

## 2016-17 Student Learning Assessment Report, Academic

<b>Program:</b> Biochemistry	<b>Degree:</b> Major	<b>Department Head:</b> George Barnes	<b>Submitted By:</b> George Barnes	<b>Date Submitted:</b> 06/13/2017	
<p><b>Mission:</b> Our mission is to provide a curriculum and environment that enables students to achieve a level of knowledge of chemistry or biochemistry appropriate for their chosen field or liberal arts education. We provide students with the foundation in chemistry and biochemistry necessary for their pursuit of careers in industry, research, education, engineering, health professions or other interdisciplinary fields. Our courses encourage active participation and critical understanding of safety issues and subject matter in both courses and laboratories. We strive to provide our faculty with career and research opportunities for their scholarly development and provide the college and community with a resource of knowledge and professional contribution</p>					
<b>1. Major/Program Student Learning Outcomes</b> Students will be able to...	<b>2. Phase</b>	<b>3. Assessment Procedures</b> (Planning/ determining)	<b>4. Assessment Results</b> (Collecting/ analyzing)	<b>5. Use of Results</b> (Discussing/ using results)	<b>6. Determining if changes impacted student learning</b>
<p>1. Master a broad set of chemical knowledge concerning the fundamentals in the basic areas of the discipline (analytical, biochemistry, inorganic, organic and physical chemistry).</p> <p>Criteria: (How do you know students are achieving learning outcome?) 50% of students will meet/exceed National Averages</p>	<p>Discussing Impact</p>	<p>Method: (ex. tests, presentations, research paper) American Chemical Society National Standardized Exams for each subject discipline</p> <p>Using a Sample of Students? Yes</p> <p>If yes, describe your sample. All students in CHEM 120, 220, and 340 and biochemistry majors separately</p> <p>When does assessment occur? others may occur at the end of fall or spring semesters each year (if the</p>	<p>In CHEM 120, 220, 320 and 340 the class average scores were higher than the national average. CHEM 120 : For all students, 64% of the scores for AY 13-15 were higher than the national average, and for AY 15, 70% exceeded the National average. For AY 15, 82% of the biochemistry majors exceeded the</p>	<p>new textbook was used in CHEM 110/120 course sequence. Comparing the results of the ACS exam from the previous years it would appear that the change in text may have not helped with the overall outcome. The decision was made by consensus of the instructors to keep the text for at least another year and re-evaluate at the end of next spring. CHEM 120 : For all students (total Of 122), 61% of the scores for AY16 were higher than the national average. For AY 16, 77% of the biochemistry majors (total of 13) exceeded the national average. CHEM 220 : 73% of the organic students and 100% of the biochemistry majors scored above</p>	<p>CHEM 120 : For all students (total of 138), 57% of the scores for AY 17 were higher than the national average. For AY 17, 65% of the biochemistry majors exceeded the national average.</p> <p>CHEM 220 : 88% of the organic students and 100% of the biochemistry majors scored above the national average for AY 17.</p> <p>Course instructors are generally satisfied with textbook and will continue to use it for another year since it does not appear to be weakening the overall outcome for the class.</p>

		<p>courses run)</p> <p>How often does assessment occur? The exams are administered at the end of each course which is typically once a year. Results are analyzed every fourth year. (last S15)</p>	<p>national average. CHEM 220 : 81% of the organic students and 100% of the biochemistry majors scored above the national average. CHEM 340 : (chemistry and biochemistry majors only) For AY12-14, 65% of all students scored above the national average with 100% of biochemistry majors exceeding the national average</p> <p>Learning Outcome Met? (Based on Criteria) Yes</p>	<p>the national average for AY16.</p>	
<p>2. identifying the essential parts of a problem and formulating a strategy for solving the problem. They will be able to rationally estimate the solution to a problem, apply appropriate techniques to arrive at a solution, test the correctness of the solution, and interpret their results.</p> <p>Criteria: (How do you know students are achieving learning outcome?) 50% of students will meet/exceed National Averages</p>	<p>Discussing Impact</p>	<p>Method: (ex. tests, presentations, research paper) American Chemical Society National Standardized Exams for each subject discipline</p> <p>Using a Sample of Students? Yes</p> <p>If yes, describe your sample. All students in CHEM 120, 220, and biochemistry majors separately</p> <p>When does assessment occur? End of spring semester for 120 and 220, others may occur at the end of</p>	<p>In CHEM 120 and 220 the class average scores were higher than the national average. CHEM 120 : For all students, 64% of the scores for AY 13-15 were higher than the national average, and for AY 15, 70% exceeded the National average. For AY 15, 82% of the biochemistry majors exceeded the national average.</p>	<p>See above for AY16 results.</p> <p>Discussions are underway reviewing the online homework system being used in CHEM 110/120 and 210/220.</p>	<p>See above for AY17 results.</p> <p>Several online homework options were explored over the last semester but none were found to be significant'y better than what we have been using. As mentioned above, a foundations class has been established to aid under performing students. Online material to support this class is being evaluated</p>

