
- 6: know the theoretical and practical nature of the chemical bond and chemical reactivity.
- 7: perform independent scientific research.
- 8: achieve proficiency in locating and utilizing chemical information and scientific databases.
- 9: achieve proficiency in writing scientific papers and reports.
- 10: demonstrate effective teamwork skills.

**Linkages between goals and outcomes:**

Chemistry majors will

1. learn the depth and breadth of the principles of chemistry in lecture, modern laboratory courses, and research. (KNOWLEDGE)

Outcome: 6

2. solve chemical problems through coursework and laboratory experience. (SKILL)

Outcomes: 2, 3, and 10

3. learn to conduct original scientific research in individual and group settings. (SKILL)

Outcomes: 7 and 8

4. acquire the skills necessary to participate in a professional scientific community. (SKILL)

Outcomes: 4 and 9

5. discover how chemistry is linked to other disciplines, and appreciate the interdisciplinary nature of science. (VALUE)

Outcomes: 1 and 5



## Implementation of the Assessment: The Plan

### *What occurs for senior majors in Chemistry Comprehensives*

- Each major in the senior year presents two talks and receives critical feedback from all departmental faculty. The feedback is collated and discussed with student by comprehensives faculty member.
- Each major attends a workshop at the library on using print and on-line resources and databases.
- Each major writes a 10 page research paper which is graded including written comments by the comprehensives faculty member.
- Each major takes 4 standardized, written exams from the American Chemical Society. The comprehensives faculty member grades these exams and compares scores to recent national results. Students must pass each exam with a score greater than a 50th percentile score. This information is shared with all departmental faculty *via* email and weekly departmental meetings.
- Each major attends a workshop at the Career Development Center on how to write a resume/*curriculum vitae* and perform in a job interview. Students submit a resume/*c.vitae* to the comprehensives faculty member.
- Chemistry faculty collect information directly from graduating senior majors on what jobs, education, or other work that each student will begin immediately after commencement.

### *What occurs in teaching laboratories*

- *Each student is given safety and chemical hygiene instruction. A signed form is submitted each semester by each student that signifies that this instruction has occurred. In particular laboratories, a questionnaire regarding cooperative/teamwork skills is administered.*

### *What occurs in Directed Research*

- *Each student submits a written research report at the end of each semester. Faculty keep these reports.*

### *Five Year Schedule of Outcomes Assessment*

The Chair will reflect outcome assessment on this five-year schedule when the annual department report is forwarded to the Dean's Office in July of each year. Eileen Spain is the current chair.

- Year 1 (July 2007) #2 and #10 Assess: outcome #2 is assessed by a Laboratory Safety Training Quiz given to students in 110L, 111L, and 145L lab courses in the 2007 spring semester; outcome #10 is assessed by a Team Building Assessment Questionnaire given to students in Chem 110L and Chem 111 L lab courses in the 2007 spring semester. Chair will facilitate the distribution of forms and collect and record assessment data.
- Year 2 (July 2008) #1 and #4 Assess: abstracts of oral presentations (from majors); summary of feedback given to the major between formative and summative comprehensives oral presentations logged by comprehensives faculty (senior seminar faculty) (reflecting feedback from all faculty in attendance at the presentations). Chair will collect data from comprehensives faculty.
- Year 3 (July 2009) #8 and #9 Assess: the comprehensives written paper (from majors) by comprehensives faculty (senior seminar faculty). Chair will collect data from comprehensives faculty.
- Year 4 (July 2010) #5 and #6 Assess: Alumni professional/educational/career data kept in faculty records; American Chemical Society written exams scores for majors. Records and scores collected and kept by Chair.
- Year 5 (July 2011) #3 and #7 Assess: student research reports for Chem 195, 295, and 395 for that year; American Chemical Society written exams scores for majors. Each faculty mentor (all tenured/tenure-track faculty in Chemistry) assess and report to Chair. Chair will collect assessments from each faculty mentor and collect scores from comprehensives faculty.

## Departmental Support

Chemistry meets weekly as a department, and this work was the main agenda item at about 6 of those 90 minute meetings during the Fall 2006 semester. We first developed the mission and goals through a revision process, and then used the same process for formulating the outcomes and course/outcome alignment matrix. We have followed through with these discussions during this 2007 spring semester as we finalized the assessment plan. The final draft was approved by all tenured/tenure-track and continuing faculty on April 5, 2007.

Chris Craney \_\_\_\_\_

Phoebe Dea \_\_\_\_\_

Donald Deardorff \_\_\_\_\_

Michael Hill \_\_\_\_\_

Linda Lasater \_\_\_\_\_

Aram Nersissian \_\_\_\_\_

Tetsuo Otsuki \_\_\_\_\_

Eileen Spain \_\_\_\_\_