

Major Assessment Findings and Curricular Improvements
Department of Chemistry
Undergraduate Program(s)
AY2008-09 through AY2012-13

Assessment Measures

The Department of Chemistry uses the following measures to assess departmental learning outcomes: senior papers as part of the senior assessment process, senior seminar presentations as part of the senior assessment process, grades in lecture and laboratory courses, research reports for those students electing Undergraduate Research, results from national ACS tests at the sophomore (organic chemistry) level, the technical writing course all seniors take before their senior assessment, course evaluations and graduate placement.

Assessment Findings

Graduate Placement (Attachment 1a)

The Chemistry Department has maintained a record of graduate placement for the last 3 years. During this time 86% of the chemistry/biochemistry graduates continued on to chemistry/biochemistry graduate programs, medical school, other professional schools (for example, pharmacy or physical therapy schools), careers in high school or middle school teaching, or the chemical industry. The outcomes of 4 students are unknown.

American Chemical Society (ACS) standardized exams (Attachment 1b):

The Chemistry Department administers ACS standardized exams at the sophomore level on a yearly basis. The results for the past 5 years for sophomore chemistry and biochemistry majors indicate that our students are performing at or above the fiftieth percentile nationally.

Chem 500/505 Scientific Literature and Technical Writing (Attachment 2): Over the last 3 years, seniors in the ChemBS/Env.ChemBS programs and in the Biochem BA/BS programs have taken Chem 505 – Scientific Literature and Technical Writing. Over the last five years, this course has evolved from a 1 credit P/F course (Chem 500 Technical Writing and Information Retrieval) taken by both juniors and seniors to a 3 credit course (Chem 505 Scientific Literature and Technical Writing) taken by all seniors partially in preparation for their senior assessment. (In fall 2013, the course was renumbered Chem 405.) The course was not offered during Fall 2009, since during that semester, there were no seniors who had not previously taken Chem 500. Enrollment, grade, and course evaluation data are provided for Chem 500 and Chem 505. When comparing enrollment figures between Chem 500 and 505, it should be kept in mind that Chem 500 served both junior and senior students, while Chem 505 was only taken by seniors.

For 2008 enrollment for Chem 500 was 15 junior and senior students. For the period from 2010 to 2012, enrollment ranged from 4 to 5 senior students in Chem 505. The grades of students in Chem 505 ranged from C to F out of 14 students. The average grade in this course is 2.7(B-). Course evaluations are available for the last three years for Chem 505. For 2010-2012, favorable course evaluations (5.97 average course rating and 8.47 average instructor rating out of 10) were obtained.

Intermediate Course: Sophomores in all chem. / biochem. programs take a year of organic chemistry. The second semester of this sequence was chosen as an appropriate intermediate course for analysis.

Organic Chemistry II – Chem 204 (Attachment 3):

For the last five years (2009-2013), the Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 204, the second semester organic chemistry course, which is taken by sophomore chemistry/biochemistry majors. During this period, enrollment ranged between 19 and 35 students, mostly biology majors. The grades of students in this class ranged from F to A with no withdrawals (W) and no incompletes (I) out of 128 students. The average grade in this course is 2.7(B⁻). Course evaluations are available for the last five years. For 2009-2012, favorable course evaluations (7.95 average course rating and 8.52 average instructor rating out of 10) were obtained. For 2013, a new evaluation form was used and a 4.04/7 course rating and 5.29/7 instructor rating were obtained. In addition to course evaluations, the American Chemical Society (ACS) exam has been administered to students in this class at the end of the spring semester 2009-2013. The average percentile score for chemistry majors in this class are reported in Attachment 1b.

Introductory Course: Freshmen in all chem.. /biochem. programs begin their studies in chemistry with a year of general chemistry(Chem 103 and Chem 104) The enrollments of these courses are large and also reflect a large number of biology, engineering, and pre-med students. The chemistry and biochemistry majors are segregated from the larger population into special laboratory sections that accompany the general chemistry lecture. These are Chem 113-04 and Chem 114-03, which have been chosen as appropriate for analysis of freshman assessment.

General Chemistry Laboratory I – Chem 113-04 (Attachment 4):

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 113-04, the first semester general chemistry laboratory course, for the five year period 2008-2012. During this period, enrollment ranged between 6 and 10 students. Most of the students were chemistry majors or students considering a chemistry major. The grades of students in this class ranged from B to A with no withdrawal (W) out of 38 students. The average grade in this course is 3.85 (A). Course evaluations are available for 2008-2012. Favorable course evaluations (8.74 average course rating and 9.0 average instructor rating out of 10) were obtained.

