

Assessment Findings and Curricular Improvements

Department of Chemistry

Undergraduate Programs

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 freshman (general chemistry) level, the sophomore (organic chemistry) level, the junior/senior (biochemistry) level, 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 75% of the chemistry/biochemistry graduates continued on to chemistry/biochemistry graduate programs, medical school, other professional schools (eg. pharmacy school), or careers in teaching or the chemical industry. Of the remaining, the outcomes of three students are unknown. Another student entered a seminary and one returned to her native country. Over this period of time, the majority of graduates were adequately prepared for the pursuit of future educational or career goals.

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

The Chemistry Department administers ACS standardized exams at the general chemistry (freshman) level and at the organic chemistry (sophomore) level on a yearly basis. The results for the past 3 years for freshman chemistry and biochemistry majors and for the past 2 years for sophomore chemistry and biochemistry majors and minors indicate that our students are performing at or near the fiftieth percentile nationally.

“Capstone” course: Seniors in the ChemBS/Env.ChemBS programs and in the Biochem BA/BS programs do not take a single course that could be considered a “capstone” course for the programs. However, all Chem BS and Env.Chem BS majors take Chem 352 and Chem 501. All Biochem BA/BS majors take Chem 572. Enrollment, grade, and course evaluation data are provided for these senior courses

Physical Chemistry II – Chem 352(Attachment 2):

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 352 for the last 3 offerings of the course (2004, 2006, and 2008). During this period, enrollment averaged approximately 5 students. The grades of students in this class spanned C- to A with an average grade in this course of 2.7 (B-). Course evaluations are available for 2004 and 2008. (In 2006 the enrollment dropped below the minimum required for generation of course evaluation forms. Evaluations were not obtained that year.) Physical Chemistry is a rigorous course with calculus and physics prerequisites. The majority of students

appreciate the rigor of the course and award favorable course evaluations (7.25 average course rating and 7.75 average instructor rating).

Advanced Inorganic Chemistry – Chem 501(Attachment 3):

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 501 for the last 3 offerings of the course (2003, 2005, and 2007).

During this period, enrollment ranged between 5 and 9 students with an average enrollment of 7. The grades of students in this class ranged from D to A with an average grade in this course of 2.7 (B-). Course evaluations are available for this period. As demonstrated by the grade distribution, the course is rigorous. The majority of students appreciate the rigor of the course and award favorable course evaluations (8.85 average course rating and 9.18 average instructor rating).

Biochemistry II – Chem 572 (Attachment 4):

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 572 for the last 3 offerings of the course (2003, 2005, and 2007).

During this period, enrollment ranged between 4 and 15 students. The grades of students in this course ranged from C to A with one withdrawal out of 24 students. The average grade in this course is 3.0 (B). Course evaluations are available for only the last offering of the course in spring 2007. Favorable course evaluations (7.82 average course rating and 7.36 average instructor rating) 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 5):

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 204, the second semester organic chemistry course for the last six years (2003-2008). During this period, enrollment ranged between 19 and 29 students, mostly biology majors. Except for one unusually high year, the enrollment average is about 21. The grades of students in this class ranged from F to A with 10 withdrawals (W) and one incomplete (I) out of 136 students. The average grade in this course is 2.5 (C+/B-). Course evaluations are available for the last five years. Favorable course evaluations (8.33 average course rating and 8.78 average 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 for the 2007 and 2008 years. The average percentile score for chemistry majors and minors 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 6):

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 2003-2007. During this period, enrollment ranged between 7 and 14 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 1 withdrawal (W) out of 53 students. The average grade in this course is 3.96 (A). Course evaluations are available for 2003, 2005 and 2006. Favorable course evaluations (9.24 average course rating and 9.02 average instructor rating) were obtained.

General Chemistry Laboratory II – Chem 114-03 (Attachment 7):

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 114-03, the second semester general chemistry laboratory course, for the six year period 2003-2008. During this period, enrollment ranged between 6 and 16 students. Excluding one unusually high year (16 students enrolled), the enrollment average is about 8. 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 1 withdrawal (W) out of 54 students. The average grade in this course is 3.84 (A-/A). Course evaluations are available for 2005 – 2008. Favorable course evaluations (9.02 average course rating and 9.02 average instructor rating) were obtained.