		<p>fall or spring semesters each year (if the courses run)</p> <p>How often does assessment occur? End of spring semester for 120 and 220, others may occur at the end of fall or spring semesters each year (if the courses run). Results are analyzed every fourth year. (last S15)</p>	<p>CHEM 220 : 81% of the organic students and 100% of the biochemistry majors scored above the national average.</p> <p>Learning Outcome Met? (Based on Criteria) Yes</p>		
<p>3. Use computers in data acquisition and processing, and use available software as a tool in data analysis and modeling.</p> <p>Criteria: (How do you know students are achieving learning outcome?) At least 75% of students meet or exceed standards (a score of &gt;15 out of 25 possible points).</p>	<p>Planning</p> <p>Impact</p> <p>Not Done</p>	<p>Method: (ex. tests, presentations, research paper) Written Laboratory Reports</p> <p>Using a Sample of Students? Yes</p> <p>If yes, describe your sample. All students in CHEM 225 and biochemistry majors separately</p> <p>When does assessment occur? For each laboratory exercise that uses data acquisition or data processing and analysis.</p> <p>How often does assessment occur? Typically, more the half of ten labs fall under the rubric for this assessment. Results are analyzed every fourth year. (last S12)</p>	<p>We used Vernier LoggerPro software (used for data acquisition, analysis and modeling) for eight of the nine experiments performed. In addition, Microsoft Excel was used in every experiment for data analysis and modeling. Two experiments are devoted to training in both the use of Excel and LoggerPro. Using nine rubric-graded written reports completed during the semester as a guide, on average 88% of all CHEM 225 students meet or exceed the standard, 92% of biochemistry majors meet or exceed the standard. (S13)</p>	<p>The results of our efforts to implement assessable results has lead to a new laboratory curriculum for CHEM 225. Vernier Logger Pro is still used in several of the new experiments, but the lab curriculum does not have a set experiment devoted to the use of the Vernier equipment. The general chemistry laboratory curriculum is strong and relies heavily on Vernier usage, so in CHEM 225, online review of instrumentation use has replaced the set laboratory. The use of Excel is still used in every experiment in the new CHEM 225 curriculum, but the Excel laboratory devoted solely to learning how to use Excel has been removed. Again, the general chemistry laboratory augmented its curriculum by adding a similar training module, and the result is that students come to CHEM 225 with stronger Excel skills. The new laboratory curriculum incorporates experiments that are based on the lecture course's textbook, and expect much more prelab planning and knowledge of subject than previous laboratory curriculum iterations. Lab</p>	<p>The use of our results has led us to believe that while Vernier technology is a very useful manner of data acquisition, the training that students receive in general chemistry is more than enough, and gives CHEM 225 students a working knowledge of the systems. This can and will open up the curriculum to a more inquiry-based model for the laboratory. The resulting change of the CHEM 225 curriculum was needed, but turned out to be difficult for the students to correlate labs with lectures. Fore this reason, we have decided to go for a more radical change, making the laboratory portion of CHEM 225 a more hands on, individual-driven experience, mimicking what chemistry and biochemistry students can face in the job market or graduate school.</p>

			Learning Outcome Met? (Based on Criteria) Yes	rubrics will be used when needed, but there will be a much stronger emphasis on precision and accuracy of the results submitted, and this will be reflected in the grading scheme. Thirty percent of the laboratory grade will be based on notebook management and report writing, with 70% of the grade based on the submitted, summarized data. (S14)	
<p>4. Understand the objective of their chemical and biochemical experiments, properly carry out the experiments, and appropriately record and analyze the results.</p> <p>Criteria: (How do you know students are achieving learning outcome?) At least 80% of students meet or exceed standards in CHEM 316 (a score of &gt;15 out of 25 possible points).</p>	<p>Planning</p> <p>Impact</p> <p>Not Done</p>	<p>Method: (ex. tests, presentations, research paper) Evaluation of the "results" section of CHEM316 laboratory</p> <p>Using a Sample of Students? Yes</p> <p>If yes, describe your sample. All CHEM 316 students and biochemistry majors separately</p> <p>When does assessment occur? Each weekly lab report results section is assessed with a rubric.</p> <p>How often does assessment occur? Data are collected and results are analyzed every fourth year. (last S12)</p>	<p>Using seven written "results" sections completed during the semester as a guide, 86% of all CHEM 316 students meet or exceed the standard. Broken out into majors, roughly 84% of biochemistry majors and roughly 90% of chemistry majors meet or exceed the standard. (S13)</p> <p>Learning Outcome Met? (Based on Criteria)</p>	<p>Since the majority of the course grade will be based on results, all written results and discussion sections will be heavily critiqued. The emphasis on the proper calculation of a result, correct statistical analysis, and acceptable precision and accuracy will be stressed. (S14)</p>	<p>Integrated Laboratory I (CHEM 316) has been replaced with CHEM 315 - Physical Chemistry Laboratory I. 315 is now a chemistry-major only course. The curriculum has the same content (thermodynamics and quantum chemistry), but has evolved into a instrumentation-heavy course with emphasis on result interpretation and error analysis. This is in line with the interpretation of our use of results, except for the fact that the course that was being assessed has been subsequently eliminated and replaced with another lab.</p>
<p>5. Employ modern library search tools to locate and retrieve scientific information about a topic, chemical, chemical/biochemical technique, or an issue relating to chemistry or biochemistry</p> <p>Criteria: (How do you know students</p>	<p>Planning</p> <p>Impact</p> <p>Not Done</p>	<p>Method: (ex. tests, presentations, research paper) Literature Project using SciFinder Scholar</p> <p>Using a Sample of Students? Yes</p>	<p>Overall mean of 78 students was 27.8. 71 of the 78 (91%) students scored above 80%. The biochemistry majors (3 total) averaged 28.3 of</p>	<p>The department is generally pleased with the results of this project and with the criteria by which it is being assessed. This year (S15), 88% of the organic students and 100% of the biochemistry majors scored over 24 on the scifinder scholar activity. The mean was 27.6.</p>	<p>No changes are deemed necessary at this time.</p>

