

Annual Assessment Update

Program/department name: Chemistry **Academic year:** 2011-2012

This form is to be used by programs with previously completed assessment plans. Please address the following areas. You may answer on this form by expanding the space between the steps or on an attachment.

Step 1: Mission

Were any changes in your mission adopted during the past year?

No Yes

Step 2: Learning outcomes

Were any changes in your learning outcomes adopted during the past year?

No Yes

Step 3: Program components

Did you change the program components in which you carry out assessment in any way?

No Yes

Step 4: Data collection methods

Did you change your data collection methods in any way?

No Yes

Step 5: Summary and analysis of data collected during the past year

Please describe and interpret the indirect and direct data you collected during this academic year.

The Chemistry Department collects data from 5 assessment instruments to examine our students at key points in their chemical sciences education. These are:

1) A set of 10 common questions written by the department, used on *every* Chem121 final exam, each semester, to evaluate the students' mastery of foundation concepts needed for further study in chemistry (Chem121 is a large service course, and the gateway to all other classes in our department);

2) An American Chemical Society (ACS) standardized General Chemistry exam given as the final exam in each Chem123 course, to compare our students' preparation in a two semester general chemistry sequence to national norms (Chem121 and Chem123 are large service courses for many fields of study);

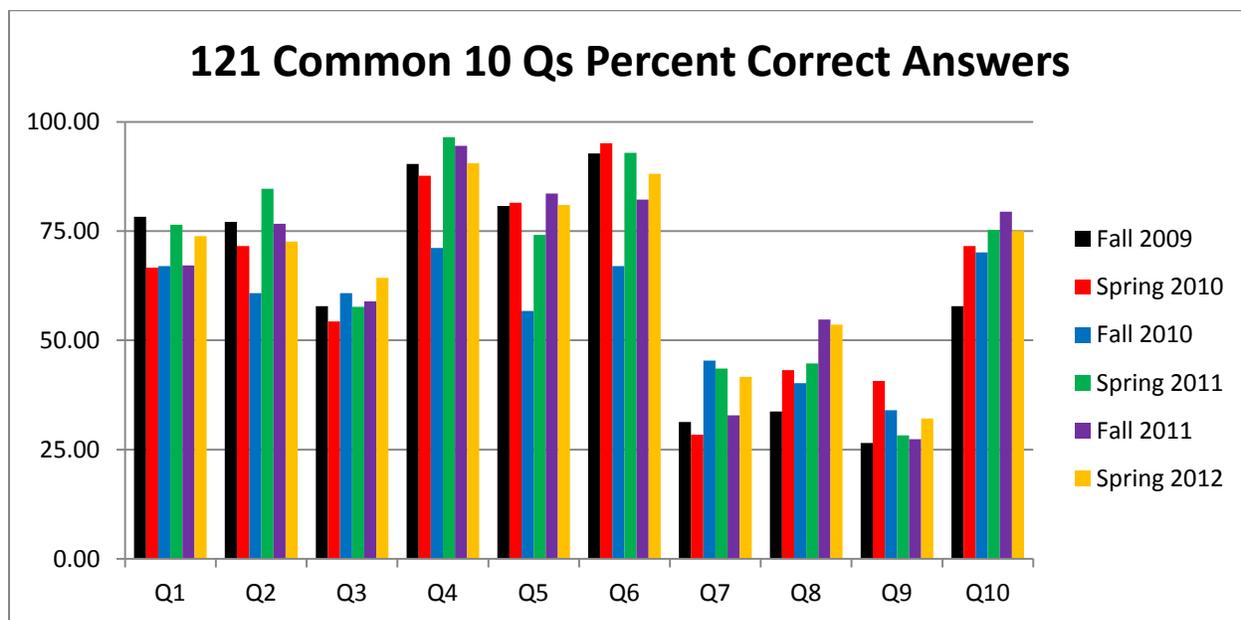
3) An ACS standardized Organic Chemistry exam given as the final exam in each Chem212 course, to compare our students' preparation in a two semester organic chemistry sequence to national norms (Chem211 and Chem212 are significant service courses to the sciences and pre-health fields);

4) A multiple choice exam written by the department, given as the final in Chem206, to assess our Chemistry minors' preparation (Chem206 is predominately taken by majors and minors only);

5) An ACS standardized exam call the Diagnosis of Undergraduate Chemical Knowledge (DUCK), given to graduating Chemistry majors, to compare our students' overall ability at the time of graduation to national norms.

