

Department of Physical Science

2006-2007

Expanded Statement of Institutional Purpose

Mission Statement

Chemistry
Chemistry, the central science, is an active discipline vital to human existence and essential to the understanding of industrial, economic, and environmental issues. The mission of chemistry is to instill an understanding of chemistry and its relevance through quality teaching, scholarly and professional activities, and service. In a world that is becoming increasingly more technical and complex, providing chemical instruction with the depth, breadth, and rigor for students to meet this need is critical.

Geoscience and Physics
Geosciences and Physics strive to provide students at Southern Utah University with excellence in physical science education. Our integrated efforts are directed toward those methods we feel produce the best possible educational experience. The primary goal of the geoscience and physics faculty is to ensure academic excellence in our students while demanding integrity, building self-esteem, and developing critical thinking skills.

Program Intended Educational Outcomes- 2006-2007

Outcomes/Objectives

Chemistry
1a. Courses will be taught by faculty with appropriate expertise and excellence in their fields of teaching.
1b. Students will learn and demonstrate an understanding of theoretical chemical principles.
2a. Qualified faculty mentors with appropriate expertise in their fields will offer chemistry laboratories, scholarship, employment, and other hands-on experiences for students.
2b. Students will practice and demonstrate chemistry principles via laboratory experiments, undergraduate research / employment, discussions out of class, etc.
3a. Students will learn and demonstrate the ability to critically think about chemistry principles, and to communicate such items via oral and written means.
3b. Class size will be limited to what is pedagogically most appropriate and meets ACS criteria.
4a. Students desiring graduate degrees will have the opportunity to develop and demonstrate their abilities to meet entrance requirements: tests, scholarship, etc.

Means of Program Assessment and Criteria for Success

Assessment Criteria & Activities

Chemistry
1a./2a. Only doctoral qualified faculty with demonstrated expertise and above-average teaching performance in appropriate chemistry sub-fields will be hired, promoted, and retained in tenured positions. Faculty will annually attend faculty development activities to enhance subject knowledge and presentation methods.
1b./2b. Chemistry students will pass their major courses with a minimum grade of "C" or better. The average score on the ACS final exam by students in each chemistry course will meet or exceed the 50th percentile. The average score on each section of the ETS field exams by graduating seniors will exceed the 50th percentile. Graduating seniors will also have had undergraduate research or employment experiences.
3a. A capstone course will assess each student's ability to communicate via a written and oral report, which will also evaluate prior "course embedded activities" requiring critical, logical, and analytical thinking.

Summary of Data Collected

Chemistry
1a/2a All eight full-time faculty are terminally (Ph.D.) qualified, and have specializations covering analytical, biochemistry, inorganic, organic, and physical chemistry. All faculty members are attending development activities for teaching.
1b/2b. Chemistry students have passed their major courses with a minimum grade of "C" or better. In 2006-2007 the average scores on all ACS final exams in each chemistry course have exceeded the 50th percentile. Moreover, average scores on ETS field exams completed by graduating seniors was the 85th percentile which places SUU Chemistry in the 95th percentile of chemistry programs administering the exams. All graduating seniors have had undergraduate research and/or employment experiences.
3a. CHEM 4990 is established as the capstone course for all chemistry majors. Students prepare a review article and present it verbally in class on research topics (requiring critical, and analytical thinking).

Use of Results

Chemistry
1a/2a. At this time, no added action is required for the eight full-time faculty. As the new MS in Forensic Science program continues this fall, the future demands of chemistry faculty members may require additional hires.
1b/2b No action is necessary at this time to match the minimum level of 50th percentile in ACS and ETS exams. We will continue to monitor the percentile scores.
3a. No action is currently necessary.
3b. To maintain the maximum class size allowed at 50 enrollees or less, Chemistry is offering selected upper division classes on an every-other-year basis. Although frowned upon by ACS, this strategy allows the average class size in chemistry to be kept at an optimal level for efficiency.
4. The College must be more aggressive in obtaining entrance exam scores from all students entering graduate programs.
5. No action is necessary at this time.
6. No action is necessary at this time.