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 103 and Chem 104). While covering the same topics and goals of the non-major sections, 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 eight. 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

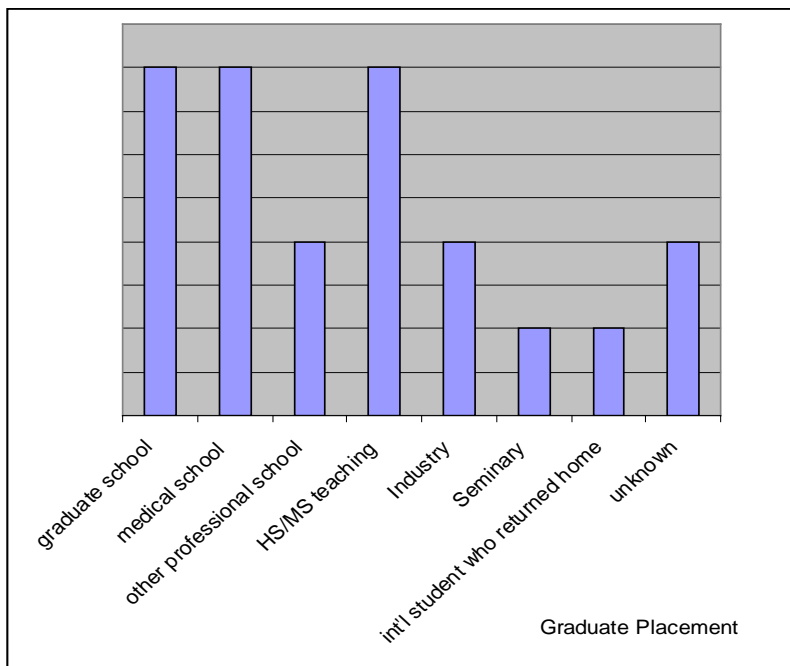
level laboratory course – organic chemistry and analytical chemistry laboratory. The students who participate in the “project lab” general chemistry lab have already had experience with some of the equipment used in the sophomore level lab and are trained in the method of keeping laboratory records expected for the more advanced classes.

- 2) At the sophomore level, a new experiment (2008) has been incorporated into the second semester laboratory course that provides 2 key improvements. 1) It serves as an introduction to the concept of “green chemistry”, a concept which is becoming more important as our society focuses more on environmental issues. 2) This laboratory experience requires the students to access the chemical literature (they can do this online) and read a published account of the experiment. The students then prepare a formal laboratory report which includes their own experimental results and discusses the chemistry of each step of the synthesis. The change is too recent to have an observed effect at the next level. However, exposure to a societal concern and one type of attempt to address it, accessing the professional literature, and introducing a new writing requirement should have a positive impact on science students.
- 3) At the junior/senior level, the physical chemistry laboratory (353) and instrumental analysis course (518) were renovated during the 2007-08 AY. New equipment was obtained for both courses and new experiments were incorporated into the curriculum. Restructuring of the courses included a stream-lining of the techniques judged to be required in the courses, acquisition of instruments to cover the necessary techniques within the chemistry department, and supervision of the course by an individual faculty member, an improvement over previous years’ reliance on equipment and expertise from outside the department. Only one offering of the courses in their current forms has been made. However, course evaluations and discussions with students taking this course indicate the students’ approval of and appreciation for the courses.
- 4) A curricular change which has been instituted and will have its first test in the 2010-2011 academic year is the creation of a new course, Chem 505 - Scientific Literature and Technical Writing, which will serve as a capstone course common to chemistry and biochemistry majors. Seniors will take the course in the fall semester. It will guide them through using the chemical literature, researching chemical topics, and making presentations. It will also coach students in preparing written research reports using the American Chemical Society style guide. By the end of the course, seniors should be well begun on preparing their written research paper and presentation which will be required for the Senior Assessment in the spring.

Attachment 1a:

Placement of Chemistry / Biochemistry graduates
2006-2008

graduate school	4
medical school	4
other professional school	2
HS/MS teaching	4
Industry	2
Seminary	1
int'l student who returned home	1
Unknown	2



Attachment 1b:

General Chemistry ACS Exam – average percentile for the class of chemistry/biochemistry freshmen majors

Year	Percentile
2006	48
2007	66
2008	49

Organic Chemistry ACS Exam - average percentile for the class of chemistry/biochemistry sophomore majors and minors.

