

Assessment Cycle

Academic Year 2016 – 2017

Bachelor of Science in Physical Science

College: Arts and Sciences

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Northwestern Mission. Northwestern State University is a responsive, Student-oriented institution that is committed to the creation, dissemination, and acquisition of knowledge through teaching, research, and service. The University maintains as its highest priority excellence in teaching in graduate and undergraduate programs. Northwestern State University prepares its Students to become productive members of society and promotes economic development and improvements in the quality of life of the citizens in its region.

College of Arts and Sciences' Mission. College of Arts and Sciences' Mission. The College of Arts & Sciences, the largest college at Northwestern State University, is a diverse community of scholars, teachers, and students, working collaboratively to acquire, create, and disseminate knowledge through transformational, high-impact experiential learning practices, research, and service. The College strives to produce graduates who are productive members of society equipped with the capability to promote economic and social development and improve the overall quality of life in the region. The College provides an unequaled undergraduate education in the social and behavioral sciences, English, communication, journalism, media arts, biological and physical sciences, and the creative and performing arts, and at the graduate level in the creative and performing arts, English, TESOL, and Homeland Security. Uniquely, the College houses the Louisiana Scholars' College (the State's designated Honors College), the Louisiana Folklife Center, and the Creole Center, demonstrating its commitment to community service, research, and preservation of Louisiana's precious resources.

School of Biological and Physical Sciences. The School of Biological and Physical Sciences will become a reputable leader in public higher education by providing a transformative science educational experience using innovative instructional methods and through the scholarly achievements of our faculty, staff, students, and alumni. The School serves and inspires the students of Northwestern State University and the public through the development of lifelong learners who are excited about science, are disciplined in analytical and critical thinking skills, and are socially, environmentally, and ethically responsible. The School delivers Associate degrees in Veterinary Technology, Bachelor of Science degrees in Biology (with concentrations in Biomedical, Clinical Laboratory Science, Forensic Science, Natural Science, and Veterinary Technology), Applied Microbiology (with concentrations in Environmental and Applied Microbiology

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and Medical and Health Profession), and Physical Sciences. The School also offers minors in Biology, Microbiology, Wildlife Management, and Chemistry.

Physical Science Program Mission Statement. The mission of the Northwestern State University Physical Science program is to provide a comprehensive education in chemistry and physics for all of our majors and to create a unique training environment for students wishing to pursue graduate or professional education.

Purpose (optional): The primary goal of the Physical Science program is to prepare students to enter into the job market competitively at the bachelor level or to further their education in either graduate or professional school.

Methodology: The assessment process for the Physical Science program is as follows:

- (1) Data from assessment tools (both direct – indirect, quantitative and qualitative) are collected and returned to the program coordinator;
- (2) The program coordinator will analyze the data to determine whether students have met measurable outcomes;
- (3) Results from the assessment will be discussed with the program faculty;
- (4) The program coordinator, in consultation with the director of the School of Biological and Physical Sciences as well as the School advisory committee, will propose changes to measurable outcomes and/or assessment tools for the next assessment period and, where needed, curricula and program changes.

Student Learning Outcomes:

NOTE: The Bachelor of Science in Physical Science is a relatively new program with low enrollment (only four declared majors during the Spring 2017 semester). Therefore, data collection was limited to only two students who took a required, major course.

SLO 1. Students will identify the basic components of the atomic structure.

Course Map: CHEM1030 – General Chemistry I. All majors are required to complete CHEM1030.

Measure 1.1. (Direct – knowledge)

Throughout the course, students will learn the structure of atoms and the importance of each subatomic particle. Each student is required to pass a quiz covering these concepts. The target is to have 75% of students attain a quiz grade of $\geq 70\%$.

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Findings: Target not met. 0/2 (0%) physical science majors earned $\geq 70\%$ on this quiz.

Analysis: Far less than 70% of students reached the target set for this outcome showing that lower-level students at the beginning of the program are not able to identify the basic components of the atomic structure and cannot perform to the set target.

Decision: The delivery of course material will be altered to improve student comprehension and retention. The target of this SLO will be maintained until $\geq 70\%$ of students to attain a final average quiz grade of $\geq 70\%$. With an increase in the number of physical science majors, future results will be more meaningful.

Measure 1.2. (Indirect – survey)

At the end of the course, a survey is administered to students to gauge their appraisal of their understanding of the basic concepts covered in the course. The target is to have 75% of the students report an above average or excellent knowledge of the indicated concepts.