Here is the summative data collected this academic year.

1) Chemistry 121 common 10 questions



These data indicate the percent of students who answered each question correctly for the compilation of all sections offered each semester. The data collected during the Fall 2011 (purple bars) and during the Spring 2012 (yellow bars) are in the same range as previous semesters for questions 1-7, 9, 10. It appears that this year students have actually passed our threshold for displaying mastery (> 50% achieving a score of 85% or higher) on question 8 for the first time since we started using this assessment instrument.

2) Chemistry 123, ACS General Chemistry Exam

	Albion College Students			ACS National Norms
	Spring 2010	Spring 2011	Spring 2012	
Mean	36.65	37.03	41.79	39.44
Stand Dev	9.80	9.64	10.18	11.55
Median	35	37	43	38.8
High	59	61	61	
low	18	21	18	
n	56	95	42	3262

This year our Chem123 students performed better on this exam, in an absolute manner, than they have in the past two years. However, the spring 2012 results are not statistically different from national norms. This means that our students are performing on par with the population of general chemistry students used to compile the national norms.

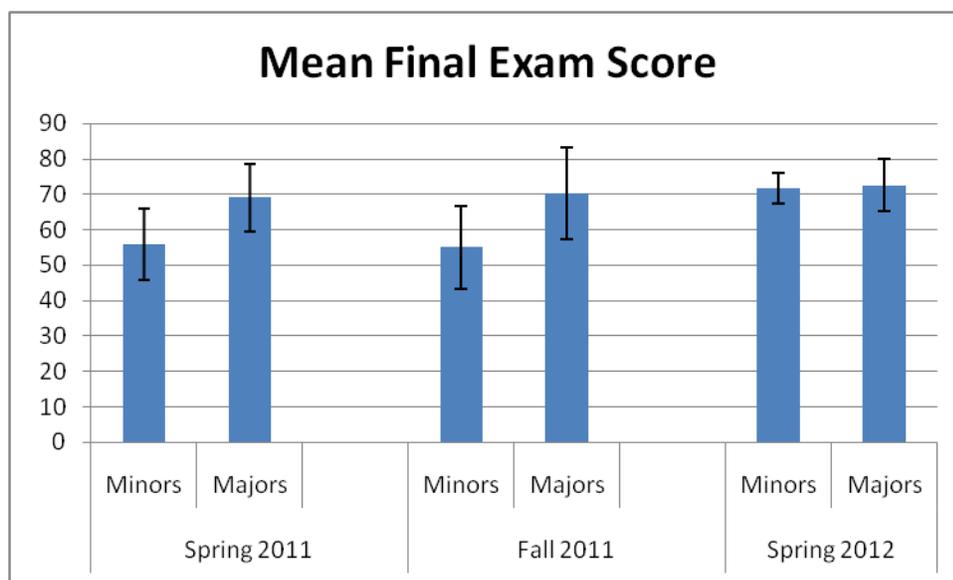
There is also a slight increase in the mean and median scores over the past few years. There are too many variables to determine the cause of this trend, but its presence is promising. Given the broad base of students who take Chemistry 123 (i.e., their backgrounds, interests and time since Chem121) these are good results.

3) Chemistry 212, ACS Organic Chemistry Exam

	Albion College Students			ACS National Norms
	Spring 2010	Spring 2011	Spring 2012	
Mean	48.77	43.04	43.28	39.47
Standard Deviation	9.14	10.26	9.36	12.16
Median	50.00	43.00	44.00	38.20

The ACS Organic Chemistry Exam has been given to the Chem 212 students for over a decade. The most recent three years of data is shown in the table above. Each year since we have given the exam, the mean and median have been at or above the national norms indicating that Albion students are learning the concepts of organic chemistry that are deemed appropriate by our national disciplinary society. However, the mean and median for the last two years are noticeably lower than in previous years. This is a matter of concern and will be considered as we reflect on the numbers.