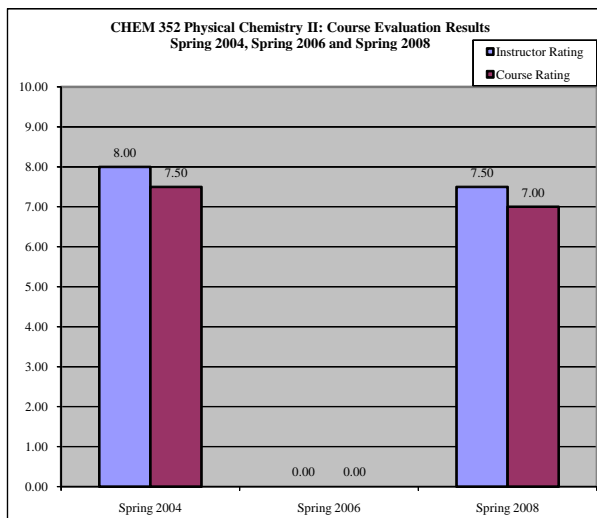
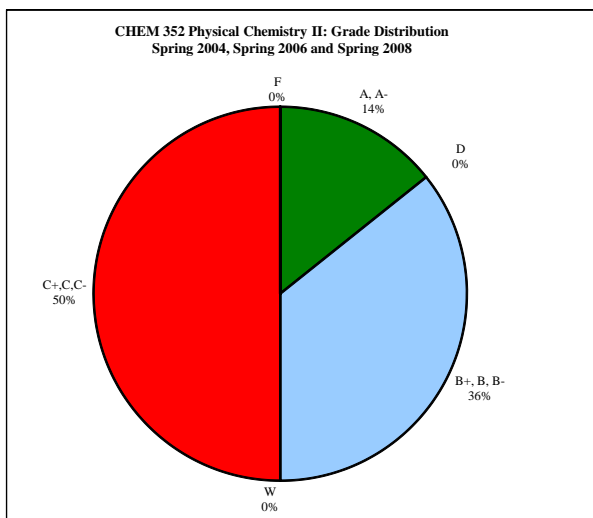
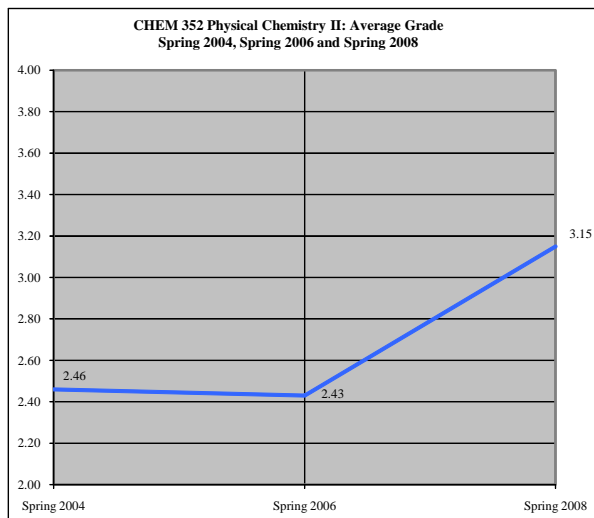
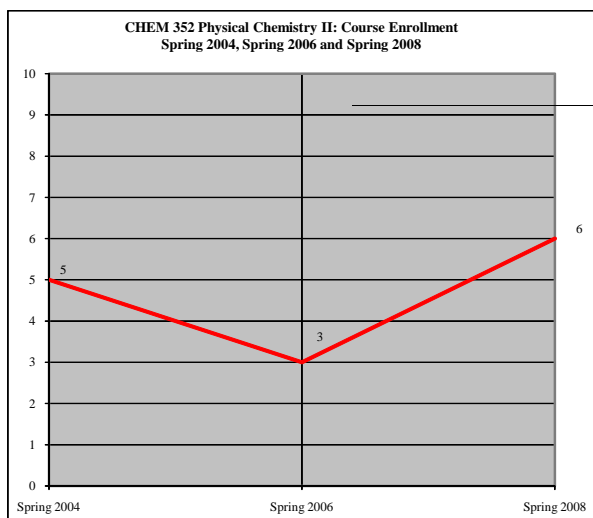
Year	Percentile
2007	53
2008	52

Attachment 2:

