

Department of Chemistry 2004-05 Annual Assessment/Planning Report

Departmental Mission

It is the mission of the Department of Chemistry to provide to all students a firm background in the theory and practice of chemistry; in this manner, the intent and implications of the science requirements in the core curriculum of the college are partially met. Those students desiring either a major or minor in chemistry, or perhaps just a greater knowledge of chemistry, build upon this foundation as they undertake continued studies in chemistry. In addition to its own curriculum, the chemistry department supports in this manner the curricula of other departments as well as the general mission of the college.

The courses of study for students majoring in chemistry are designed to prepare them to enroll as graduate students in full standing at leading universities; to provide the foundation for pursuing careers in medicine, dentistry and other professions; and to fill positions as chemists in industrial laboratories. The department accomplishes this preparation by offering three degree curricula, the BS in Chemistry degree, B.S. in Chemistry - Biochemistry Specialization degree, and the BA in Chemistry degree. All these curricula embody training in the five fundamental subdivisions of the science: biochemistry, inorganic, organic, analytical, and physical chemistry.

Both the BS in Chemistry curriculum and the B.S. in Chemistry - Biochemistry Specialization curriculum are accredited by the American Chemical Society and are intended for those students who plan to go to graduate school in chemistry or chemical engineering, attend medical or other pre-professional schools, or to fill positions in industrial laboratories. Students completing the additional requirements for this prestigious recognition are awarded a certificate by the American Chemical Society documenting their status as professional chemists and are frequently given preferential treatment as candidates for professional positions.

The B.A. curriculum provides great flexibility in choosing electives, and this permits a program to be designed to fit the student's individual aspirations. It is intended for those who wish to combine a technical background with a more liberal arts education.

In support of the general mission of the college, all faculty members are expected to continue to grow professionally and to share that "growth" with colleagues. Additionally, Research and Faculty Development Grants are available through the Citadel Development Foundation, and CDF is a possible source for "matching funds" for outside grants.

As opportunities present themselves and time permits, the faculty is also expected to share their expertise through Public Service activities.

The BS in Chemistry curriculum is accredited by the American Chemical Society; it is a continuing goal of the department to maintain this valuable approval by an independent external professional agency.

This mission statement was adapted from that prepared by the Department of Chemistry in the fall of 1997 and which is fully consonant with the mission statement of the college.

Expected Results (Goals and Skills Acquired)

Goals

B.A. Program in Chemistry. Students who successfully complete this degree plan will have a background in the general theories of chemistry that are further augmented by the five major areas of chemistry: analytical, inorganic, organic, physical, and biochemistry. The level of coverage will provide the student with a strong technical background in chemistry. Because the degree program allows students to take nine electives, students will be able to tailor their degree plan to match their graduation expectations. Students will be prepared to enter programs that have post-graduate studies in chemistry (primarily at the Masters level), medicine, dentistry, law, business, etc. Additionally, they will have a sufficient foundation to enter industrial positions in the same general areas.

B.S. Program in Chemistry. Students who successfully complete this degree plan will have a more in-depth background in chemistry that what is provided in the B.A. in Chemistry program. As a result of this higher level of coverage, the students who successfully complete this program will be able to pursue the more "research-oriented" areas of chemistry in addition to the same opportunities as the B.A. degree holders. In particular, this program will prepare students for research positions in industry, entrance into Ph.D. programs in Chemistry, and graduate programs in Chemical Engineering.

B.S. Program in Chemistry-Biochemistry Specialization. Students who successfully complete this degree plan will have a more in-depth background in biochemistry that what is provided in the B.S. in Chemistry program. As a result of this higher level of coverage, the students who successfully complete this program will be able to pursue the more "research-oriented" areas of biochemistry in addition to the same opportunities as the B.S. degree holders. In particular, this program will prepare students for research positions in the biotechnology industry, entrance into Ph.D. programs in Biochemistry.

Skills

B.A Program in Chemistry. Once this program is completed, the successful candidate will have a very broad background in chemistry as a discipline. The student will have a knowledge of the general ideas and theories that comprise the basic foundation for the study of chemistry. On this foundation, the students will then acquire expertise in the five traditional areas of chemistry: organic, inorganic, physical, analytical, and biochemistry. In particular, it is expected the student will develop a firm understanding of chemical kinetics and thermodynamics, quantum mechanics, designing chemical synthesis, mechanisms of chemical processes, organic and inorganic reactions, quantitative and instrumental analytical techniques, and professional abilities such as literature searches, oral presentations, and written reports. Additionally, the laboratory aspects of these courses are designed to reinforce the principles described above.

