

**Annual Key Assessment Findings and Curricular Improvements**  
**Chemistry Department/A&S**  
**Undergraduate BA/BS Program in Chemistry/Biochemistry/Environmental Chemistry**  
**AY 2013-2014**

**I. Key Assessment Findings**

The CUA Chemistry Department is periodically reviewed by the American Chemical Society for approval of its BS chemistry degree. Approval is granted to institutions meeting faculty, instrumentation, library, and curriculum criteria. The Chemistry Department submitted its latest comprehensive report to ACS in July 2012. The next review should be in 2017.

*Senior Assessment*

Six candidates for May 2014 graduation completed a written research paper and gave an oral presentation of the topic, which fulfilled the senior assessment requirement for these students. The group included candidates for the BS in Chemistry, BS in Biochemistry, and BS in Environmental Chemistry. All students passed the senior assessment (see table 1).

Table 1 Undergraduate Comprehensive Exam Results

	Fail		Pass		High Pass		Pass w/Honors		TOTAL
	#	%	#	%	#	%	#	%	
BS Chemistry	1	0.00%	1	100.00%	0	0.00%	0	0.00%	1
BS Biochemistry	4	0.00%	4	100.00%	0	0.00%	0	0.00%	4
BS Environ Chem	1	0.00%	1	100.00%	0	0.00%	0	0.00%	1

As indicated in the table of results for the senior assessment rubric that follows, most candidates met expectations in all categories.

**Table of Results**  
**Student Learning Assessment Rubric**  
**Department of Chemistry**  
**Chemistry BS, Biochemistry BA/BS, Environmental Chemistry**  
**Senior Assessment**

Trait	Level						Mean	SD	Total N
	Exceeding Expectations (3pts)		Meeting Expectations (2pts)		Below Expectations (1pt)				
	N	%	N	%	N	%			
<b>1) Proficiency in curricular content and chemical concepts in the comprehensive paper</b>	0	0%	6	100%	0	0%	2.00	0.00	6
<b>2) Written presentation of scientific topics</b>	0	0%	6	100%	0	0%	2.00	0.00	6
<b>3) Effective use of peer-reviewed scientific literature</b>	0	0%	6	100%	0	0%	2.00	0.00	6
<b>4) Oral communication and presentation of scientific topics</b>	2	33%	2	33%	2	33%	2.00	0.89	6

Note: 1) The "N" represents the number of students at each level of performance for each trait.

2) The "%" represents the percentage of the number of students falling at the level performance

for each trait against the total number of students.

3) The mean is the average of all scores across the levels within the trait.

4) The standard deviation (SD) is the measure of the variability of the data set, indicating

how "spread out" these data are from the mean value.

**Senior Assessment Rubric**

Trait	Level		
	Exceeding Expectations (3pts)	Meeting Expectations (2pts)	Below Expectations (1pt)
1) Proficiency in curricular content and chemical concepts in the comprehensive paper	<ul style="list-style-type: none"> <li>-Explains concepts clearly and accurately. Links laboratory (or literature) research methods and results to principles learned in coursework.</li> <li>-Defines a research problem (literature or student's own laboratory experience).</li> <li>-Explains experimental design for study of problem.</li> <li>-Accurately analyzes data and clearly presents findings.</li> <li>-Draws/discusses appropriate conclusions.</li> <li>-Discusses topics beyond the coursework exposure.</li> </ul>	<ul style="list-style-type: none"> <li>- Explains concepts clearly and accurately. Links laboratory (or literature) research methods and results to principles learned in coursework.</li> <li>- Defines a research problem (literature or student's own laboratory experience).</li> <li>- Explains experimental design for study of problem.</li> <li>- Accurately analyzes data and clearly presents findings.</li> <li>-Draws/discusses appropriate conclusions.</li> </ul>	<ul style="list-style-type: none"> <li>- Demonstrates limited and/or inconsistent understanding of curricular content, chemical concepts and related areas in the paper.</li> <li>- Fails to explain concepts clearly and accurately.</li> <li>- Does not integrate laboratory (or literature) research methods and results to principles learned in coursework.</li> </ul>
2) Written presentation of scientific topics	<ul style="list-style-type: none"> <li>- Logical presentation following standard scientific reporting format.</li> <li>- No apparent flaws in the scientific reasoning.</li> </ul>	<ul style="list-style-type: none"> <li>- Logical presentation following standard scientific reporting format.</li> <li>- No serious flaws in the scientific reasoning.</li> </ul>	<ul style="list-style-type: none"> <li>- The comprehensive paper is poorly written: it does not present a logical discussion of a topic.</li> <li>- There are serious errors in stated facts or in the scientific</li> </ul>