THE CATHOLIC UNIVERSITY OF AMERICA
Institutional Research and Assessment

COURSE SUMMARY DATA: DEPARTMENT OF CHEMISTRY
CHEM 352 Physical Chemistry II

Term	Course Enrollment	Course Grade		Course Grades						Course Evaluation Results						
		Avg.	StDev.	A, A-	B+, B, B-	C+, C, C-	D	F	W	#	%	Instructor Rating Avg.	Instructor Rating StDev.	Course Rating Avg.	Course Rating StDev.	
Spring 2004	5	2.46	0.87	1		4					2	40.00%	8.00	0.00	7.50	0.71
Spring 2006	3	2.43	0.75		1	2						0.00%				
Spring 2008	6	3.15	0.59	1	4	1					6	100.00%	7.50	2.74	7.00	2.45

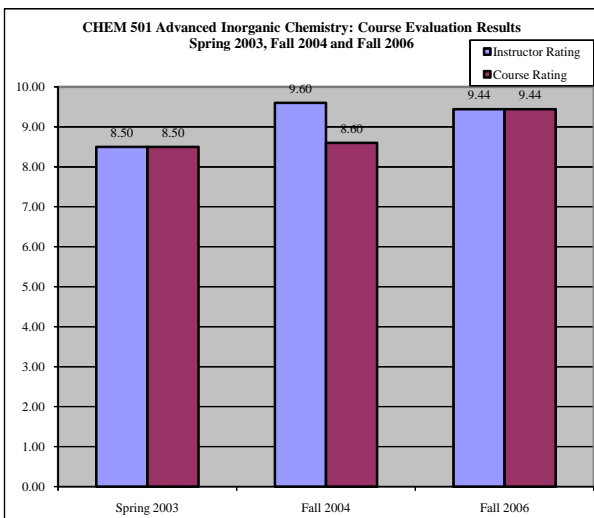
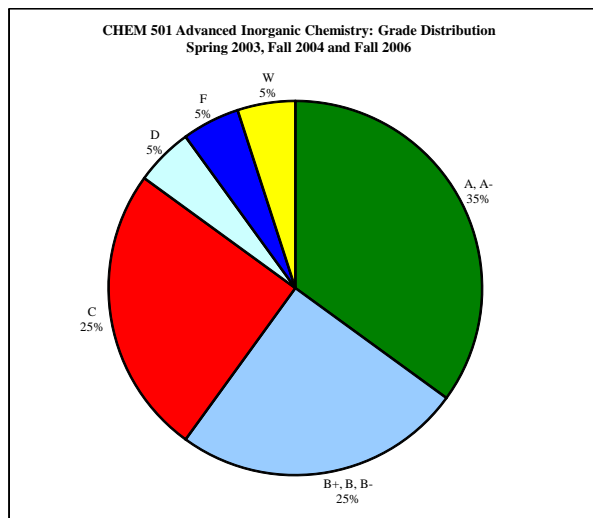
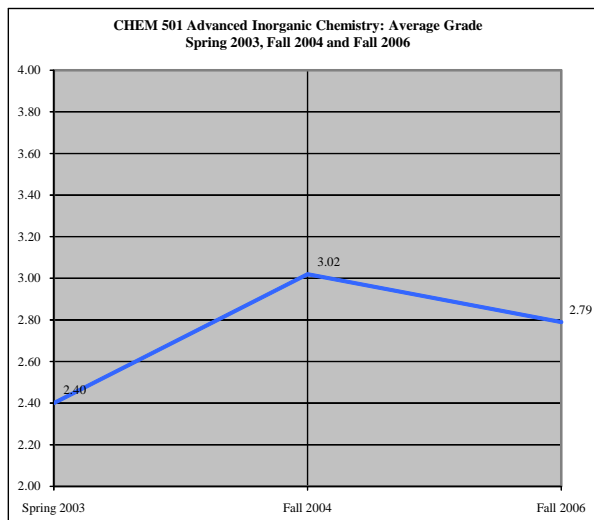
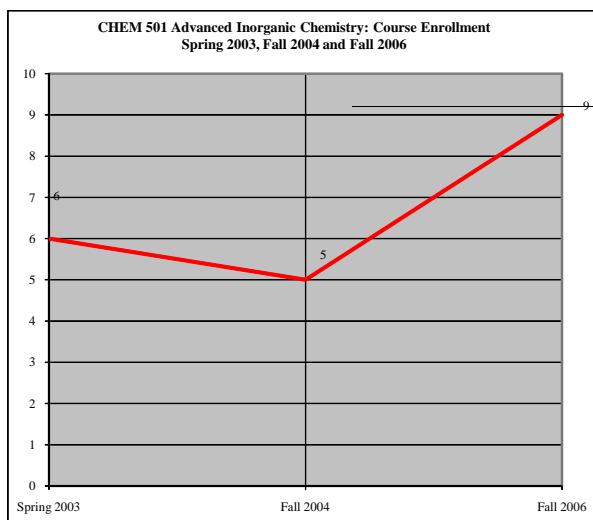


