2007-2008 Yearly Program Assessment report for
the Department of Chemistry Undergraduate Program.

I. Assessment Activities:

A. Program Goals

1. The program seeks to provide a high quality education for both our major and non-major students. This is our singular goal as educators.

2. Learning Outcomes/Data Collection.
The Department has historically used three tools to assess the program, A, B and C below. However, if the need arises for us to take a more detailed look at specific issues related to the performance of the Department, a detailed study of the problem is undertaken and the results are presented to the faculty. In this period we underwent an external review, and those results will be detailed in the next year's report.

A. Final Exams in General Chemistry
The Department of Chemistry is committed to gradually increasing the tools by which to follow the progress of our students through our programs. Because our largest attrition rates occur within the first courses students take in chemistry, we are starting to tabulate final exam scores in General Chemistry 211 and 212. While not a true standardized exam, the final in these courses is departmental and undergoes relatively few changes over the years. We believe its addition will aid the Department in monitoring student progress through the curricula.

B. Standardized *American Chemical Society Exam in Organic Chemistry*. The Department of Chemistry uses this mathematically objective method of evaluating the progress of its students as they matriculate through our program. At the end of their second semester of organic chemistry (typically the Spring semester of the sophomore year) a national exam written by the American Chemical Society (ACS) is given. We plan to use this tool in conjunction with the Principles of Chemistry Scores (Section A, above) to further investigate and improve retention through this critical portion of our curricula.

C. The Department bases its success, in part, on its ability to successfully prepare its graduates to pursue employment or further their education. It is difficult to keep track of every graduating senior once they leave campus, but we generally are able to track 80-90% of them. We were able to track fewer graduates than normal in this reporting period (68%).

Table 1	Number of students	Percent of students
Seniors Graduating in 2006-2007	22	100%
Admitted to Ph. D. programs	3	14%
Admitted to pharmacy, medical, veterinary or law school	4	18%
Admitted to Master's in Forensics		
Admitted to Other Master's programs	2	9%
Admitted to the Department Chemistry's Master's program	2	9%
Additional Education	1	5%
Industrial employment	3	14%
Attempting Admission to Medical School		
High School Teaching		
Unknown	7	32%

D. The fourth measure of our success lies in the number of students whose research (e.g. Capstone) is presented to the chemical community. In chemistry, the following methods are standard for dissemination of research: (i) having a research paper published in a peer reviewed national or international journal (ii) presenting a paper at a national meeting of the American Chemical Society or (iii) presenting a paper at a regional or local meeting of the ACS. Because of the natural time lag associated with the publication of research in journals, students from earlier years will be carried over into this year and those from this year will appear in later years.

Table 2.	Number of students
Student co-authors in journal papers	4
Student presenters at national meetings	1
Student presenters at regional meetings	0
Students presenters at local or state meetings	0
Students co-authoring posters/papers at national meeting (not presenting)	2

Note: It is difficult to comply with Board of Trustee Initiative 3 because there is no national standard measure available for students graduating with an undergraduate degree in chemistry. The only quantitative data available is the GPA of the graduate. This value can be normalized using a student's composite ACT score when they enter our program. We will make every effort to obtain similar data from other schools or obtain a national standard to which we will compare our students. A simple ratio of ACT score to final GPA would provide a numerical value for comparison. The collection of data for annual reports will primarily consist of results from exit surveys and normalized GPAs.

3. Results

A. General Chemistry Final Exams

We are including data from the CHM 211 final exams for the past 5 years. Complete final exam data from Fall 2004 to present is presented in Table 3.

Table 3 CHM 211 Final Exam Scores

Score	Fall 2004	Fall 2005	Fall 2006	Fall 2007	Fall 2008
90%+	3.4*	4.4	4.5	7.3	3.0
80	6.8	20.8	18.3	19.9	9.0
70	14.4	27.8	22.8	25.3	15.7
60	31.3	19.0	20.3	20.3	19.8
0- 59	44.1	30.8	37.1	27.2	52.6
N	236	321	197	246	268
Mean	60	70	65	68	57

*Percentage of student in this range.

The object of tracking the final exam scores for the first 2 years of our students will be to discover ways of improving retention throughout the program. The data need to be correlated with scores from CHM 355 and 356 in the hope that it will point to ideas by which rates may be improved. The final exam averages were fairly constant through the previous 4 years, the last 3 of which used the same final exam. They were relatively independent of the group of instructors teaching the courses. Values this year warrant comment. This year we chose to use a different final exam from the previous 3 years and this inevitably had an impact on student scores. In addition we had 2 instructors who had never taught this course before this fall.