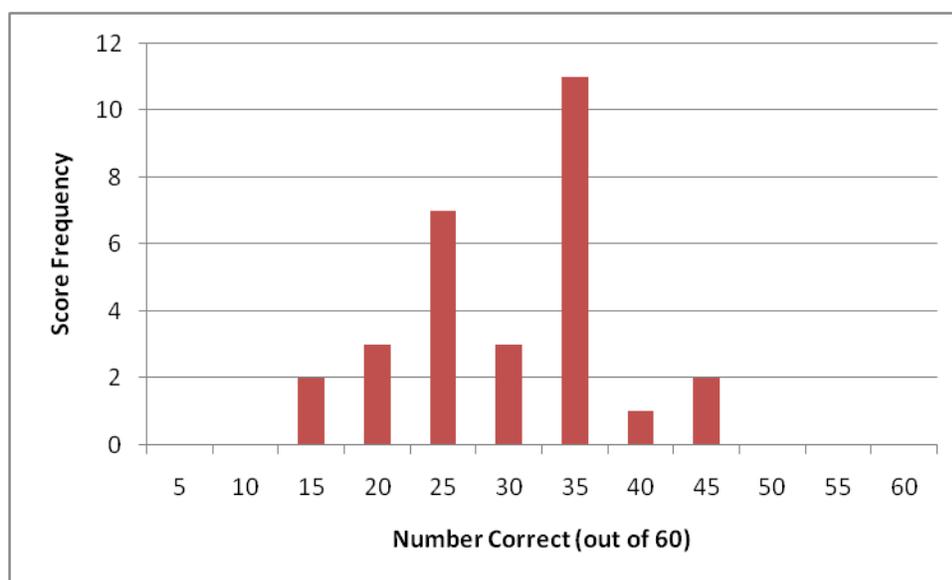
4) Chemistry 206, Minor Assessment



	Spring 2011		Fall 2011		Spring 2012	
	<i>Minors</i>	<i>Majors</i>	<i>Minors</i>	<i>Majors</i>	<i>Minors</i>	<i>Majors</i>
N	5	12	2	16	4	14
Mean Final Exam Score (%)	56	69	55	70	72	73
Standard Deviation	10	9	12	13	4	7
% Q failed (< 50%)	38	24	17	17	23	20
% Q passed (>= 50%)	62	76	83	83	77	80
Mean Final Course Grade	3.5	3.8	3.5	3.5	3.4	3.6
Standard Deviation	0.4	0.3	0.3	0.5	0.4	0.4

This data set is small since we only started this assessment during the Spring 2011 semester. However, the Spring 2012 semester saw minors performing at the same level as the majors, in absolute terms, for the first time.

5) ACS DUCK Form 2012 Exam



	Albion	National Norms (anticipated)
Mean	28	31
St. Dev.	8	
Median	30	
Mode	25	
High	45	
Low	13	
n	29	

This year the Chemistry Department participated in a national trial of the DUCK Form 2012. As a result, the national norms have yet to be compiled for this exam, thus we cannot make meaningful comparisons at this time. The ACS expects the normalized mean to be a 31. If this prediction holds true, it will most likely be the case that while our absolute average is lower than the national average, the two values are statistically insignificant, as has been the case for the last two years with the DUCK Form 2008.

Step 6: Use of the data

Given that most of these data are collected at the end of the spring semester, we tend to use them for planning for the next academic year. Specifically,

- 1) The Chem121 common 10 data will be used to discuss the usefulness of online homework which the department implemented this year for the general chemistry courses. Additionally, individual instructors are using these data to compare the outcomes of different teaching strategies piloted this year in their individual sections.
- 2) These data will be used to discuss any possible changes to Chemistry 121 and/or Chemistry 123 we might make in the future, including, but not limited to, a different text, the use of online homework, teaching styles, and course content.
- 3) These data will be used to discuss any possible changes to the Chemistry 211, 212 sequence, including, but not limited to, a different text, teaching styles, and course content.
- 4) These data will be used, in conjunction with other assessment data, to compare the proficiencies of our minors and majors during different semesters. Once the data sets grow to an appreciable size, we can begin to compare these results to other assessment pieces, e.g., Chem121 common 10 and the DUCK exam, to “track” proficiencies of our students as they complete their course of study.
- 5) These data will be used to discuss the abilities of majors as compared to other institutions. Once the comparison institutions, and their results, are identified, we will be able to evaluate these data more thoroughly.