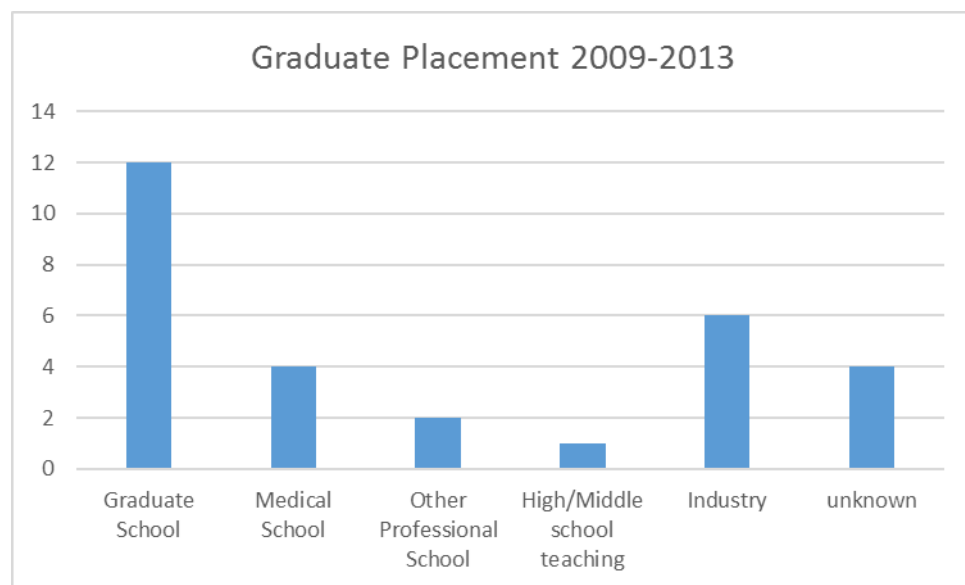
General Chemistry Laboratory II – Chem 114-03 (Attachment 5):

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 114-03, the second semester general chemistry laboratory course, for the five year period 2009-2013. During this period, enrollment ranged between 7 and 10 students. Most of the students were chemistry majors or students considering a chemistry major. The grades of students in this class ranged from B to A with no withdrawal (W) out of 43 students. The average grade in this course is 3.91 (A). Course evaluations are available for 2009 – 2013. For 2009-2012, favorable course evaluations (8.68 average course rating and 8.83 average instructor rating out of 10) were obtained. For 2013, a new evaluation form was used and a 6.75/7 course rating and 6.88/7 instructor rating were obtained.

Senior assessment results

The senior assessment in the Department of Chemistry consists of a written paper on an advanced topic approved by the faculty and a formal presentation of the topic to the chemistry faculty. Results for the senior assessment for the last five years are displayed in Attachment 6.

Attachment 1a: Graduate Placement



Attachment 1b: American Chemical Society (ACS) standardized exam results

Organic Chemistry ACS Full Year Exam average percentile scores for the class of chemistry/biochemistry majors