Goal Statement

Chemistry will:

1. Provide expert instruction in all classroom settings: lectures, labs, recitations, etc.
 2. Provide students competitive opportunities for scholarship, employment, and other hands-on experiences with qualified faculty mentors.
 3. In a personalized environment, educate students to think critically and independently, and to improve communicative, creative, analytic and information gathering skills.
 4. Prepare students who choose to pursue graduate degrees upon graduation either in chemistry or the health sciences.
 5. Surveys of general education and service course students will be conducted to assess success of our courses in providing background knowledge.
 6. Prepare students who choose to pursue employment upon graduation in a science related field in business/industry/ education. Provide service courses for other academic and professional programs, and for the general education experience.
 7. Meet or exceed standards of an approved chemistry curriculum as established by the American Chemical Society (ACS).
- 4b. Appropriate tracks of study will be provided for professional, health care and forensic emphases.
 - 5a. Students desiring employment upon graduation will be prepared for business, industry, or education.
 - 5b. Appropriate tracks of study will be provided for professional chemistry and education majors.
 6. In addition to offering courses for the campus general education program, the division will provide chemistry courses that can meet the needs of chemistry majors as well as other academic majors.
 - 7a. The chemistry curriculum will be approved by the American Chemical Society (ACS), assuming that adequate resources are available to meet ACS criteria.
 - 7b. Chemistry will continue to align the chemistry curricula at SUU with the nationalized ACS curricula.
 - 7c. Chemistry will continue to utilize the nationalized ACS exams as final exams for each course in the SUU chemistry curricula.
 - 7d. Chemistry will continue to require all graduating seniors to take the Educational Testing Service (ETS) field exams.so
- 3b. Sizes of classes will be monitored relative to scores on ACS final exams and ETS field exams.
 4. Scores of students or entrance success relative to admittance standards in graduate chemistry programs will be tracked. In addition, Dental Admission Test (DAT), Medical College Admission Test (MCAT), and other relevant scores will be monitored for determining subject matter mastery. (Also, see 1b/2b above).
 5. Placement of graduates will be monitored annually. Surveys of students and employers will assess chemistry graduates preparedness.
 6. Surveys of general education students will be implemented to assess success of courses.
 - 7a. The chemistry curriculum has been resubmitted for approval by ACS and a report has been received from the ACS detailing what items must be addressed and improved.
 - 7b. For best practice and economy, only ACS approved courses will be included in the major curricula.
 - 7c/7d. See item 1b./2b. above relative to requirements on ACS final exams and ETS field exams in chemistry.
- 3b. Class sizes did not exceed 50 enrollees per section. Perhaps, this contributes to the consistency with which scores exceed the 50th percentile on all classes.
 4. Scores from students who shared their test results for entrance to graduate school and health fields demonstrate that they had mastered chemistry subject materials. None appeared below the national average.
 5. All graduating seniors were either placed in employment or went on to graduate education.
 6. Surveys of undergraduate students in both major and service courses are being analyzed and summary data prepared for review.
 - 7a. We have purchased a 200 MHz NMR and FTIR, as recommended by ACS, and the addition of our newest faculty member will allow chemistry to meet the contact hour requirement (15 contact hours max).
 - 7b. Only ACS approved courses are included in the present curriculum.
 - 7c. See item 1b/2b for results on ACS/ETS tests.
- 7a. Chemistry hopes to undergo review this academic year that should lead to ACS approval of our degree programs.
 - 7b. No action is necessary at this time.
 - 7c. No action is necessary at this time.

Geosciences and Physics will:

8. Provide expert instruction in all teaching settings: lectures, labs, field trips, etc.
9. Provide expert direction/instruction for competitive opportunities in scholarship, employment, and other experiences.
10. Educate students to think critically and independently, and to improve communicative, creative, analytic and information gathering skills.
11. Prepare students who choose to pursue pre-professional (physics) or graduate (geology) education.
12. Prepare students who choose to pursue employment in a science related field in business, industry, or public education upon graduation.
13. Provide service courses for other academic and professional programs and for the general education purpose.