B.S. Program in Chemistry. The student will acquire the same skills as described for the B.A. Program in Chemistry. However, these skills will be supplemented by more in-

depth coverage of cross-discipline topics such as spectroscopic chemical analysis, basic biochemical systems, independent research projects, and advanced synthesis techniques involving organic, inorganic, and organometallic compounds.

B.S. Program in Chemistry-Biochemistry Specialization. The student will acquire the same skills as described for the B.S. Program in Chemistry. However, these skills will be supplemented by a much greater coverage in biochemical techniques.

This year the following portions of our program were assessed: the BS/BA degree programs.

Program Assessment

Assessment Tools

Student Portfolios (Classes of 2003, 2004, 2005)

For the past 10 years we have been maintaining student portfolios within the Chemistry Department. These portfolios contain copies of the students' major works: final exams, major papers, research thesis, etc. Basically, each faculty member assesses each major work they place in the student portfolio. By having the faculty provide their insight to the work, the committee can complete their task more efficiently. The overall review is conducted by the committee reviewing the major works in the portfolio and filling out a summary form that considers each area of chemistry.

Departmental Questionnaire (Classes of 2002)

Previously (1997 and before) the Head of the Department of Chemistry distributed a questionnaire form to the graduating seniors and held an exit interview to go over their responses. In 1998, a web based version of the departmental questionnaire form (that has been used for the past seven years) was developed and made available to the students. This is the fifth year for its use in this format.

The Citadel Experience Survey (2003, 2004)

The assessment information was transferred to the senior exit survey.

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Assessment Results

A review of the items in the 9 portfolios indicate that we satisfactorily covered the five major areas of chemistry during the course of the students' careers at The Citadel and provided the students with a strong theoretical background. Their performances on the

final exams for all their courses demonstrated they mastered the topics of the courses to a degree that would provide a reasonable chance for success in future courses and/or in their future careers. Additionally, the quality of the BA or BS theses provided evidence the students were successful in attaining a sound, (and broad), theoretical and practical knowledge base in chemistry. Furthermore, the emphasis that was placed on writing the thesis and defending the thesis before the faculty committee should provide the student with experience in dealing with a technically oriented peer group in a formal setting. Overall, no deficiencies were noted by the committee with regards to meeting the goals of the programs.

Portfolio Table

Area/Item	Exceeds or Meets Standards	Marginal Performance	Does Not Meet Standards	No Data
Analytical Chemistry	9			
General Chemistry	8			1
Inorganic Chemistry	9			
Organic Chemistry	9			
Physical Chemistry	9			
Biochemistry	7			2
Writing in the Curriculum	9			
Student's Career Goal	8			1
Student Evaluation	9			
Program Assessment	9			

Attainment of Career Goals

Career Goal	Number Successful*
Graduate School	3

Industry	1	
Military	4	
Professional Schools	0	
Other	0	
Unknown	1	
Not Attained	0	

Conclusions

Historically, the Department of Chemistry has been successful in preparing students for their chosen careers. The data for the past three years indicates this is still the case. From the information provided by the students, they are going into a career that meets with their expectations. We take this to be an extremely positive assessment of our program(s).

Student Satisfaction with the Program

Overall, the students indicated the department was strong in several areas: availability of the faculty, the faculty's concern for their success, the knowledge base of the faculty, and the favorable student/faculty ratio (particularly in the upper level courses).

On the departmental form, the most common area of weakness was the lack of State funds for new instrumentation/equipment. However, they also indicated that the various outside sources of funding have had a positive effect on our holdings. These sources are the Jumper Fund, Schiller Science Initiative, and the Citadel Foundation. They also noted the lack of upper level chemistry electives as a concern.

Actions Taken

The data indicates that we have few weaknesses in our programs. We did have a couple of instances where course assessments were not present in the portfolios. We need to strive to insure that we have 100% compliance in this area.

The major item which we must address is to insure we have adequate funding to maintain our current level of instrumentation and continue to upgrade.

Resources Required

We still need to have an adequate equipment budget line item. While our supplies budget has increased over the past few years, there is still no specific budgeted line item for equipment. We continually request that we have a \$12,000-15,000 line item to replace/upgrade equipment on an annual basis.

Major Issues and Actions

Major Issues Relative to the Facilities

This year we received funding to increase our freshman equipment holdings to accommodate an anticipated large incoming class. We now have the basic equipment to allow the four freshman labs to operate at capacity simultaneously doing our current lab experiments.