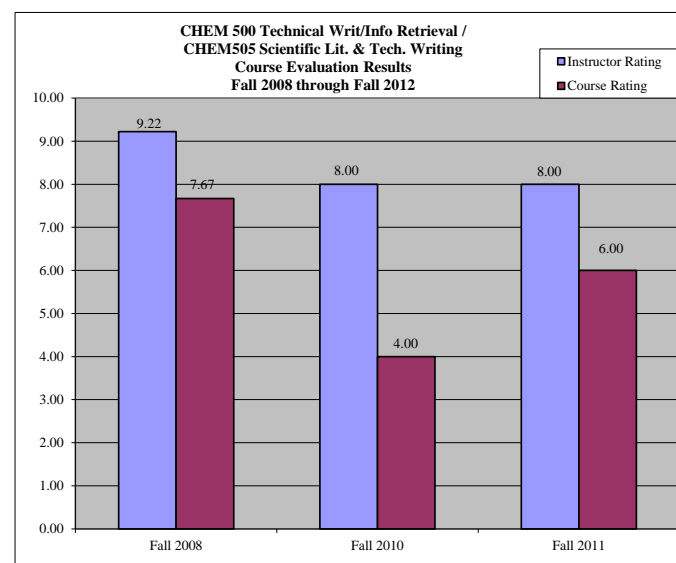
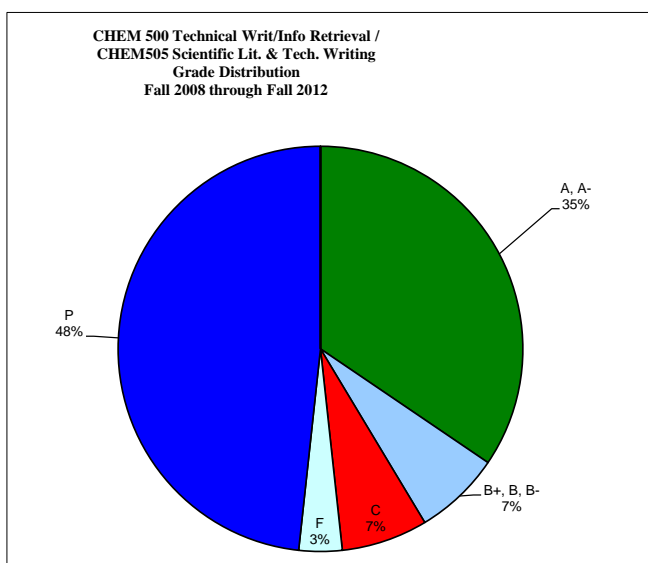
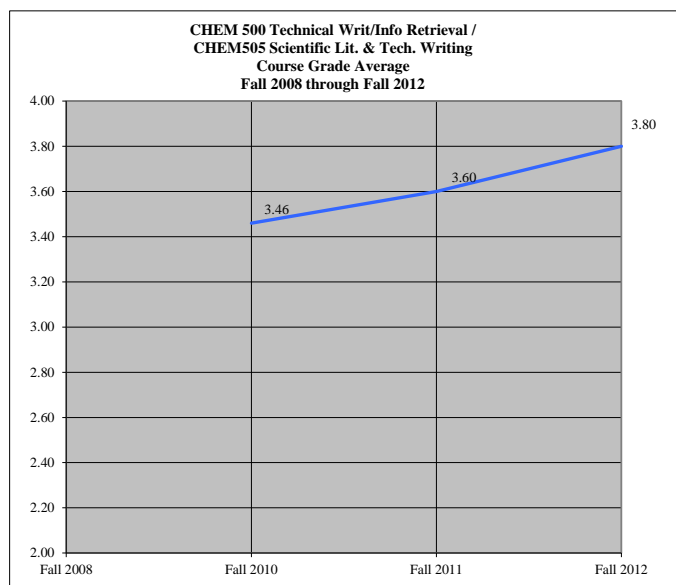
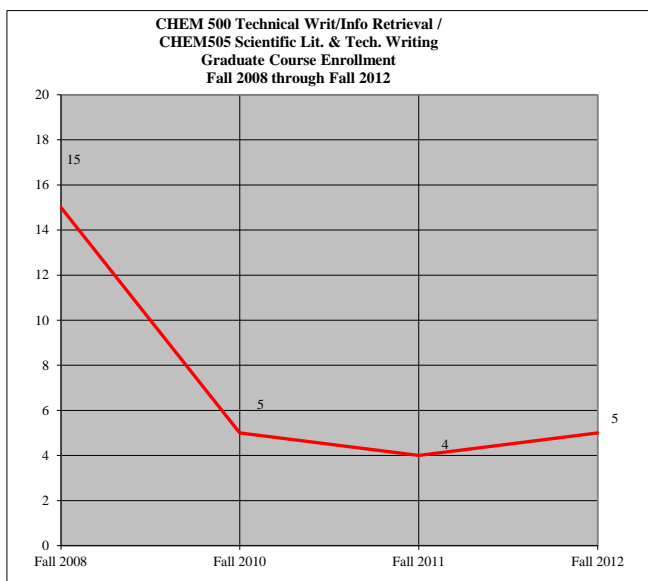
Year	percentile
2009	60.4
2010	54.8
2011	62
2012	47
2013	59.9
Average:	56.8

Attachment 2:

THE CATHOLIC UNIVERSITY OF AMERICA
 Planning, Institutional Research, Student Learning Outcomes Assessment

COURSE SUMMARY DATA: DEPARTMENT OF CHEMISTRY
 CHEM 500 Technical Writ/Info Retrieval /CHEM505 Scientific Lit. & Tech. Writing

