

CHEMISTRY

Mission and Structure

This mission of the chemistry department is to provide a quality education for chemistry and biochemistry majors, those entering chemistry teaching at the secondary education, and for other majors requiring chemistry such as biopsychology, biology and environmental science. The chemistry department also provides quality education through the general education program. The chemistry major is designed to give students a broad education in chemistry coupled with a research experience.

As a field, chemistry is generally divided into the areas of analytical, biochemistry, inorganic, organic and physical. The chemistry department is well represented in these areas. The chemistry program parallels that required for certification by the American Chemical Society Committee on Professional Training (ACS-CPT) and consists of the following:

Two semesters of general/analytical chemistry	(CHEM 140 and CHEM 220/225)
Two semesters of organic chemistry	(CHEM 130 and CHEM 230)
Two semesters of physical chemistry	(CHEM 312 and CHEM 322)
Two semesters of calculus	(MATH 151 and MATH 152)
Two semester of calculus based physics	(PHYS130 and PHYS 132)
One semester of biochemistry	(CHEM 330)
Four semesters of Science Seminar	(CHEM350)

Students may select electives from:

One semester of advanced inorganic	(CHEM 370)
One semester of advanced chemistry	(choice of CHEM340, CHEM362, CHEM380, or CHEM390)

This curriculum prepares students well for careers as industrial chemists, as professionals in health-related fields, as graduate students in chemistry, biochemistry, and environmental chemistry, as teachers, and as productive citizens using their scientific education in diverse ways. Due to staffing considerations, the ACS-CPT certification has not been available to chemistry graduates for several years. Recent hiring in the department has corrected the staffing issue and the chemistry department will be seeking reinstatement of the ACS-CPT certification during the upcoming academic year.

Discovery based approaches, used in many courses throughout the curriculum, and undergraduate research, are key components of the chemistry curriculum and require significant laboratory, instrumental and computational work. Critical analysis skills are continually developed and connections with real chemical problems and societal issues are woven into courses throughout the curriculum. Students are also encouraged to apply for off-campus internships and research experiences.

In addition to direct support for other science programs, chemistry offers multiple sections of Cultural Chemistry, a course taken by non-majors as part of the general education program. In this course there is a very strong emphasis on societal issues and the impact of scientific thinking on everyday decisions and problems. Chemistry Faculty also participate in Introduction to Liberal Arts (formerly Freshman Seminar), Issues and Ideas, and the Environmental Science program (by teaching ENVI103).

Goals of the Major

The Goals of the chemistry program are that graduates:

1. understand the principles and vocabulary of chemistry
2. appreciate the interrelatedness of the various sciences
3. use modern instrumentation and computational tools to solve problems
4. analyze problems, critically evaluate data, and interprets results to others
5. communicate scientific information, in both written, oral, and mathematical forms, to peers and the general public.

Faculty in the chemistry department derive individual course goals from these department goals. Table 1 contains the courses in which the department goals are addressed.

Table 1: Courses and Assessment for Department Goals

Goal	Course	Assessment	Notes
1. understand the principles and vocabulary of chemistry	All Courses	Faculty use a mixed methods approach to assessment with the majority of the tools being embedded into the course.	Courses in an area are responsible for the vocabulary and principles of that area. There is significant overlap between the areas.
2. appreciate the interrelatedness of the various sciences	All Courses	Faculty use a mixed methods approach to assessment with the majority of the tools being embedded into the course.	Inherent in biochemistry and physical chemistry but also done in several other courses.
3. use modern instrumentation and computational tools to solve problems	Primarily in CHEM312, 322, 330, and 340.	Faculty uses a mixed methods approach to assessment with the majority of the tools being embedded into the course. However, instrumental skills are primarily assessed through authentic assessment tools.	Introduction occurs in lower division courses, but most frequent use in physical chemistry, biochemistry, and instrumental analysis.
4. analyze problems, critically evaluate data, and interprets results to others	All courses	Faculty use a mixed methods approach to assessment with the majority of the tools being embedded into the course.	Pervasive throughout the curriculum, particularly in laboratory courses.
5. communicate scientific information, in both written, oral, and mathematical forms, to peers and the general public	All courses but CHEM322 has a significant focus on chemical writing and CHEM350 focuses on oral communication. Research courses require both.	Authentic assessment is used as the primary tool for assessment of both written and oral communication	Primarily done in upper division courses.

Assessment

The chemistry department uses a mixed method approach to assessment. A mixed method approach uses both qualitative and quantitative tools to assess effectiveness. Quantitative methods used include examinations, quizzes, and laboratory reports as well as formal papers (primarily formative, but the final research paper is used for summative assessment). Qualitative methods used include both formal and informal presentations as well as discussions and interviews (primarily formative, but the poster presentation is used as summative assessment). Standardized examinations are used in some upper division courses to compare student performance on a national basis, and as a summative assessment.

Beginning with the goals of the department, each faculty member has derived learning outcomes and success criteria for each of their courses. The chemistry department will be reviewing the success criteria and the degree to which the criteria were met in an upcoming department meeting. Additional points to be addressed at the meeting include:

- Formalizing the assessment process for undergraduate research
- Formalizing the exit surveys and interview process
- Formalizing alumni survey process
- Communicating expectations from courses to evaluate retention