Summary of Scholastic Activities

In light of the Mission statement, the faculty of the Chemistry Department continued to have an above average year in scholarly pursuits. Overall, 6 refereed journal articles were either published or accepted for publication, 12 presentations were made (professional meetings or invited seminars at other institutions); seven grants (research or travel) were awarded, seven reviews of scholarly works were made, 27 miscellaneous items such as conference attendance or participation, and five student research projects were mentored. Considering there are only eight faculty in the department and the average teaching load was just shy of 14 contact hours, this is a remarkable accomplishment.

Faculty and Student Awards

Medbery Teaching Award - John Murden

Medbery Teaching Mentorship - Not Awarded

Samuel Adam Wideman Scholarships - Charles Logan, Stephanie Slan, Cody Sandquist, Sermpun Lhamlhak

Wideman Fellowship - Not Awarded

Charles F. Jumper Scholarship - Not Awarded

ACS Section Award - Sermpun Lhamlhak

High GPR (Overall in Chemistry) - Sermpun Lhamlhak

ACS Analytical Chemistry Award - Not Awarded

High GPR (Junior) - Roy Johnston

High GPR (Sophomore) - Richard Terrio

High GPR (Freshman) - Jonathon Olson, Lisa Bydairk

Faculty/Student Social Events

In order to forge a stronger link between the faculty and the students of the chemistry department, we held two social gatherings this year. The Chair of our Extracurricular Activities committee, organized a fall and a spring dinner at Ryans's Steakhouse, and a Christmas gathering in the Department. The spring dinner also included the annual awards ceremony in which the above mentioned awards were presented. The events were well-attended and both students and faculty enjoyed themselves.

Summer Sessions

The second summer term of 2004 and the first summer term of 2005 saw full sections of all courses offered by the Department of Chemistry. Current projections show we will have a record number of students in the summer program. Furthermore, in some of the lab courses, overflow sections had to be established to accommodate all the students. This is certainly a positive effect that is due, in part, to our ACS approved program and the investment in equipment we have made over the past 5 years.

Promotion/Tenure Recommendations and Personnel Matters

MAJ Mabrouk was reviewed and successfully promoted to (full) Professor. CPT Brown also underwent review for a fourth probationary appointment. This was a major review. The tenured faculty unanimously recommended she be offered a fourth appointment. We also hired Dr Michael Dorko to fill a newly created tenure-track position. Professor Lisa Zuraw was on sabbatical leave this year and will return next fall.

2004-2005 Planning Document

During the planning stages for the 2004-2005 academic year, the following areas were highlighted: assessment, curricula, independent funding sources, and increase ties with local industry.

Assessment. A copy of the assessment report is attached. We assessed the B.A. and B.S. in Chemistry programs this year. The data shows we continue to meet expectations in these areas.

Curriculum. We dropped the CSCI 110 requirement for all our programs and replaced this course in both B.S. in Chemistry programs.

Facilities. The scheduled renovations and upgrades were completed. We continue to upgrade our facilities needs as a part of the assessment process.

Independent Funding. We have been successful in bringing either donations or useable equipment to the Jumper Fund. The alumni have slightly increased the level of donations to the Jumper Fund.

Local Ties. We maintained our increased ties to the outside. Faculty and students were involved in judging at science fairs, working with the College Board in developing high school AP curricula, and worked with companies and MUSC in a consulting capacity. The most common type of consultation involved the new GC-MS. Additionally, we were heavily involved in the ACS Regional meeting. This included student faculty participation in the paper sessions, students running a poster session, and a co-author on a grant that funded the student poster sessions.

Personnel. This year we had a successful promotion this year, a successful probationary reappointment, hired a newly created tenure-track position, and successfully found replacements for two faculty who will be on sabbatical next year.

Overall, we made strong progress in all areas of this year's goals.

2005-2006 Goals/Objectives

Assessment Areas. This year we will assess our facilities and our upper level courses. With regards to the rest of the assessment cycle, we will continue to collect data for future reviews.

Independent Funding Sources. Because of the lack of full formula funding from the State, we feel it is necessary to continue to look in nontraditional areas to acquire funding for the instruments for our program. It will be left to the Department Head to look into possible donor sources.

Increase Ties with Local Industry/Community. The faculty of the Chemistry Department will increase ties with colleagues in industry to develop possible internships for our students so they can gain valuable, practical experience; and, to encourage these companies to donate their excess instrumentation to us.

Personnel. We anticipate having two probationary reappointment recommendations, one post-tenure review, choosing a new department head, upgrading the Administrative Assistant position to include monitoring grants and assisting in grant preparation (this will involve a re-classification).

Transfer Department Head Administration. All files, schedules, etc will be consolidated and made available to the next department head to provide a smooth transition in administrations.

Other Areas. In all other areas of instruction and research, we will continue our current activities and take advantage of the facilities that were upgraded over the past few years.