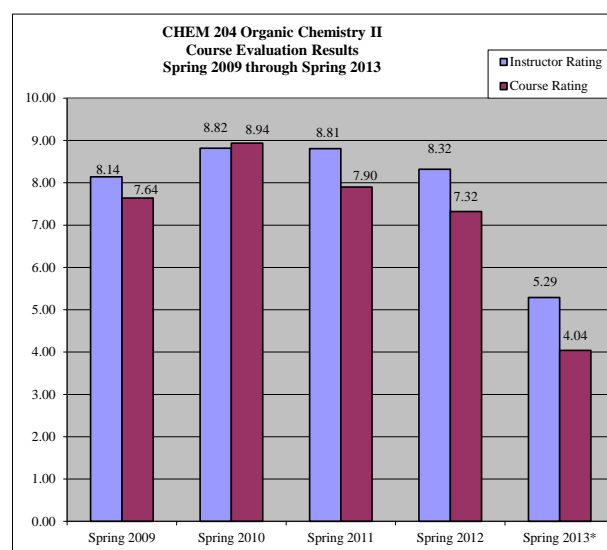
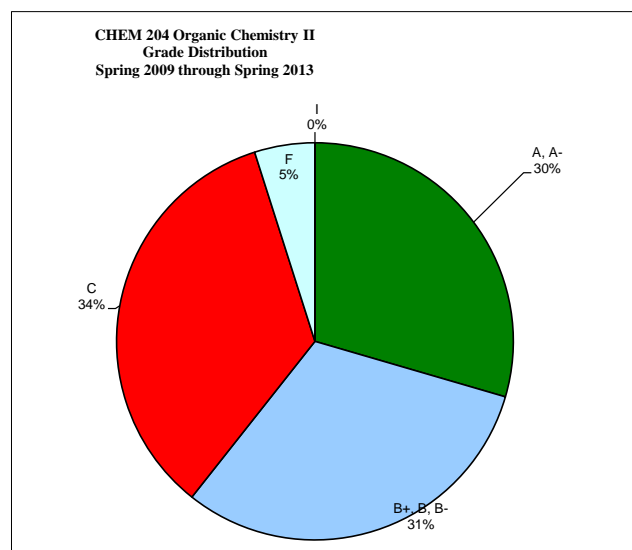
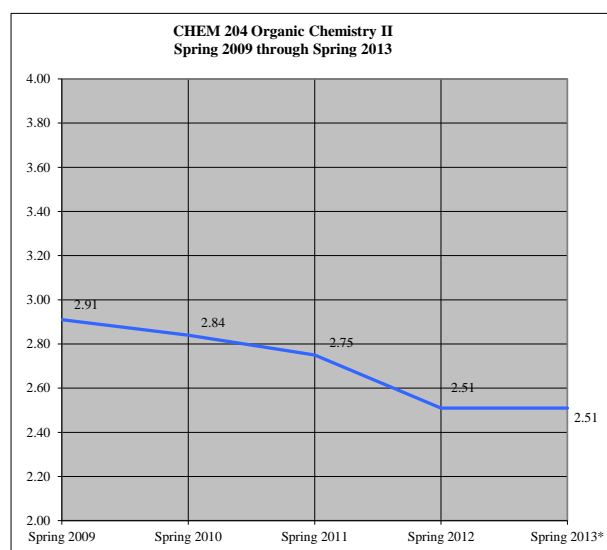
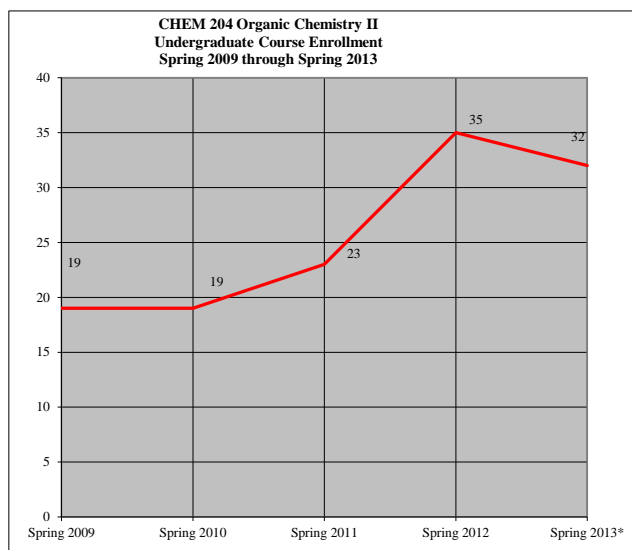
Term	Graduate Course Enrollment	Course Grade		Course Grades							Course Evaluation Results						
		Avg.	StDev.	Grade Distribution							Course Eval.		Instructor Rating		Course Rating		
				A, A-	B+, B, B-	C	F	P	W	I	#	%	Avg.	StDev.	Avg.	StDev.	
Fall 2008	15						1		14			9	60.00%	9.22	1.39	7.67	2.24
Fall 2010	5	3.46	0.87	3	1	1						3	60.00%	8.00	1.00	4.00	1.00
Fall 2011	4	3.60	0.42	3		1						4	100.00%	8.00	0.82	6.00	2.45
Fall 2012	5	3.80	0.45	4	1							5	100.00%	9.40	1.34	7.80	3.35