Attachment 3:

THE CATHOLIC UNIVERSITY OF AMERICA
Institutional Research and Assessment

COURSE SUMMARY DATA: DEPARTMENT OF CHEMISTRY
CHEM 501 Advanced Inorganic Chemistry

Term	Course Enrollment	Course Grade		Course Grades						Course Evaluation Results					
		Avg.	StDev.	A, A-	B+, B, B-	C	D	F	W	#	%	Instructor Rating Avg.	Instructor Rating StDev.	Course Rating Avg.	Course Rating StDev.
Spring 2003	6	2.40	1.53	1	2	1		1	1	2	33.33%	8.50	2.12	8.50	2.12
Fall 2004	5	3.02	0.84	2	2	1				5	100.00%	9.60	0.55	8.60	0.55
Fall 2006	9	2.79	1.24	4	1	3	1			9	100.00%	9.44	0.88	9.44	0.88

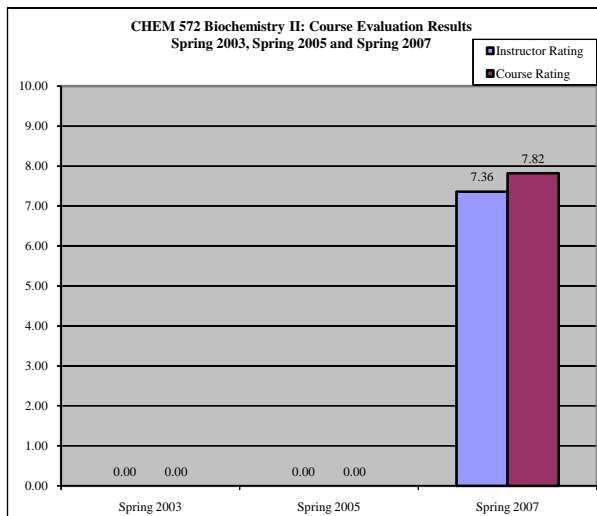
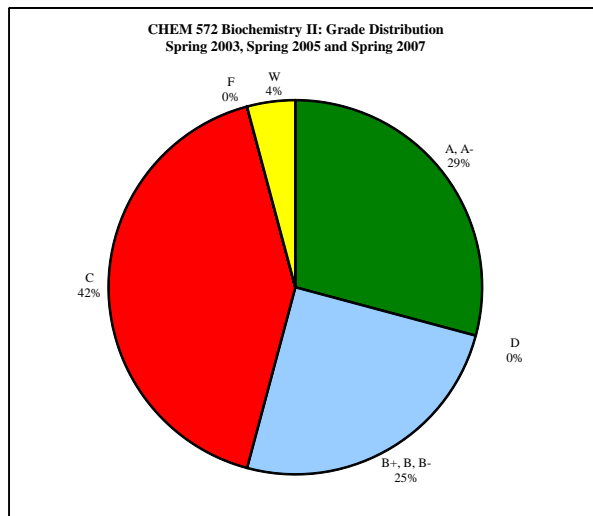
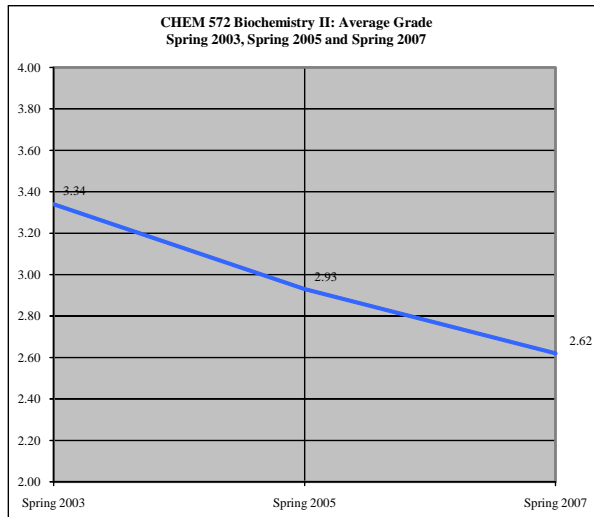
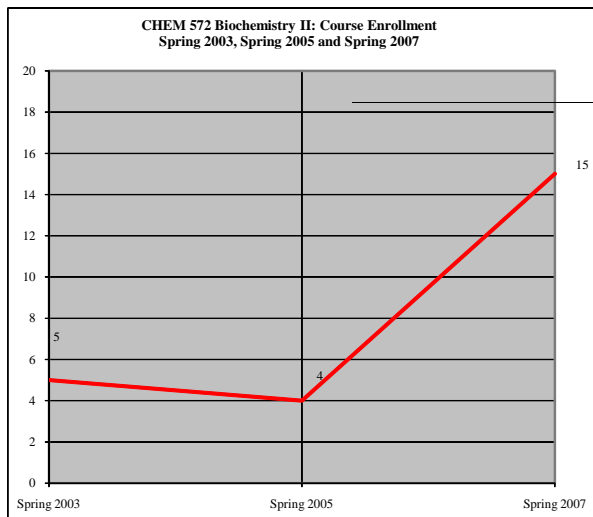


