

*Institutional Effectiveness Report
Academic Year 2007-2008
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 2007-2008, the department continued to use four primary assessment tools for program evaluation in the chemistry capstone course (CHEM 499). The Major Field Achievement Test (MFAT) was administered to graduating seniors. In addition, in-house tests were developed for assessing inorganic, organic, physical, and analytical chemistry. Each graduating senior completed an exit questionnaire and an exit interview with the department chairman.

During the Spring 2008 semester we opted to take the MFAT in chemistry on-line for the first time. There were serious malfunctions during the test. First, the test was not user-friendly, and many students had difficulties reading various graphics, interpreting spectra, and just keeping the needed material on the same screen. For example, students were observed trying to hold their answer sheets and pencils at various angles to find intersections on graphs. The students were seriously frustrated with these problems and it disrupted their attention. In addition, the test was divided into two parts. According to the directions, part one was ETS material and part two was in-house questions. When the students got to part two, they clicked exit since we had no in-house questions. However, this turned out to actually be the second half of part one. Because our students only took "half" the test, their scores are invalid and should not be compared to any other group. We worked with ETS to try to resolve these issues and have some preliminary data that could only be used in-house due to these circumstances. Next year we will be using the printed test!

The in-house tests developed for the specific subject areas continued to show the same results as from previous years. The inorganic scores were the highest, followed by physical and analytical, with organic scores being the lowest. We expect these scores because the students generally take organic during their sophomore year, with inorganic, physical, and analytical being taken during their junior and senior years. We will continue to encourage our students to take the optional advanced organic chemistry course.

Primary Issues Identified During 2007-2008 with a Review of Actions Taken During 2007-2008 for the Department of Chemistry

| Issues of Concern 2007-2008 | Actions Taken |
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| New faculty need to be hired as a result of changes in teaching loads. | Although the advertising and recruiting process began for hiring an additional instructor, budget constraints forced the cancellation of this position. |
| Trailer sections need to be offered for general and organic classes. | The fall 2008 schedule was originally planned to include a trailer section of CHEM 102. However, when our new faculty position was cut, the schedule had to be modified and the trailer section had to be dropped. Once the department has sufficient faculty, trailer sections can be added. |

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| <p>A Tutoring Program needs to be developed for assisting students in the lower level chemistry lectures and laboratories.</p> | <p>The Chemistry Tutoring Program was developed and implemented for the 2007-2008 academic years, using funds provided by the State of SC Fund for Women and Minorities in Science and Mathematics. Tutors were heavily recruited from the student affiliate group. Tutors provided assistance with general, analytical and organic chemistry homework and laboratories. Tutors also provided feedback on optimum hours and ways to improve tutoring services. Eight tutors led by a faculty member assisted approximately 175 students from September 2007 to April 2008.</p> |
| <p>Special courses need to be developed for nursing students</p> | <p>The Chair of the Department of Chemistry talked with the Head of the Nursing Program regarding the need for new courses or changes in the current general chemistry courses. Based on this information, there appears to be no need at this time to modify our general chemistry program as it seems to fit the needs of the nursing majors.</p> |
| <p>Increase membership and participation in the Student Affiliate Section of the American Chemical Society</p> | <p>Dr. Jennifer Kelley has assumed leadership of the Student Affiliate chapter of the ACS. For 2007-2008, there were a total of 22 chapter members (6 ACS student affiliates and 16 non-student affiliates).</p> <p>For Mole Day (October 23, 2007), the chapter created a bulletin board to make chemistry students aware of Mole Day, how chemists use Avogadro's number and some history about Avogadro. The chapter also had a bake sale to promote interest in our local chapter and to make students aware of Mole Day. Cupcakes were iced with various formulas and elements from the periodic table.</p> <p>On November 16, 2007 two faculty members and four chapter members judged science posters at a local elementary school. These posters were developed during National Chemistry Week activities.</p> <p>On March 27, 2008 two faculty and two chapter members judged the junior chemistry division at the Sand Hills Region IV Science Fair.</p> <p>On April 22, 2008 (Earth Day), the chapter created an Earth Day Bulletin board with information about green chemistry and energy saving tips.</p> |