Attachment 3:

COURSE SUMMARY DATA: DEPARTMENT OF CHEMISTRY
CHEM 204 Organic Chemistry II

Term	Undergraduate Course Enrollment	Course Grade		Course Grades							Course Evaluation Results						
		Avg.	StDev.	Grade Distribution							Course Eval.		Instructor Rating		Course Rating		
				A, A-	B+, B, B-	C	D	F	W	I	#	%	Avg.	StDev.	Avg.	StDev.	
Spring 2009	19	2.91	0.79	5	7	7						14	73.68%	8.14	1.92	7.64	1.69
Spring 2010	19	2.84	0.80	6	6	7						17	89.47%	8.82	1.42	8.94	1.09
Spring 2011	23	2.75	1.03	6	8	6	3					21	91.30%	8.81	1.25	7.90	2.59
Spring 2012	35	2.51	1.28	11	8	11	1	4				31	88.57%	8.32	1.66	7.32	1.99
Spring 2013*	32	2.51	1.09	8	9	11	2	2				26	81.25%	5.29	1.88	4.04	2.31

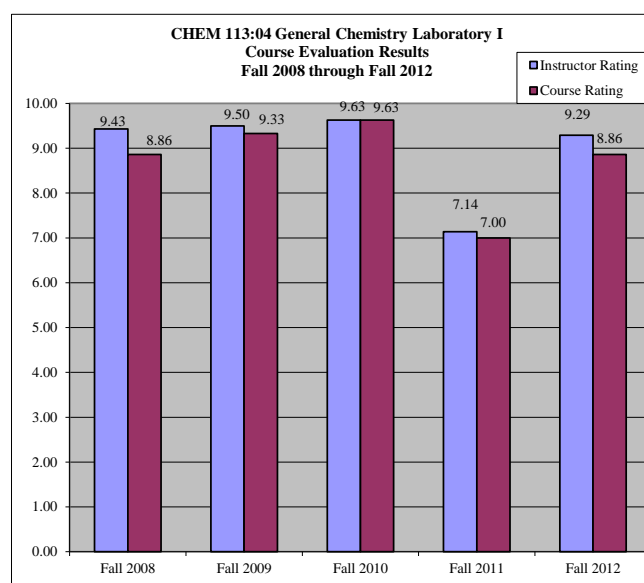
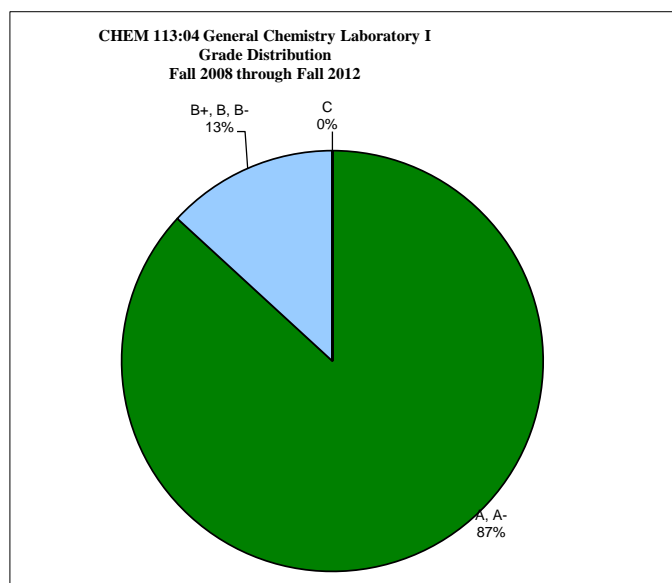
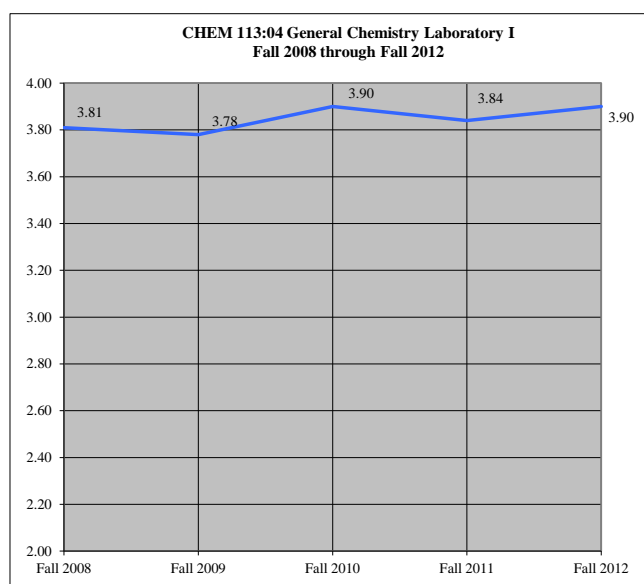
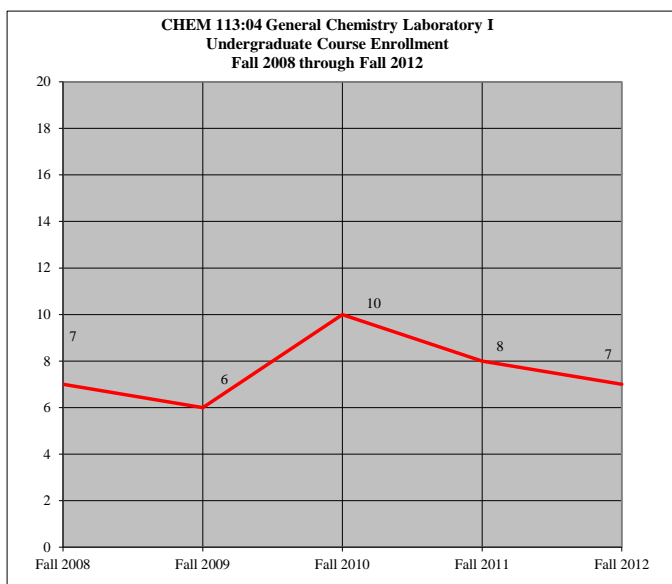


*Spring 2013 was using a new evaluation form where instructor and course ratings were based on a 7-point scale

Attachment 4:

COURSE SUMMARY DATA: DEPARTMENT OF CHEMISTRY
CHEM 113:04 General Chemistry Laboratory I

