

*Institutional Effectiveness Report
Academic Year 2011-2012
Undergraduate Chemistry*

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Mission and Goals

The Department of Chemistry offers lower-level courses appropriate for general education and upper-level courses for major and minor programs in chemistry. These courses also serve as foundation courses for majors in other areas such as biology, mathematics, and pre-professional programs. Topics and concepts on the fundamental laws of nature that govern the physical universe and on the methods of scientific inquiry used to investigate and develop those laws are the foundations of course content. A basic understanding of the fundamental laws of nature and a basic understanding of the process of scientific inquiry are essential parts of a liberal arts education.

The chemistry program seeks to offer courses in chemistry that are taught by full-time faculty members with appropriate advanced degrees dedicated to science education at the university level. The courses offered in the department range in level from introductory courses that expose non-science majors to scientific thought to advanced courses that cover current and complex topics in modern chemistry. The laboratory experience is required in appropriate courses to illustrate the importance of experimentation to the scientific endeavor. For the majors in chemistry, the opportunity to undertake undergraduate research is offered. Since part of the research is the interpretation and communication of results, majors graduating from those programs in the department are expected to be proficient in oral and written communication, to be familiar with the scientific literature, and to be aware of the importance and usage of computers in science.

Those students completing either of the two major tracks offered by the Department of Chemistry are prepared to enter into any number of career choices. These include science education at the secondary level; work in local, region, and national industries and with governmental agencies; and entrance into graduate or professional schools.

The current chemistry curriculum consists of two tracks. The first is the track leading to the basic or minimal chemistry major. The second track is the curriculum leading to the American Chemical Society (ACS) certified degree. The ACS-certified degree requires additional advanced course work in chemistry, physics, and mathematics.

Assessment Activities

For 2011-2012, the department used a variety of assessment instruments in CHEM 499, Chemistry capstone course. These included a standardized test of undergraduate chemistry knowledge, an exit survey, and an exit interview. In addition, each student was required to give a 20 minute presentation on a topic in the current chemistry literature.

During the Spring 2012 semester we administered the American Chemical Society Diagnostic of Undergraduate Chemical Knowledge to the four students enrolled in the CHEM 499 Chemistry capstone course. The scores ranged from the 42nd percentile to the 94th percentile (raw scores of 34 to 44 out of 60 questions). The average score was at the 66th percentile. We will continue to review fundamental topics as part of the course requirement.

The surveys and exit interviews showed that the majors were generally satisfied with the course offerings, with the lab experience, and with opportunities for research. Students were satisfied with faculty knowledge, availability, and advising. Concerns include the need to update computer facilities/software and laboratory equipment.

The oral presentations were much improved this year in terms of quality. A rubric was given to the students to help in their presentations. This year we also had the students do a practice presentation to each other. They obviously benefited from the feedback and suggestions. The faculty will continue to look at ways of addressing oral presentations in lower level courses to help improve presentation skills.

Based on each of these assessment tools, the faculty will look at different strategies of reviewing the content from the major areas in chemistry in the CHEM 499 course. We will continue to encourage students to take additional advanced coursework and to participate in research activities.

*Primary Issues Identified During 2011-2012
with a Review of Actions Taken During 2011-2012 for the Department of Chemistry*

Issues of Concern 2011-2012	Actions Taken
New faculty need to be hired as a result of changes in teaching loads.	Budget constraints continue to delay the hiring of additional full-time faculty. Three adjunct faculty were used to cover additional sections during the 2011-2012 academic year.
The Tutoring Program needs to continue to be developed for assisting students in the lower level chemistry lectures and laboratories.	Tutoring sessions from this year were very productive. Over 300 individual tutoring sessions were conducted, and reflection statements that were required for tutors and some tutee classes were encouraging. Most have indicated that the tutoring sessions have increased their understanding of chemistry.
Increase membership and participation in the Student Affiliate Section of the American Chemical Society	<p>For 2011-2012, there were a total of 33 chapter members (11 ACS student affiliates and 24 non-student affiliates).</p> <p>Recruitment and retention were achieved by having professors announce the first meeting of the semester in chemistry lectures. Flyers were also posted in various locations around campus. A social in the Fall was held for recruitment as well as many other activities throughout the year. The Student Affiliate Section also was represented at the Student Organization Fair. The Student Affiliate Section also has a Facebook page (Francis Marion University American Chemical Society) to improve our web presence and awareness about the group's activities. In addition, email addresses were collected this year and used to promote affiliate activities.</p> <p>The student affiliates were involved in a variety of activities. These included monthly meetings, social events, field trips, and professional meetings.</p> <p>The Student Affiliate section received an International Year of Chemistry grant that was used toward National Chemistry Week events (a health screening and Zumba classes).</p> <p>The Student Affiliate section also applied for and received a National Meeting Travel Grant.</p> <p>Our chapter got to be in the "Spotlight" in the <i>inChemistry</i> magazine for undergraduates.</p> <p>The Student Affiliate section was recognized with an Outstanding Chapter Award for 2010-2011.</p>