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| <p>Increase the opportunity for chemistry students to participate in undergraduate research</p> | <p>Four chemistry faculty and ten students attended the Southeast Regional Meeting of the American Chemical Society (SERMACS) in Greenville, SC from October 24-27th. Dr. Kris Varazo and his research student, Dana Gulledge, presented a research poster in analytical chemistry and Dr. Allen Clabo presented a research poster in computational chemistry as part of the formal meeting. Dr. Leroy Peterson and Dr. Jennifer Kelley's research students, Katie Lewis, Sagar Madiwhala, Jonetha Fleming, and Aaron Oxendine presented research posters in inorganic synthesis and Dr. Clabo's research students Ashley Russell and Katie Rosa presented research posters in computational chemistry as part of the undergraduate portion of the meeting. The majority of the students' research was accomplished during the summer and was funded by the National Science Foundation and the State of SC Fund for Women and Minorities in Science and Mathematics. The posters can be viewed on the third floor of the Leatherman Science Facility.</p> <p>Five FMU student affiliate members and one faculty member attended the 2008 South Carolina Academy of Science at Clemson University, March 20th, 2008. All students gave oral presentations on their various research projects on inorganic synthesis and characterization. Larnelle Peterson, student affiliate member, won the outstanding male presenter for his presentation, "Synthesis and crystal structures of some inorganic-organic hybrids containing fluorosaccharinate".</p> <p>Dr. Leroy Peterson has been awarded a National Science Foundation research grant funded for collaborative undergraduate research with the University of South Carolina.</p> <p>Dr. Kris Varazo was awarded an EPSCOR-IDEA grant for the fall 2007 semester.</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> |

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| <p>Examine and apply traditional and new teaching strategies, incorporating new technologies.</p> | <p>Faculty using MSB 304 incorporated the Smart Board into lectures.</p> <p>Several lab experiments were modified in the General and Organic lab programs. Further modifications are needed for both programs.</p> <p>On January 29, 2008 ten students and five faculty members participated in a tour of Roche Carolina Pharmaceuticals which included a tour of the pilot plant.</p> |
| <p>Office and instructional computers need to be upgraded.</p> | <p>A total of 37 computers were obtained for instructional use. 24 new Lenovo laptops were obtained using lottery money. 13 used Gateway desktop computers were received as a donation from the Biology Department. No faculty computers were updated this year.</p> |
| <p>Publicity needs to be improved via local media and the University's Community Relations Office</p> | <p>Dr. Jennifer Kelley and members of the SAACS promoted various departmental activities campus-wide and coordinated press releases with the Community Relations Office.</p> |
| <p>Increase the participation of women and minorities in chemistry</p> | <p>Drs. Leroy Peterson, Allen Clabo, and Kris Varazo are mentoring student research projects utilizing funds from the Women and Minorities Grant.</p> <p>Four chemistry faculty and ten students attended the Southeast Regional Meeting of the American Chemical Society (SERMACS) in Greenville, SC from October 24-27th. Nine of the ten students were women and/or minorities.</p> <p>On March 20, 2008 Toby Nelson, an FMU alum and Post Doctoral Fellow at Carnegie Mellon University gave a presentation on his current research and graduate research projects in polymer science. He also provided insights on what is like to be a graduate student, working in a research facility and the importance of a strong undergraduate chemistry background. His presentation was particularly effective because he is an African-American originally from the Pee Dee region.</p> |

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| | <p>On April 25th, 2008 two faculty members and three student affiliate members attended the local chapter meeting for the Annual Awards at Claflin University in Orangeburg, SC.</p> |
| <p>Continue general education assessment in CHEM 101 and CHEM 150</p> | <p>The general education assessment was administered in fall 2007 using the experiment on the conversion of a carbonate to a chloride.</p> |