Attachment 4:

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COURSE SUMMARY DATA: DEPARTMENT OF CHEMISTRY
CHEM 572 Biochemistry II

Term	Course Enrollment	Course Grade		Course Grades Grade Distribution						Course Evaluation Results					
		Avg.	StDev.	A, A-	B+, B, B-	C	D	F	W	Course Eval. #	Course Eval. %	Instructor Rating Avg.	Instructor Rating StDev.	Course Rating Avg.	Course Rating StDev.
Spring 2003	5	3.34	0.48	2	3										
Spring 2005	4	2.93	1.08	2		2									
Spring 2007	15	2.62	0.94	3	3	8			1	11	73.33%	7.36	2.20	7.82	2.36

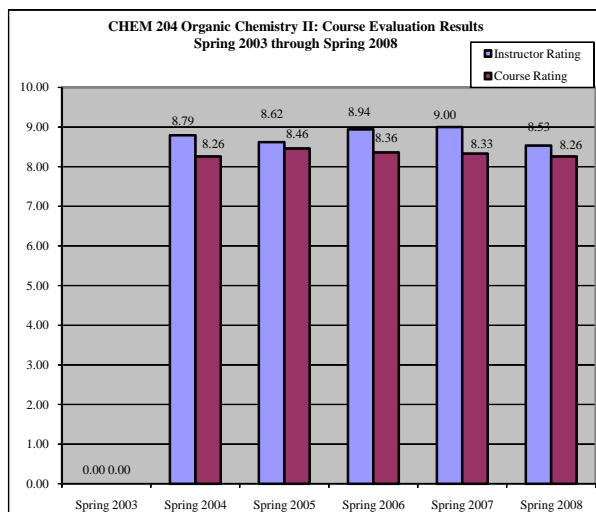
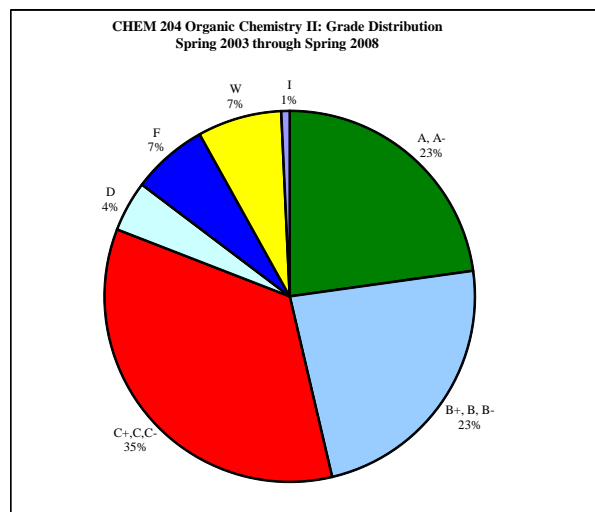
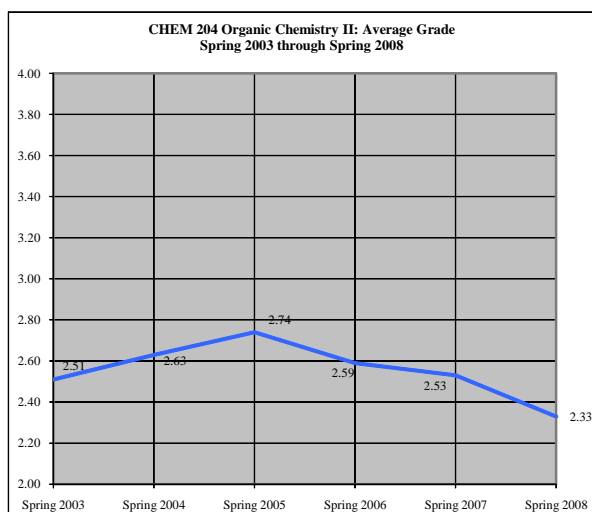
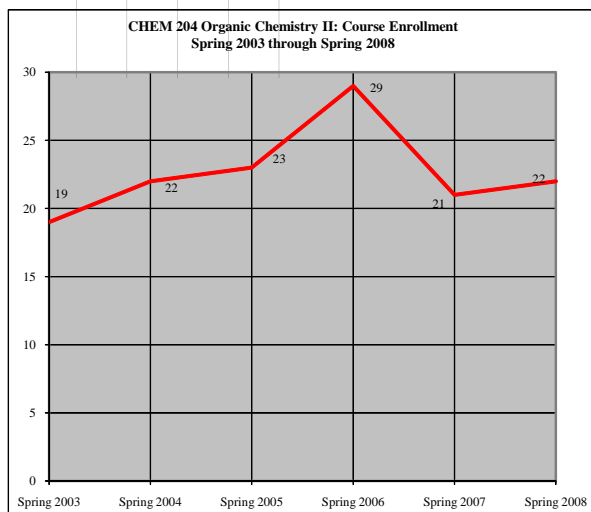