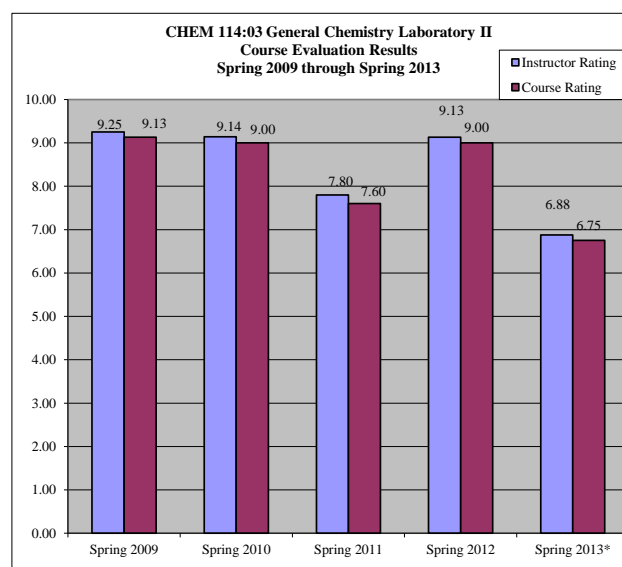
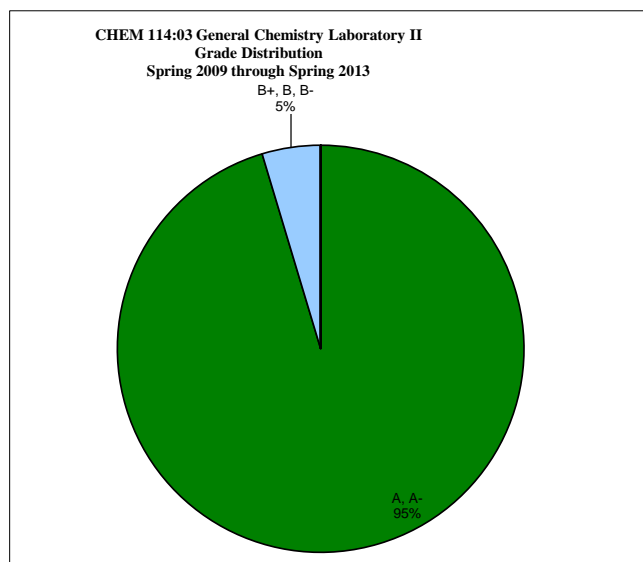
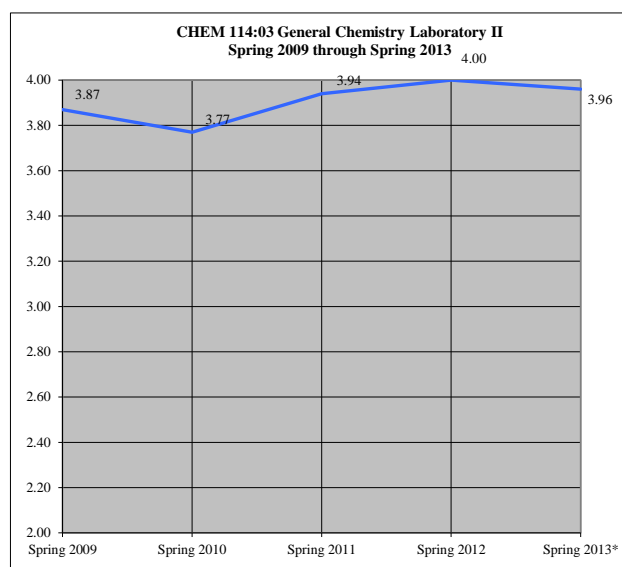
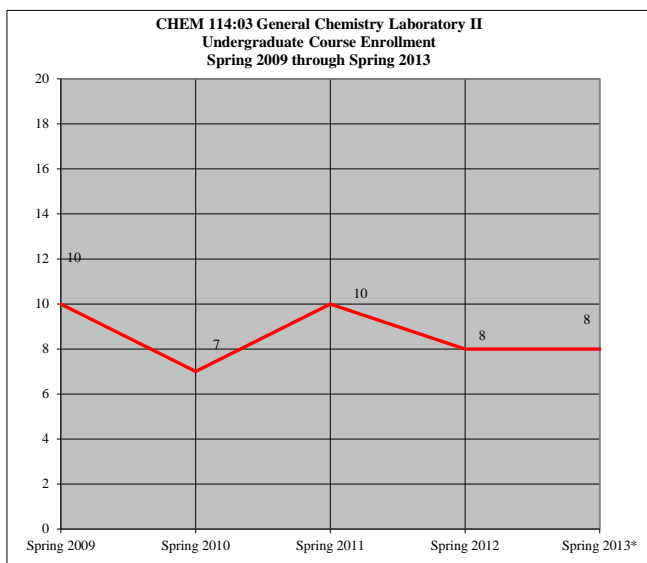
Term	Undergraduate Course Enrollment	Course Grade		Course Grades						Course Evaluation Results					
		Avg.	StDev.	A, A-	B+, B, B-	C	F	W	I	Course Eval.		Instructor Rating		Course Rating	
										#	%	Avg.	StDev.	Avg.	StDev.
Fall 2008	7	3.81	0.27	6	1					7	100.00%	9.43	1.13	8.86	1.86
Fall 2009	6	3.78	0.28	5	1					6	100.00%	9.50	0.84	9.33	0.82
Fall 2010	10	3.90	0.32	9	1					8	80.00%	9.63	0.74	9.63	0.52
Fall 2011	8	3.84	0.26	7	1					7	87.50%	7.14	3.18	7.00	2.31
Fall 2012	7	3.90	0.26	6	1					7	100.00%	9.29	0.76	8.86	1.46



Attachment 5:

COURSE SUMMARY DATA: DEPARTMENT OF CHEMISTRY
CHEM 114:03 General Chemistry Laboratory II