	<ul style="list-style-type: none"> <li>- Technically well-written.</li> <li>- No grammatical errors.</li> </ul>	<ul style="list-style-type: none"> <li>- May contain minor mistakes which do not invalidate the main point(s) of the paper.</li> <li>- May contain minor grammatical errors, but not enough to affect understanding by the reader.</li> </ul>	reasoning presented in the paper.
3) Effective use of peer-reviewed scientific literature	<ul style="list-style-type: none"> <li>- Relevant and more than sufficient number of citations of peer-reviewed scientific literature.</li> <li>- Includes current citations.</li> <li>- Thorough and critical evaluation of technical articles.</li> <li>- Literature citations follow an acceptable format.</li> </ul>	<ul style="list-style-type: none"> <li>- Contains a minimum number of citations of relevant peer-reviewed scientific literature.</li> <li>- Includes current citations.</li> <li>- Literature citations follow an acceptable format.</li> </ul>	<ul style="list-style-type: none"> <li>- The comprehensive paper does not contain adequate citations, either to allow the reader to conclude that proper credit has been given to scientific research sources or to bolster statements or conclusions presented in the paper. Enough recent articles have not been cited to ensure that an up-to-date review of the topic has been performed.</li> </ul>
4) Oral communication and presentation of scientific topics	<ul style="list-style-type: none"> <li>- Information is presented in a clear and organized manner.</li> <li>- Understanding of the subject matter is apparent.</li> <li>- Explanations are understandable by the general chemistry audience.</li> </ul>	<ul style="list-style-type: none"> <li>- Information is presented in a clear and organized manner.</li> <li>- Understanding of the subject matter is apparent and explanations are understandable to someone in the narrow field of the topic, but not to the general chemistry</li> </ul>	<ul style="list-style-type: none"> <li>- In an oral presentation, the information is not presented in a clear and organized manner.</li> <li>- The student does not display an understanding of the subject matter.</li> </ul>

	<ul style="list-style-type: none"> <li>- Slides, charts, handouts are neat and well-organized.</li> <li>- Appropriate use of chemical structure drawing programs and/or computer presentation software.</li> <li>- Literature references are cited where appropriate for data presented.</li> <li>- Answers to questions reveal a strong conceptual understanding of the topic.</li> <li>- Extrapolates findings of research (either laboratory work or literature work) to address more advanced questions.</li> </ul>	<p>audience.</p> <ul style="list-style-type: none"> <li>- Slides, charts, handouts are neat and well-organized.</li> <li>- Appropriate use of chemical structure drawing programs and/or computer presentation software.</li> <li>- Literature references are cited where appropriate for data presented.</li> <li>- Answers to questions reveal a conceptual understanding of the topic.</li> <li>-Cannot extrapolate findings of research (either laboratory or literature work) to address more advanced questions.</li> </ul>	
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### *Graduate Placement*

Of the six graduates in chemistry, environmental chemistry or biochemistry in 2014, one was accepted into a medical program for Fall 2014. One was accepted into a dental program for Fall 2014. One began working for Booz Allen Hamilton in Fall 2014. One of the 2014 graduates began a graduate program in biotechnology in Fall 2014, and two graduates have begun graduate programs in chemistry, one in Fall 2014 and one in Spring 2015.

## II. Performance in key courses

**“Capstone” course:** Seniors in the ChemBS /Env.Chem BS programs and in the Biochem BA/BS programs in this academic year did not take a single course that could be considered a “capstone” course for the programs. All seniors did, however, take Chem 405, Science Communication. All Chem BS and Env.Chem BS majors took Chem 352 and all Chem BS and Biochem BS majors took Chem 501 (now Chem 401). All Biochem BA/BS majors took Chem 572 (now Chem 472). Enrollment, grade, and course evaluation data are provided for these courses for the last offerings for the class graduating in Spring 2014.

### **Physical Chemistry II – Chem 352 (Spring ‘14):**

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 352 for the last offering of the course (Spring 2014).

For the last offering of this course (Spring 2014), enrollment was 6 students. The grades of students in this class spanned A to C- with an average grade in this course of 3.12 (B). Course evaluations are available for this period. A 5.00 average course rating and a 5.60 average instructor rating (out of 7) were obtained.

### **Advanced Inorganic Chemistry – Chem 501(Fall 2012):**

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 501 for the last offering of the course (2012).

For the last offering of this course (Fall 2012), enrollment was 8 students. The grades of students in this class ranged from A to C- with an average grade in this course of 3.09 (B). Course evaluations are available for this period. A 8.63 average course rating and a 9.13 average instructor rating (out of 10) were obtained.

### **Biochemistry II – Chem 572 (Spring 2013):**

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 572 for the last offering of the course (2013) taken by this graduating class.

For the last offering of this course (Spring 2013), enrollment was 10 students. The grades of students in this course ranged from A to C. The average grade in this course was 3.43 (B+). Course evaluations are available for this period. A 6.00 average course rating and a 6.40 average instructor rating (out of 7) were obtained.

### **Science Communication – Chem 405 (Fall 2013)**

The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 405 for last offering of the course in Fall 2013. For the offering of this course in Fall 2013 the enrollment was 7 students. The grades of students in this course ranged from A to B. The average grade in this course was 3.57 (B+). Course evaluations are available for this period. A 5.43 average course rating and a 6.29 average instructor rating (out of 7) were obtained.