

## Chemistry and Biochemistry Department

### Assessment of Student Learning:

The following description lists the goals of the program, the instruments used to assess, how well the goals are met, typical results, response and timelines. Assessment data is collected in a database maintained by the Department secretary. The faculty meets annually to hold discussions.

**GOAL 1. For each student to acquire a broad, basic knowledge base in the chemical sciences. Major areas include: general chemistry, organic chemistry, analytical chemistry, biochemistry, inorganic chemistry and physical chemistry**

1a **MEANS:** The Department uses standardized final examinations supplied by the American Chemical Society in every course for which they are available (7 courses, all major areas).

**RESULTS:** Average results are approximately the 50<sup>th</sup> percentile, with a range of 2-100.

**USE:** Results are used to identify topics that have received inadequate coverage

**TIMELINE:** ACS exam scores are examined each year by the Chair and faculty members teaching the courses involved. Results discussed collectively by the faculty every few years.

1b **MEANS:** The Department follows a curriculum approved by the American Chemical Society.

**RESULTS:** Students who attend graduate school have done very well in entrance examinations and first-year coursework - an indication of adequate preparation.

**USE:** Curriculum is changed in response to American Chemical Society suggestions.

**TIMELINE:** The Department Chair submits an annual report to the ACS. Every five years, the Chair prepares and submits a comprehensive report to the American Chemical Society Committee on Professional Training for continuing certification.

1c **MEANS:** The Department encourages collaborative student/faculty research.

**RESULTS:** Publications, conference presentations, research reports.

**USE:** Peer review offers constructive criticism.

**TIMELINE:** Continuous.

**GOAL 2. Students should be able to understand and design experiments. Students should be able to report experimental results in an appropriate fashion and be able to comment on the validity of experimental results and conclusions. Students should be able to use standard laboratory glassware and instrumentation; they should also be cognizant of the potential dangers inherent to certain materials and be able to assess risk factors associated with their use.**

2a **MEANS:** Students are enrolled in laboratory courses throughout their undergraduate careers here. Various labs include: experiment design; statistical and graphical analysis of data; error analysis; spectral acquisition and interpretation; synthesis, analysis. Key student written laboratory reports are collected starting in the freshman year and examined collectively for indications of improvement in writing proficiency and scientific sophistication. All research students attend a yearly safety seminar and each lab includes further instruction relevant safety considerations.

**RESULTS:** Typical students show dramatic improvement in scientific writing skills by the junior year. The department continues to require extensive written reports for all lab courses.

**USE:** Any perceived weakness is examined as an individual or collective property. Any systematic deficiency is addressed by course or emphasis modification.

**TIMELINE:** Select faculty (analytical, physical chemistry) examine collections of reports every four years. Yearly department discussions of each chemistry student include observations on progress in the major areas detailed above.

**GOAL 3. For each student to be adequately prepared for employment in industry, government labs or secondary education or to pursue graduate education in chemistry, related disciplines or professional schools.**

3a **MEANS:** The Department maintains a web-based alumni database, which tracks virtually every graduate.

**RESULTS:** Nearly all graduates are successfully employed in chemical or teaching careers or are in advanced programs. Over 50% of the graduates during the past 12 years have attended graduate school.

**USE:** We have solicited suggestions from graduates in areas of course content and the structure of new programs.

**TIMELINE:** Continuous.

3b **MEANS:** Cover letter/resume assignment in seminar class.

**RESULTS:** Original assignments are archived in student files. Grades are summarized in the department assessment spreadsheet when scores are reported to the Department Secretary.

**USE:** General level of preparation is examined.

**TIMELINE:** Fall semester.

3c **MEANS:** GRE, MDCAT or CST scores.

**RESULTS:** Results in student file when available.

**USE:** General level of preparation is examined.

**TIMELINE:** Continuous.

**4. For each student to be able to search, read and critically evaluate chemical literature. Additionally, to be able to report scientific results clearly and accurately by both written and oral expression.**

4a **MEANS:** The Department requires each graduating senior to present a one-hour, formal seminar covering a recent publication in chemistry.

**RESULTS:** Essentially all students successfully complete the assignment.

**USE:** This capstone presentation is a good indicator of the general competence level of graduating seniors.

**TIMELINE:** Students present a seminar during the spring of their senior year; students and all faculty evaluate the seminar.

### **Responsibilities:**

In general, the Department Chair is responsible for initiating the meetings, writing reports, and leading discussions. Individual faculty members are required to collect the data, help devise assessment instruments, participate in the discussions of improvement plans and implement the plans in their courses. Each year, one or more of the above areas is addressed. Data is collected and discussed during the fall or spring semesters as appropriate. Assessment discussions are also often incorporated into weekly staff meetings.

### **Record keeping:**

Assessment data is collected in a database maintained by the department secretary and a summary of annual assessment activities is contained in the Annual Report.

**Introduction: Assessment is the examination by the academic department of what is being done by its faculty to achieve the unit's or program's learning goals and objectives in relation to the University's mission/vision. Note: Describe assessment in relation to the goal(s) indicated at the beginning of the year.**

**As part of their annual report, departments are to comment on each of the following:**

**a. How was assessment undertaken? That is, in light of the academic program's goals and objectives, including those for student learning, briefly describe assessment activities and measures.**

The Department follows the guidelines for BS programs established by the American Chemical Society's Committee on Professional Training. The guidelines have recently (2007-9) undergone major revisions. They have been changed to allow flexibility in chemistry programs and to reflect the increasingly interdisciplinary nature of science.

The Department's learning goal this year is to examine our sequence of courses for majors in light of the new ACS-CPT guidelines. Although many courses remain unchanged, revisions to the physical chemistry and inorganic course offerings have been implemented. We held department meetings for overall discussions and then formed some groups of involved faculty to formulate curriculum revisions.

**b. Summarize the outcome of the assessment activities.**

The current sequence of courses will satisfy the ACS-CPT guidelines, allowing the Department to continue to offer ACS certified degrees in chemistry and now biochemistry as well.

**c. Briefly indicate any changes or planning for changes as a result of assessment activities. Discuss whether it is feasible to implement changes based upon outcomes under the present circumstances.**

The major change was in CHEM 316/317 which has been revised and renamed as *Introduction to Physical Chemistry* and *Advanced Physical Chemistry*. Other courses had slight modifications or changes in emphasis.

**7) Summary of Five-Year External Program Review (if applicable):**

The Department is certified by the American Chemical Society Committee of Professional Training and completed a five-year review in May 2010. The annual report to the ACS was submitted in June 2010.