Attachment 5:

THE CATHOLIC UNIVERSITY OF AMERICA
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COURSE SUMMARY DATA: DEPARTMENT OF CHEMISTRY
CHEM 204 Organic Chemistry II

Term	Course Enrollment	Course Grade		Course Grades							Course Evaluation Results						
		Avg.	StDev.	A, A-	B+, B, B-	C+, C, C-	D	F	W	I	Course Eval. #	%	Instructor Rating Avg.	StDev.	Course Rating Avg.	StDev.	
Spring 2003	19	2.51	0.71	2	5	12						19	86.36%	8.79	1.58	8.26	1.82
Spring 2004	22	2.63	1.18	5	6	8		2	1			13	56.52%	8.62	2.57	8.46	2.26
Spring 2005	23	2.74	1.19	7	5	4	2	1	4			16	55.17%	8.94	1.00	8.36	1.39
Spring 2006	29	2.59	1.22	5	11	6		3	4			15	71.43%	9.00	1.81	8.33	2.23
Spring 2007	21	2.53	1.26	8	1	10		2				19	86.36%	8.53	1.68	8.26	1.66
Spring 2008	22	2.33	1.20	4	4	7	4	1	1	1							

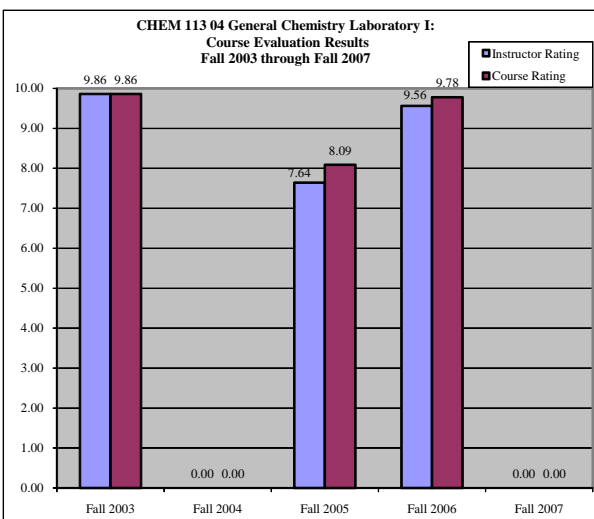
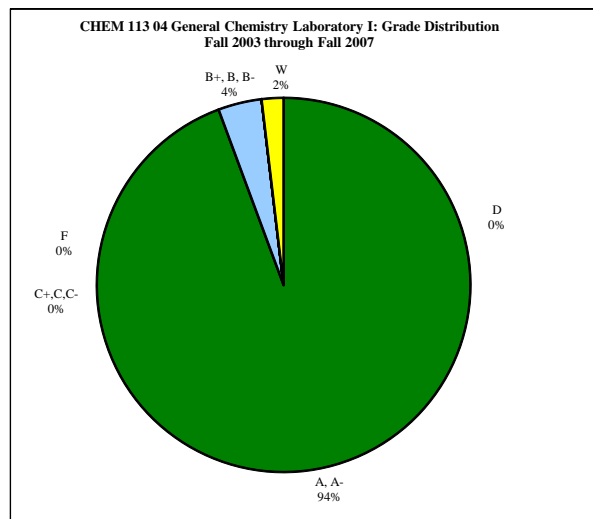
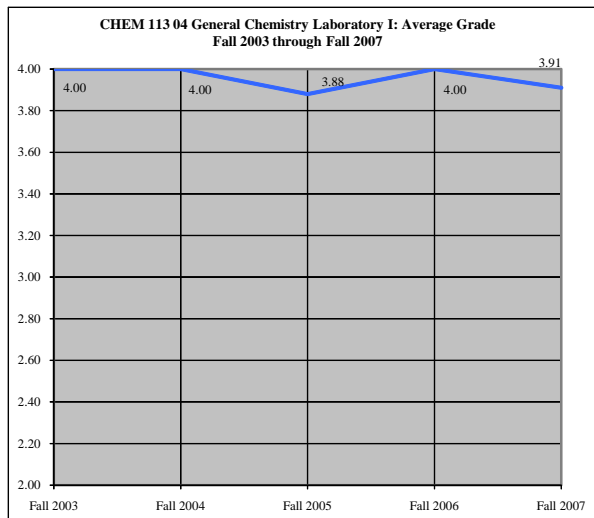
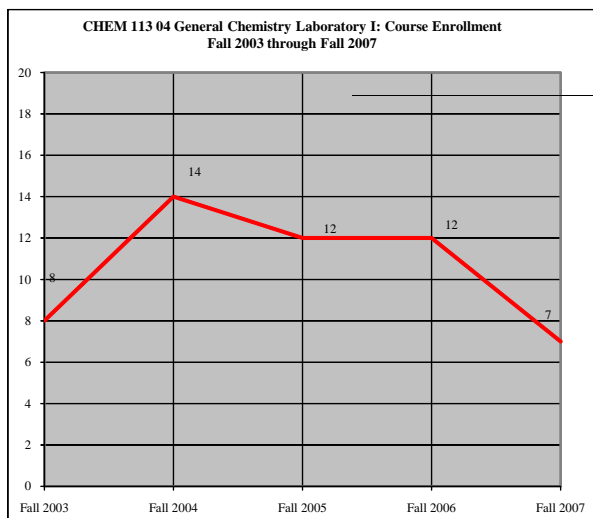


Attachment 6:

THE CATHOLIC UNIVERSITY OF AMERICA
Institutional Research and Assessment

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

Term	Course Enrollment	Course Grade		Course Grades Grade Distribution					Course Evaluation Results						
