

University of Louisiana at Lafayette

Detailed Assessment Report 2015-2016 Chemistry BS

As of: 11/17/2016 10:05 AM CENTRAL

(Includes those Action Plans with Budget Amounts marked *One-Time, Recurring, No Request.*)

Mission / Purpose

The mission of the UL Dept. of Chemistry is to provide instruction of chemistry subjects to students majoring in either Chemistry itself, or in other scientific fields such as physics, biology, etc.

The purpose of this instruction is to provide students with both the fundamentals upon which the field of chemistry is based, and to equip students with the latest techniques, knowledge base and breadth of application of chemistry to both the sciences and society.

The Department of Chemistry at UL Lafayette is certified by the American Chemical Society and is committed to advancing the intellectual, technological, cultural and scientific knowledge of its students and faculty following the highest standards of scientific inquiry. The mission of the department is accomplished through the use of several mechanisms including 1) classic and innovative classroom and laboratory instruction, 2) student advising and 3) undergraduate research. The department strives to teach students to be independent scientists and scientifically literate citizens. By partnering with communities both inside and outside the University, the department supports the application of the chemical sciences to address the societal needs for both chemistry and science majors, but also for non-science majors as well.

The Dept. of Chemistry also services in the capacity of a service department offering a range of chemistry courses designed for specific non-chemistry majors to provide needed and useful chemical knowledge to such students.

Student Learning Outcomes/Objectives, with Any Associations and Related Measures, Targets, Findings, and Action Plans

SLO 1: Chem 317- Biochemistry I

Recognize organic chemical reactions embodied in biochemical processes. Students will **know, recognize** and be able to **classify** the four major classes of biomolecules, **predict, contrast, explain** and **determine** the **identifying** and **distinguishing** characteristics of each class. They will **know** and be able to **evaluate** the various biomolecular forces operative in the structural organization of proteins, nucleic acids, lipids and carbohydrates. They will **know, distinguish** and be able to **explain** protein organization, **know** and **explain** enzyme catalysis mechanisms, and **know**, and be able to **explain** and **distinguish** between Michaelis-Menton (M-M) and non-M-M kinetics as well as **calculating** M-M kinetics problems.

Students will **know** biomembrane structure, general composition, functional purposes, and be able to **explain** physicochemical properties of the biomembrane. This understanding will also include **recognizing** and **explaining** the various means of transport across membranes.

Related Measures

M 1: ACS Std Exam Biochemistry

When the SACS Assessment program began several years ago, the Chemistry Department had arbitrarily chosen a benchmark performance level of 70% of our majors answering the sub-discipline Standard Exam questions with 70% correctness. At the time, this seemed a reasonable level of performance requirement. However, over the intervening years, we have been struggling with attaining this goal on Organic and P. Chem., the two major sub-disciplines that have been considered in the assessment process thus far. We have been getting results well below the 70% goal, both in students achieving the desired performance as well as actually answering 70% of the questions correctly.

A meeting was held to discuss the issues confronting our students' performances and it was recognized that we had no national benchmark against which to compare or measure the selected performance level of our students. An investigation into just what is the national result on the ACS Standard Exams resulted in the TABLE ACS. The results of the TABLE are averages of all students taking the exams for General and Organic as other science majors are required to take those courses.

It would appear that we have set a seemingly impossibly high standard on our students compared to the national performance of students who come from other well recognized schools across the nation. As a result, the UL Chemistry Department SACS Committee has decided that we must reassess our own performance level desired from our students and to reset our goals in order to offer our students a more reasonable performance level that can be attained by them as well as judged more responsibly against national level performance on the Standard Exams. Though the Department may wish to hold desires for such a high standard of performance of our students in the distant future, requiring such at this point in time and in light of national norms, may be like demanding they run a marathon before they have learned to simply run. As a case in point, only 13% of students nationally taking the Standard Exam in P. Chem. actually attain a 70% correctly answered questions. Nationally, 70% of the students actually only answer about 45% of the questions correctly.

With the beginning of the 2015-2016 Assessment period, we will initiate a new starting standard gaged to the national norms of the various sub-discipline performances. For Biochemistry, we will set the standard of 70% of our students achieving 40% correct answers.

