Annual Key Assessment Findings and Curricular Improvements
Chemistry Department/A&S
Undergraduate BA/BS Program in Chemistry/Biochemistry/Environmental Chemistry
AY 2014-2015

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

Two candidates for January 2015 graduation and three candidates for May 2015 graduation completed written research papers and gave oral presentations of their topics, which fulfilled the senior assessment requirement for these students. The group included candidates for the BS in Chemistry and the BS in Biochemistry. 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	0	0.00%	2	100.00%	0	0.00%	0	0.00%	2
BS Biochemistry	0	0.00%	3	100.00%	0	0.00%	0	0.00%	3

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

	Level								
	Exceeding Expectations (3pts)		Meeting Expectations (2pts)		Below Expectations (1pt)				
Trait	N	%	N	%	N	%	Mean	SD	Total N
1) Proficiency in curricular content and chemical concepts in the comprehensive paper	0	0%	5	100%	0	0%	2.00	0.00	5
2) Written presentation of scientific topics	0	0%	5	100%	0	0%	2.00	0.00	5
3) Effective use of peer-reviewed scientific literature	0	0%	5	100%	0	0%	2.00	0.00	5
4) Oral communication and presentation of scientific topics	0	0%	5	100%	0	0%	2.00	0.00	5

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	-Explains concepts clearly and accurately. Links laboratory (or literature) research methods and results to principles learned in coursework. -Defines a research problem (literature or student's own laboratory experience). -Explains experimental design for study of problem. -Accurately analyzes data and clearly presents findings. -Draws/discusses appropriate conclusions. -Discusses topics beyond the coursework exposure.	- Explains concepts clearly and accurately. Links laboratory (or literature) research methods and results to principles learned in coursework. - Defines a research problem (literature or student's own laboratory experience). - Explains experimental design for study of problem. - Accurately analyzes data and clearly presents findings. -Draws/discusses appropriate conclusions.	- Demonstrates limited and/or inconsistent understanding of curricular content, chemical concepts and related areas in the paper. - Fails to explain concepts clearly and accurately. - Does not integrate laboratory (or literature) research methods and results to principles learned in coursework.
2) Written presentation of scientific topics	- Logical presentation following standard scientific reporting format. - No apparent flaws in the scientific reasoning.	- Logical presentation following standard scientific reporting format. - No serious flaws in the scientific reasoning.	- The comprehensive paper is poorly written: it does not present a logical discussion of a topic. - There are serious errors in stated facts or in the scientific

	- Technically well-written. - No grammatical errors.	- May contain minor mistakes which do not invalidate the main point(s) of the paper. - May contain minor grammatical errors, but not enough to affect understanding by the reader.	reasoning presented in the paper.
3) Effective use of peer-reviewed scientific literature	- Relevant and more than sufficient number of citations of peer-reviewed scientific literature. - Includes current citations. - Thorough and critical evaluation of technical articles. - Literature citations follow an acceptable format.	- Contains a minimum number of citations of relevant peer-reviewed scientific literature. - Includes current citations. - Literature citations follow an acceptable format.	- 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.
4) Oral communication and presentation of scientific topics	- Information is presented in a clear and organized manner. - Understanding of the subject matter is apparent. -Explanations are understandable by the general chemistry audience.	- Information is presented in a clear and organized manner. - 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	-In an oral presentation, the information is not presented in a clear and organized manner. - The student does not display an understanding of the subject matter.

	- Slides, charts, handouts are neat and well-organized. - Appropriate use of chemical structure drawing programs and/or computer presentation software. - Literature references are cited where appropriate for data presented. - Answers to questions reveal a strong conceptual understanding of the topic. - Extrapolates findings of research (either laboratory work or literature work) to address more advanced questions.	audience. - Slides, charts, handouts are neat and well-organized. - Appropriate use of chemical structure drawing programs and/or computer presentation software. - Literature references are cited where appropriate for data presented. - Answers to questions reveal a conceptual understanding of the topic. -Cannot extrapolate findings of research (either laboratory or literature work) to address more advanced questions.	

Graduate Placement

Of the five graduates in chemistry and biochemistry in 2015, two have been accepted into pharmacy programs, one has accepted a position as a research assistant for Dr. Mash at the Center for the Study of Traumatic Stress, Uniformed Services University, Bethesda, MD and one is attending a physical therapy graduate program at the University of New England. One has returned to Saudi Arabia. Her plans are unknown.

II. Performance in key courses

"Capstone" course: Seniors in the Chem BS program and in the Biochem BS program 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 majors took Chem 352 and all Chem BS and Biochem BS majors took Chem 401. All Biochem BS majors took Chem 472. Enrollment, grade, and course evaluation data are provided for these courses for the last offerings for the class graduating in Spring 2015.

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 offering of this course in 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 401(Fall 2014):
The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 401 for the last offering of the course (Fall 2014).

For the offering of this course in Fall 2014, enrollment was 8 students. The grades of students in this class ranged from A to C- with an average grade in this course of 3.01 (B). Course evaluations are available for this period. A 6.49 average course rating and a 6.80 average instructor rating (out of 7) were obtained.

Biochemistry II – Chem 472 (Spring 2015):
The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 472 for the last offering of the course (Spring 2015) taken by this graduating class.

For the offering of this course in Spring 2015, enrollment was 8 students. The grades of students in this course ranged from A to F. The average grade in this course was 3.13 (B). Course evaluations are available for this period. A 6.39 average course rating and a 6.75 average instructor rating (out of 7) were obtained.

Science Communication – Chem 405 (Fall 2014)
The Department of Chemistry analyzed course grade, evaluation, and enrollment data in Chem 405 for last offering of the course in Fall 2014. For the offering of this course in Fall 2014 the enrollment was 5 students. The grades of students in this course ranged from A to C. The average grade in this course was 3.60 (B+). Course evaluations are available for this period. A 5.90 average course rating and a 6.00 average instructor rating (out of 7) were obtained.

Curricular Improvements

For future offerings of general chemistry lab, Dr. Katherine Havanki is redeveloping the curriculum for General Chemistry I & II Lab (Chem 113 &114). The new curriculum will be highly aligned with the lecture component of the sequence (Chem 103 &104). Keeping in mind the challenge of the Laudato Si' to "protect our common home", Dr. Havanki will design all new activities to decrease safety hazards to the students and drastically reduce the production of hazardous waste in the lab, a cost savings for the university. This also addresses the challenge of conducting the courses in the new laboratory space in the Nursing-Biology building given to chemistry department for this purpose which is much smaller than the facilities that had been available in Maloney Hall.

Dr. Havanki will write new labs focusing on developing technical skills and safe chemical handling while teaching the principles addressed in the lecture. She will also introduce students to computer modeling software, which will allow them to visualize compounds and concepts, such as polarity and bond angle, studied in class.

A new type of lab, a multi-week scenario lab will be introduced into Chem 113 and 114. The goal of this module is to give students an immersive research experience (from development to presentation) within prescribed parameters. Students will be able to select one of several scenarios linked to current events. Given a list of materials and an overarching goal, teams of two or three students will develop a research proposal (including: research question(s), procedures, chemical safety information, and an analysis plan for data) by drawing on their experience from previous laboratory activities. Students will order their own materials and equipment from the stockroom, collect data, and write reports on the research findings. One possibility being explored is a poster session where students can present scientific posters about their findings.

Dr. Havanki, whose expertise is in chemical education, will also perform an evaluation of the scenario lab modules to determine their overall impact on the course and effectiveness on student learning.