		Avg.	StDev.	A, A-	B+, B, B-	C+, C, C-	D	F	W	Course Eval. #	Course Eval. %	Instructor Rating Avg.	Instructor Rating StDev.	Course Rating Avg.	Course Rating StDev.
Fall 2003	8	4.00	0.00	8						7	87.50%	9.86	0.38	9.86	0.38
Fall 2004	14	4.00	0.00	14											
Fall 2005	12	3.88	0.27	10	2					11	91.67%	7.64	1.96	8.09	1.87
Fall 2006	12	4.00	0.00	11					1	9	75.00%	9.56	0.53	9.78	0.44
Fall 2007	7	3.91	0.15	7											



Attachment 7:

THE CATHOLIC UNIVERSITY OF AMERICA
Institutional Research and Assessment

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

Term	Course Enrollment	Course Grade		Course Grades						Course Evaluation Results						
		Avg.	StDev.	A, A-	B+, B, B-	C+, C, C-	D	F	W	Course Eval. #	Course Eval. %	Instructor Rating Avg.	Instructor Rating StDev.	Course Rating Avg.	Course Rating StDev.	
Spring 2003	8	3.66	0.44	4	3											
Spring 2004	6	4.00	0.00	6												
Spring 2005	16	3.71	0.33	12	4					14	87.50%	9.00	1.80	9.07	1.54	
Spring 2006	9	3.90	0.15	9						7	77.78%	8.00	1.15	8.00	1.41	
Spring 2007	8	4.00	0.00	8						8	100.00%	9.75	0.46	9.50	0.53	
Spring 2008	7	3.77	0.37	6	1					6	85.71%	9.33	0.82	9.50	0.84	