Furthermore, we will report the results for each semester's case, but we will retain these new standards levels for each sub-discipline for two or three assessment cycles before we reassess those standards levels for any further adjustment. One critical reason behind this approach is that with so few majors in the sampling as we historically have had, the statistics are somewhat iffy for basing any changes from the results of a single semester's case. It is hoped, that over several semesters, an overall trend result would more likely emerge that may not be determinate with one such semester result. Additionally, the results over several semesters may permit each sub-discipline's committee to better assess the "apparent" academic weaknesses of students and/or weaknesses in subject coverage that leads to the results requiring address. In essence, several semesters sums the numbers of students to offer a better pool of students for the statistical analysis of performance that just cannot be attained in one semester's result.

Source of Evidence: Standardized test of subject matter knowledge

Target:

For Biochemistry , we will set the standard of 70% of our students achieving 40% correct answers on the Standard Exam in Biochemistry.

Connected Document

[Standard Exam Performance of Chem Majors in Biochemistry I](#)

Finding (2015-2016) - Target: Met

In accordance with the Measures Section, the standards adopted for the Biochemistry courses is 70% of the Chemistry Majors should score at least 40% correct answers on the American Chemical Society Standard Exam in Biochemistry. Table 1a shows the results for this cycle, Fall 2015 semester. The average percent correct answers is 50% while the median is 60%. This cycle, 82% of the majors scored 40% or better correct answers. The biochemistry committee finds that this is a very good showing for a first time assessment under the new system employed herein.

However, three students, 27%, scored minimally, while two students, 18%, scored below the ACS standard exam national average. Taken together, 5 majors, 45%, scored barely on or below the desired goal, suggesting a potential for shortfall; if all five were below 40%, then only 55%, not 82% would have met the Department goal of 70% majors correctly answering 40% of the questions. As the Chem 317 (Biochemistry I) is a chemistry course, the Biochemistry Committee notes that these majors performed minimally or below the national average set as the goal? It may well be that these 5 majors are biology poorer students, and though the other majors may have had a better grasp of applicable biology principles going into the course, the 5 did not.

Connected Document

[Standard Exam Performance of Chem Majors in Biochemistry I](#)

Related Action Plans (by Established cycle, then alpha):

Chem 317- Biochemistry I

Our target goal originally was for 70% of our majors to perform at least at the national average of correct answers on the national level Standard Exam in Biochemistry. Our result shows that 82% performed at or above that 40% correct answers. However, this is the first such case under our new measures protocol. It must be kept in mind that those who take the Standard Exam in Biochemistry are not just Chemistry majors. Thus, the current 40% "ruler" may need to be adjusted. As any faculty member well knows, sometimes a group of majors are better or less than others over time. It is the Biochemistry Committee's judgement to leave matters in place, see what next year's Chem 317 majors do, and compare those results with this one, before we make any decisions or contemplate any changes, if any.

Established in Cycle: 2015-2016

Implementation Status: On-Hold

Priority: High

Relationships (Measure | Outcome/Objective):

Measure: ACS Std Exam Biochemistry | **Outcome/Objective:**
Chem 317- Biochemistry I

SLO 2: P. Chem 301

Students in Chemistry 301 are expected to master the subject course according to the goals set forth by the physical chemists and faculty of the Department of Chemistry. The assessment process entails not only course examinations, but also questions in physical chemistry derived from National Standardized Examinations in Physical Chemistry. Such

standardized examinations are generally taken by other non-chemistry majors who nonetheless must demonstrate a mastery of physical chemistry, such as chemical engineering students, though essentially, the more likely candidates for such exams are chemistry majors. The means of assessment is the comparison of chemistry majors' performance on national standardized examinations in physical chemistry, and TABLE lists the national results of students taking the Standardized Exam in Physical Chemistry. The national result is the baseline of performance that the Department of Chemistry at UL judges its chemistry majors should at least meet. The Department's aim is that 70% of our students should achieve the baseline performance as noted in TABLE for physical chemistry.

Related Measures

M 2: Standard Exam Performance

P. CHEM 301, Table 1b:

In accordance with the Measures Section, the standards adopted for the Physical Chemistry courses is 70% of the Chemistry Majors should score at least 45% correct answers on the American Chemical Society Standard Exam in P. Chemistry. From Table 1a, the average correct answers are 50%, but only 38% of majors actually scored 45 % correct or better. Five majors, 38%, scored 42%, only 3% points below the national standard average. This could represent a statistical variation (one question that represents a "luck of the draw" or a transient weakness) that had they answered one more question correctly, they each would have done 50% correct. Had they done so, 77% of the majors would have performed at 45% or better. Taken as a whole in this light, the result are reasonably good and indicates a reasonable potential to achieve the desired performance level.