Geoscience & Physics

8. Courses will be taught by faculty with expertise appropriate to their teaching assignments.
9a. Laboratories, field experiences, and other hands-on experiences will be conducted by faculty members with appropriate expertise in their fields.
9b. Students will practice and demonstrate understanding of theoretical and applied principles via laboratory experiments, undergraduate research, field experiences, etc.
9c. Graduates in geoscience will write a senior thesis based on their independent research.
10. Students will learn and demonstrate the ability to critically think about physical science.
11a. Students desiring professional/graduate degrees will have the opportunity to develop and demonstrate their abilities to meet entrance requirements: tests, scholarship, etc.
11b. Appropriate curricula will be provided for pre-professional/graduate preparation.
12a. Students desiring employment upon graduation will be prepared for business, industry, or public education.
12b. Appropriate curricula will be provided for technician/physical science employment.
13. In addition to offering courses for the campus general education program, geoscience and physics will provide courses that meet the needs of other academic majors (engineering, chemistry, forestry, biology, etc).

Geoscience & Physics

8./9a. Only doctoral or professionally qualified faculty with appropriate expertise who are evaluated in teaching, scholarship, and service at least as standard performance (SP) in all areas will be hired, promoted, and tenured. Faculty will participate annually in development activities to enhance subject knowledge and presentation methods.
9b. Geoscience and physics students will pass their "major" courses with a grade of "C" or better. Graduating seniors will perform acceptably on the general portions of the Graduate Records Examination (GRE) and pre-professional admissions exams (MCAT and DAT).
9c. Geoscience students will also complete directed undergraduate research/senior thesis projects, including presentation of the results at state, regional, or national professional meetings.
10. Capstone geoscience experiences (senior thesis and field camp) will assess each student's ability to communicate via written and oral reports. Their success in these activities will provide evaluation of prior "course embedded activities" requiring critical, logical, and analytical thinking.
11a./11b. Graduate acceptance / entrance success in graduate geoscience programs will be tracked. In addition, GRE and other relevant scores will be monitored for determining subject matter mastery. (Also, see 2b. above).
12a./12b. Placement of graduates will be monitored annually. Surveys of both students and employers will assess preparedness of geoscience graduates
13. Surveys of general education and service course students will be
Geology & Physics

Geoscience & Physics

8./9a. All full-time faculty members are doctorally or professionally qualified, and have specializations appropriate to the courses they teach. All participate in teaching development activities, including pedagogical short courses, and five faculty members made professional presentations on pedagogical issues at national and regional meetings last year.
9b. Geoscience students have completed their "major" courses with a grade of "C" or better and graduating seniors have performed acceptably on the subject and conducted to assess success of our courses in providing background knowledge. general portions of the Graduate Records Examination (GRE).
9c. Graduating geoscience students have all participated in directed senior thesis projects, the results of which were presented in the annual meetings of the SUU Student/Faculty Research Day, Utah Academy of Sciences, Arts, and Letters and the Rocky Mountain Section of the Geological Society of America.
10. All geoscience graduates have completed senior thesis and field camp, and their success in these capstone courses provides evidence of competency in "course embedded activities" requiring critical, logical and analytical thinking.
11. Three of seven geoscience graduates applied were accepted to geology graduate programs this year.
12. Two of three geoscience graduates have secured employment in the field. Their success is being monitored.
13. Surveys were conducted in general education courses (GEOL 1010, 1110, and 1210). The data are currently being analyzed.

Geoscience & Physics

8/9a. At this time, no added action is required for geoscience faculty members. We have hired one more faculty member in physics, which has also allowed us to return a chemistry faculty member to full time chemistry teaching Fall, 2007. We also feel it is time to consider the future of the GIS program and determine a direction for it to move. We will initiate discussion on this topic during the 2007-08 academic year.
9b./9c./10. We are attempting to integrate undergraduate research and reporting its results earlier into our curriculum. This past year, not only did seniors present research results, sophomores and juniors conducted research and presented it at a state and regional professional meetings. Based on the success of the last two year's students, we have added an undergraduate research component to two three additional major's courses.
11a. Greater effort will be expended to encourage graduate studies.
12. We have assisted students in content related job placement. This year's exit survey is comprehensive and will be used to make curricular decisions for the 2007-08 academic year.
13. Student survey data have been used to modify the assessment criteria in two (GEO 1010 and GEO 1110) of the courses surveyed. Student response to these changes was very positive.