<p>are achieving learning outcome?) At least 80% of students meet or exceed standards (a score of &gt;24 out of 30 possible points)</p>		<p>If yes, describe your sample. All CHEM 220 students and biochemistry majors separately</p> <p>When does assessment occur? Each spring semester.</p> <p>How often does assessment occur? Data are collected and results are analyzed every fourth year. (last S14)</p>	<p>30 pts and all scored above the 24 pt criteria. (S14)</p> <p>Learning Outcome Met? (Based on Criteria) Yes</p>	<p>No changes are deemed necessary at this time.</p>	
<p>6. Know and follow the proper procedures and regulations for safe handling and use of chemicals</p> <p>Criteria: (How do you know students are achieving learning outcome?) At least 75% of students will meet or exceed standards of scoring 85% on safety quiz. ( score of 13 of 15 pts)</p> <p>Note: that this assessment procedure could not be evaluated as written since the quiz format changed to allow 5 attempts at getting a perfect score.</p>	<p>Impact Not Done</p>	<p>Method: (ex. tests, presentations, research paper) The safety quiz results in CHEM 210 will be evaluated.</p> <p>Using a Sample of Students? Yes</p> <p>If yes, describe your sample. All CHEM 210 students and biochemistry majors separately</p> <p>When does assessment occur? Quizzes are given each week as part of the laboratory portion of CHEM 210</p> <p>How often does assessment occur? Data are collected and results a</p>	<p>Overall mean of 78 students was 14.8. The biochemistry majors (3 total) averaged 15 of 15 pts and all scored above the 13 pt criteria. (F13)</p> <p>Learning Outcome Met? (Based on Criteria) Yes</p>	<p>Broader safety training is now implemented with online modules. At the end of each module, a quiz must be taken by the student and passed at a minimum proficiency. Since students can review the module and retake the quiz to achieve the necessary score, the procedure of assessment and measurement need to be modified.</p>	<p>New online system forces students to obtain a minimum score making the current criteria meaningless for assessing student outcomes since all must pass. This assessment tool will be re-evaluated in the next cycle.</p>
<p>7. Communicate the concepts found within chemistry and/or biochemistry as well as the results of their</p>	<p>Discussing Impact</p>	<p>Method: (ex. tests, presentations, research paper) Student presentations at the</p>	<p>Of the 19 graduating Chemistry and</p>	<p>Our department has started the "Research Fellows" program to recruit exceptional students and get</p>	<p>Our department has continued to recruit promising students into the "Research Fellows" program getting</p>

<p>laboratory experiments with clarity and coherence through effective writing and oral communication skills.</p> <p>Criteria: (How do you know students are achieving learning outcome?) 50% of graduating seniors will have either given a presentation or coauthored a peer-reviewed publication</p>		<p>“Academic Celebration” will be evaluated by faculty from the department and the instructors i</p> <p>Using a Sample of Students? Yes</p> <p>If yes, describe your sample. All CHEM 426 students and biochemistry majors separately</p> <p>When does assessment occur? End of spring semester.</p> <p>How often does assessment occur? Data are collected and results are analyzed every fourth year. (last S15)</p>	<p>Biochemistry majors, all 19 presented at least one poster at the Academic Celebration. The majority of these students also presented their posters in the School of Science Academic Celebration, which followed later in the afternoon. Nine students presented posters at the American Chemical Society’s Eastern New York’s section Undergraduate Research Symposium hosted at Siena College by the Department of Chemistry and Biochemistry. In addition, 3 students presented posters at National ACS conferences</p> <p>Learning Outcome Met? (Based on Criteria) Yes</p>	<p>them involved in projects in their first year. Students will continue to strengthen communication skills by participating in professional meetings, in house seminars and the Academic Celebration.</p>	<p>them involved in projects in their first year.</p> <p>The department is generally pleased with the results of this project, no changes are deemed necessary at this time.</p>
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