It should be noted that the instructor evidently notified students that 12 specific questions were optional and student 13 refused to answer such questions and was listed as zero correct herein. If student 13 is not counted, the results of Table 1a change as indicated by numbers in parentheses.

Source of Evidence: Standardized test of subject matter knowledge

Target:

Under the new (for this 2015-2016 cycle) process of assessment, the target was essentially achieved. The small number of students does present problems with the statistics, and as noted previously, one student refused to answer the standardized questions as it was made an option, as opposed to a component of the regular final.

Connected Document

[Standard Exam Performance of Chem Majors in P. Chem](#)

Finding (2015-2016) - Target: Met

The Department SACS committee finds that for the first assessment under the new assessment protocols instituted for the 2015-2016 period, the results are reasonable and workable. Improvements can be made and are in the works as noted by the Department's P. Chem. Committee under the Action Plan section.

Connected Document

[Standard Exam Performance of Chem Majors in P. Chem](#)

Related Action Plans (by Established cycle, then alpha):

P. Chem. Committee Action Plan

P. CHEM 301:

In accordance with the proposed action plan for the academic year 2014-2015, the action plan herein for P. Chem 301 is to accumulate several years of P. Chem 301 raw data as is shown in Table 1a for this year's report. After such accumulation, the raw data will be pooled and processed. It is the hope that such pooled data will provide a larger number of students for the statistical analysis and offer better statistical results from that analysis. To make decisions on the current sparse raw data will provide questionable statistical results.

Dept. of Chemistry P. Chem Committee Action Plan CHEM 301: Fall 2015

The results for CHEM 301 for the fall semester 2015 were not bad. The number of students in that class is small so further results in following years should be obtained. Since that course is taught by two instructors on an alternating basis, more careful coordination should be done concerning the material covered in the course so that scores can be compared from year to year. This can be easily done between the instructors as they have worked closely on the course for many years. A complicating factor is the role of the subsequent course, CHEM 302. It is a critical course for chemical engineering majors. Uncertainty about their student needs and backgrounds leads to some variance in presenting CHEM 301. We will attempt to meet with the chemical engineering department and clarify their desires concerning the course.

Established in Cycle: 2015-2016

Implementation Status: Planned

Priority: High

Relationships (Measure | Outcome/Objective):

Measure: Standard Exam Performance |

Outcome/Objective: P. Chem 301

Analysis Questions and Analysis Answers

How were assessment results shared and evaluated within the unit?

Faculty are informed of results in Dept level meetings concerning SACS-Weave matters. Also permitted access to Weave for viewing of documents.

Identify which action plans [created in prior cycle(s)] were implemented in this current cycle. For each of these implemented plans, were there any measurable or perceivable effects? How, if at all, did the findings appear to be affected by the implemented action plan?

Significant change to the criteria of student performance was implemented this cycle based upon previous years results. An assessment of the National Standard exams in Chemistry to ascertain just what are the national norms of performance revealed that our initial standards for our students were some 50% greater than the national performance norms. We thus readjusted our standards of performance of our majors accordingly to the varois national standard exam norms for each of the subdisciplines of chemistry. This analysis and discussion appears in the 2014-2015 Action Plan section as well as noted throughout the current sections of the 2015-2016 documents.

The results have shown a much more promising improvement by comparing our students with the national norms. Though we may wish to increase those performance norms, it is the decision of the Dept. SACS Committee to let the current standards applicable to our majors continue for several years to see if there is consistency/constancy of result rather than some anomaly outcome this cycle.

What has the unit learned from the current assessment cycle? What is working well, and what is working less well in achieving desired outcomes?

The most significant point learned is that nationally, student performance on the national standardized exams in chemistry is no better than our own majors. Pointedly, and surprisingly as well, some of the schools represented in the pool of institutions whose students have taken these standardized exams are very well known and even held in the highest esteem. So we were pleasantly surprised and pleased that our student majors' performance was at least on par with the nation's range of students.

The other point and one that may not be resolvable is that though certainly chemistry majors on the national level do take the national standardized exams, it is not exclusively chemistry majors. Determining a breakdown of majors doing so may not be as straightforward a process to pursue or achieve. For the moment and foreseeable future, relying on the "gross" national norms of performance of all students in chemistry may be our only practicable approach in employing some form of nationalized standard exam in chemistry.