<p>Increase the Chemistry department's ties with the scientific community</p>	<p>The department (with the Student Affiliates) invited three on-campus speakers and six off-campus speakers to give talks this year. Former students came back and talked about pharmacy school, graduate school, and working in industry. A chemistry faculty member describes her REU experience. The ARCH program was discussed as well as a talk on suicide prevention. The department also hosted four speakers for the Science Symposium.</p>
<p>Increase the opportunity for chemistry students to participate in undergraduate research</p>	<p>Eight students were involved in undergraduate research projects this year.</p> <p>Two faculty and six students presented posters at the annual meeting of the Southeastern Section of the American Chemical Society (SERMACS).</p> <p>An internal grant for \$5000 was funded that allowed the department to take 20 students to the SERMACS. In addition, one student went to the national meeting in March and presented a poster.</p> <p>In addition, we had 10 students attend the local section meeting this past semester.</p> <p>Four students have also received REU's for this summer.</p>
<p>Secretarial help is needed on the third floor.</p>	<p>Due to budget constraints, the Chemistry Department continues to share a secretary with the Physics Department (first floor). This is not an ideal situation and will continue to be revisited as the budget improves.</p>
<p>Examine and apply traditional and new teaching strategies, incorporating new technologies.</p>	<p>Several lab experiments were modified in the General and Organic lab programs. Further modifications will be examined for both programs.</p> <p>The Laboratory Manuals in CHEM 101 and 102 are being revised to include more pictures of the equipment they will use and revising the text to make it more readable.</p> <p>The use of our new Perkin Elmer Spectrum Two UATR FT-IR spectrometer in the general chemistry Honors lab has significantly reduced sample preparation time, which in turn allowed more time to discuss relevant concepts, theory, and interpretation of the students' results.</p> <p>Faculty continue to use the multimedia equipment in the classrooms with varying success. In order to use powerpoint and other forms of presentation successfully, this equipment needs to be upgraded.</p>

<p>Office and instructional computers need to be upgraded.</p>	<p>In Dec of 2011 the computers for undergraduate use in both computer labs were updated. This included 14 stations in LSF 310, Chemistry Computer Lab, and 7 stations in MSB 315, the Chemistry Majors Computer Lab. In additions two stations were upgraded for the Tutoring Center. Each station was equipped with a Lenova i-5 with access to laser printers.</p> <p>Four faculty computers were also upgraded this year.</p>
<p>Publicity needs to be improved via local media and the University's Community Relations Office</p>	<p>Flyers announcing events were posted in the Leatherman Science Facility, McNair Science Building, campus housing and the Smith University Center. Communication was also accomplished via e-mail and announcements in class. Flyers were used to make students aware of the availability of the chemistry tutoring center and the hours of operation. Order forms for sweatshirts were distributed in the chemistry classes.</p> <p>A Facebook page (Francis Marion University American Chemical Society) has been developed to communicate about events, exchange digital photos, and interact with members. The Facebook page improved our web presence and improved awareness about the group's activities.</p>
<p>Increase the participation of women and minorities in chemistry</p>	<p>Women and minorities were actively involved in all activities of the Student Affiliate chapter, from social events, fundraisers, trips to professional meetings, and interactions with elementary and middle school students. Seven of the eleven student affiliate members are women or minorities.</p> <p>Women and minorities are strongly encouraged and actively participate in undergraduate research, in the tutoring program, and in various departmental activities.</p>
<p>Continue general education assessment in CHEM 101</p>	<p>The general education assessment was administered in fall 2011 students enrolled in CHEM 101. A series of multiple choice questions were developed using the experiment on the conversion of a carbonate to a chloride. Overall, the students showed, as indicated by the correctness of their responses, that they generally understood the scientific principles being questioned.</p>
<p>Continue to be involved in science activities with elementary and middle school students</p>	<p>A faculty member conducted monthly science experiments for Hannah-Pamplico Middle School after school program.</p> <p>The department provided science fair judges for the Sand Hills Regional Science Fair and well as for local schools. Copies of our course materials were provided for the Chemistry teacher at RE Lee Academy.</p> <p>A faculty member consulted with a local high school on the creation</p>

	<p>of a (non-AP) second-year chemistry course.</p> <p>Two faculty participated again at the AP Chemistry reading.</p> <p>The Student Affiliate was involved with a local elementary school helping them prepare science fair posters. In addition the affiliates did tie-dye t-shirts for science fair participants.</p>
<p>Update of laboratory equipment and instrumentation</p>	<p>The Stimulus Fund (\$40K) updates included a full set of microscale labglass kits, set of 10 micropipettors, Critical Point Apparatus for Physical Chemistry, set of 20 spectrophotometers for Vernier Data Acquisition, two GPC columns, two Spectronic 20D's, two analytical balances, three conductance meters, and additional sensors for the Vernier data acquisition equipment.</p> <p>Other new equipment acquired includes 1) the new FT-IR with Attenuated Total Reflectance capability (virtually no sample prep – reads surface of the sample), 2) the Nikon Inverted Image Microscope for “Imaging Microscopy” and 3) several more digital melting point apparatuses.</p>