Term	Undergraduate Course Enrollment	Course Grade		Course Grades						Course Evaluation Results					
		Avg.	StDev.	Grade Distribution						Course Eval.		Instructor Rating		Course Rating	
				A, A-	B+, B, B-	C	F	W	I	#	%	Avg.	StDev.	Avg.	StDev.
Spring 2009	10	3.87	0.24	9	1					8	80.00%	9.25	1.04	9.13	1.25
Spring 2010	7	3.77	0.26	6	1					7	100.00%	9.14	1.21	9.00	1.29
Spring 2011	10	3.94	0.13	10						10	100.00%	7.80	2.25	7.60	2.59
Spring 2012	8	4.00	0.00	8						8	100.00%	9.13	0.83	9.00	0.76
Spring 2013*	8	3.96	0.11	8						8	100.00%	6.88	0.35	6.75	0.71



*Spring 2013 was using a new evaluation form where instructor and course ratings were based on a 7-point scale

Attachment 6:

**UNDERGRADUATE COMPREHENSIVE EXAMINATION RESULTS
SCHOOL OF ARTS AND SCIENCES
DEPARTMENT OF CHEMISTRY
AY2008-2009 to AY2012-2013**

	Fail		Pass		High Pass		Pass w/Honors		TOTAL
	#	%	#	%	#	%	#	%	
AY2008-2009		0.00%	7	100.00%		0.00%		0.00%	7
AY2009-2010		0.00%	12	100.00%		0.00%		0.00%	12
AY2010-2011		0.00%	6	100.00%		0.00%		0.00%	6
AY2011-2012		0.00%	5	100.00%		0.00%		0.00%	5
AY2012-2013		0.00%	5	100.00%		0.00%		0.00%	5
TOTAL	0	0.00%	35	100.00%	0	0.00%	0	0.00%	35

Note:

- 1) Milestone outcomes were included in the categories High Pass and Pass with Honors if these designations were explicitly indicated in the students' milestone record.
- 2) Category "High Pass" includes both "High Pass" and "Pass with distinction".
- 3) The count in this table is based on the exam outcomes of all attempts in an academic year.

Curricular Improvements

Curricular improvements include changes in the experimental and lecture components of key courses.

1) At the freshmen level, chemistry and biochemistry majors are grouped within one laboratory section of Chem 113-4 & Chem 114-3. These are the first and second semester laboratory courses taken in conjunction with General Chemistry (Chem 10 and Chem 104). While covering the same topics and goals of the non-major section the “project lab” sections try to imitate the experience of an actual research lab in choice of experiments and in the keeping of laboratory records. In addition, both the fall and spring semester courses require the students to research and prepare a presentation on a current chemical or biochemical topic. The freshman class of chemistry and biochemistry majors is generally small – six to ten. This course provides close interaction on a regular basis between the freshman chemistry and biochemistry majors and a faculty member, provides a more professional introduction to the field of chemistry, fosters camaraderie among majors in a given class through the sharing of a common and “special” (different from the non-major laboratory sections) experience, and teaches laboratory techniques appropriate for students who will eventually be taking advanced laboratory courses. The general effects of this course can be expressed as 1) a better understanding of chemistry and biochemistry as professional pursuits and 2) a better preparation for and performance in the next level laboratory courses – organic chemistry and analytical chemistry laboratories. The students who participate in the “project lab” general chemistry lab have already had experience with some of the equipment used in the sophomore level lab and are trained in the method of keeping laboratory records expected for the more advanced classes.

2) A new course Chem 505 - Scientific Literature and Technical Writing, designed to replace Chem 500 in the curriculum, was implemented in 2010. While chemistry and biochemistry juniors and seniors took Chem 500 in 2008, Chem 505 was restricted to chemistry and biochemistry seniors. This is apparent in the course summary data, in which the enrollment for Chem 500 in Fall 2008 is significantly greater than the enrollment for Chem 505 in Fall 2010. Since there were no seniors in Fall 2009 who had not already taken Chem 500, the course was not offered in Fall 2009. Chem 500 addressed the topics of accessing the chemical literature and transmission of science ideas in print and in oral formats. In addition to these, Chem 505 provided preparation for the written research paper and presentation to the faculty which was required for the Senior Assessment in the spring semester. A significant improvement has been seen in student performance in the senior assessments since preparation for the senior assessment was made a priority for this course. Students spent more time on preparation for the assessment than in past years and suffered less anxiety in addressing this last hurdle to their graduation.