B. Results of *ACS Exam in Organic Chemistry*:

Of the 115 students taking the final exam in CHM 356 during the 2007-2008 academic year, 51% made above the 50^{th} percentile, nine percent were above the 90^{th} percentile, and 19% above the 75^{th} percentile (Table 3). The number in the 50^{th} percentile, 51%, is generally what we have been seeing over the last 3 years (Table 4). It is also significantly above the average of the last 7 years (46%), continuing a trend that began in 2005-2006. We attribute the improvement in the

last 3 years to the effort of the Department to improve student performance and retention through the CHM 355-356 sequence. These measure included introduction of CHM 254, the POGL method of instruction, and inclusion of online homework in CHM 356. Details of all of this appeared in the last report.

Table 4 ACS National Exam Scores

Year	# Students	50thile	75%ile	90%ile
2006-7	106	59	14	6
2008-9	115	51	19	9

Table 5 Historical pattern of the 50%ile

Year	Number of Students	50%ile
2001-2	107	43
2002-3	131	34
2003-4	116	39
2004-5	120	45
2005-6	151	53
2006-7	106	59
2008-9	115	51
AVG	N=625	46

C. Results of Tracking Graduates.

We find no other tool as useful in our assessment of the Department as is following our students in the first 6 months following their graduation. Table 1 summarizes the results for the previous academic year. The total number of graduates for the year was 22. This number is on par with the average number of graduates over the last 5 years (24). Two years ago we experienced an apparent growth in the number of majors at 33, and we hoped that this would continue due to the introduction of majors in forensic chemistry and biochemistry, but disappointingly the number last year fell back to 22. This year we again had 22 graduates, it appears that the large number of graduates two years ago may not be a long term trend.

During this year, we saw 84% of the students we were able to track, either attend professional school, or go on to graduate work in the field. The number is significantly higher than that of the last 2 reports, 67% and 73%, respectively; although this may result from tracking fewer than normal students.

D. Results from Research Productivity of Seniors.

The Department believes student presentations and publications to be an important measure of its success. The University requires a Capstone experience from all graduating seniors. It would be easy to develop “busy work” projects for them, however we believe that participating in faculty directed research provides significant benefits to both students and their mentors. Thus, the number of presentations and publications are a measure of the quality of both a student’s achievement and the quality of the research in the Department.

Furthermore, peer pressure ensures that research which is presented at a meeting of faculty peers be novel and of high quality. The results of the period are presented in Table 2. We are proud to have 7 undergraduate names appearing on technical presentations this year, although the number is down from 17 last year. These includes 1 student presenting her own work at a national meeting of the ACS, where they meet students and professionals from all over the country, and it also hones their ability to answer technical questions concerning their work, which is an extremely valuable skill when interviewing for employment. Finally, four student names appeared on scientific publications, including three co-authoring articles in the prestigious journals *Journal of Chemical Physics* and *Organometallics*.

II. Plans for the current year:

We underwent an external program review in December. This review examined both our graduate and undergraduate programs, including the curricula. When we receive the final report, the Department will develop an implementation plan in the Spring and Fall of 2009.

III. Assistance Needed:

The Department's operating budget is inadequate to its task. For example, comparatively little of the lab fees charged to students are actually returned to the Department for the purpose of operating and maintaining those labs. Students remark, with disturbing frequency, that their high schools were better equipped. Chemistry is a technology dependent discipline, however we have been able to purchase only one new piece of software (in the past year) in nearly a decade. In our 5 year program review (2006) we noted that the Department significantly outspends our financial allocation each year. This year the Department received its first significant budget increase in years, but the prospect of decreased lab fees in the Spring may negate much of the gain.

A lack of funds to support graduate stipends also hurts the undergraduate program. Our laboratories cannot effectively function without teaching assistants. As a result we must recruit undergraduates to serve this function. Students opting for this course credit take fewer upper division content based courses. Because the Department has funding for only 1½ graduate students nearly all of our labs have undergraduate teaching assistants. This results in lower quality instruction and prevents the Department from experimenting with some kinds of new teaching methods because of the lack of qualified GAs.

IV. What one most important thing has the Department/program learned through this process?

The Department has used assessment for years to gauge the need for programmatic changes and to test the efficacy of changes made. As such, the formal university program has not provided direct benefit to the Department. Having said that, this process has provided the Department with significant quantities of data that we are now using in recruiting and proposal writing.