Findings: Target not met. 0/1 (0%) physical science majors reported that they had an above average or excellent understanding of basic components of atomic structure.

Analysis: Far less than 75% of students reached the target set for this outcome showing that lower-level students are not confident in their understanding or retention of basic concepts of atomic structure and cannot perform to the set target.

Decision: The delivery of course material will be altered to improve student comprehension and retention. The target of this SLO will be maintained until $\geq 70\%$ of students are confident in their above average-to-excellent understanding of basic concepts in atomic structure. With an increase in the number of physical science majors, future results will be more meaningful.

SLO 2. Students will be able to classify the various types of atomic bonding.

Course Map: CHEM1030 – General Chemistry I. All majors are required to complete CHEM1030.

Measure 2.1. (Direct – knowledge)

Throughout the course, students will learn about the various types of atomic bonding and the significance of each type. Each student is required to pass a quiz covering these concepts. The target is to have 75% of students attain a quiz grade of $\geq 70\%$.

Findings: Target not met. 0/2 (0%) physical science majors earned $\geq 70\%$ on this quiz.

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Analysis: Far less than 70% of students reached the target set for this outcome showing that lower-level students at the beginning of the program are not able to classify the various types of atomic bonding and cannot perform to the set target.

Decision: The delivery of course material will be altered to improve student comprehension and retention. The target of this SLO will be maintained until $\geq 70\%$ of students to attain a final average quiz grade of $\geq 70\%$. With an increase in the number of physical science majors, future results will be more meaningful.

Measure 2.2. (Indirect – survey)

At the end of the course, a survey is administered to students to gauge their appraisal of their understanding of the basic concepts covered in the course. The target is to have 75% of the students report an above average or excellent knowledge of the indicated concepts.

Findings: Target not met. 0/1 (0%) physical science majors reported that they had an above average or excellent understanding of basic components of atomic/chemical bonding.

Analysis: Far less than 75% of students reached the target set for this outcome showing that lower-level students are not confident in their understanding or retention of basic concepts of atomic/chemical bonding and cannot perform to the set target.

Decision: The delivery of course material will be altered to improve student comprehension and retention. The target of this SLO will be maintained until $\geq 70\%$ of students are confident in their above average-to-excellent understanding of basic concepts in atomic/chemical bonding. With an increase in the number of physical science majors, future results will be more meaningful.

SLO 3. Students will define different properties of solution chemistry.

Course Map: CHEM1030 – General Chemistry I. All majors are required to complete CHEM1030.

Measure 3.1. (Direct – knowledge)

Throughout the course, students will learn about solution chemistry. Each student is required to pass a quiz covering these concepts. The target is to have 70% of students attain a quiz grade of $\geq 70\%$.

Findings: Target not met. 1/2 (50%) physical science majors earned $\geq 70\%$ on this quiz.

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Analysis: Far less than 70% of students reached the target set for this outcome showing that lower-level students at the beginning of the program are not able to define different properties of solution chemistry and cannot perform to the set target.

Decision: The delivery of course material will be altered to improve student comprehension and retention. The target of this SLO will be maintained until $\geq 70\%$ of students to attain a final average quiz grade of $\geq 70\%$. With an increase in the number of physical science majors, future results will be more meaningful.

Measure 3.2. (Indirect – survey)

At the end of the course, a survey is administered to students to gauge their appraisal of their understanding of the basic concepts covered in the course. The target is to have 75% of the students report an above average or excellent knowledge of the indicated concepts.

Findings: Target not met. 0/1 (0%) physical science majors reported that they had an above average or excellent understanding of basic components of solution chemistry.

Analysis: Far less than 75% of students reached the target set for this outcome showing that lower-level students are not confident in their understanding or retention of basic concepts of solution chemistry and cannot perform to the set target.

Decision: The delivery of course material will be altered to improve student comprehension and retention. The target of this SLO will be maintained until $\geq 70\%$ of students are confident in their above average-to-excellent understanding of basic concepts in solution chemistry. With an increase in the number of physical science majors, future results will be more meaningful.

SLO 4. Students will use numerical data to perform chemical calculations.

Course Map: CHEM1030 – General Chemistry I. All majors are required to complete CHEM1030.

Measure 4.1. (Direct – knowledge)

Throughout the course, students will learn about chemical calculations. Each student is required to pass a quiz covering these concepts. The target is to have 70% of students attain a quiz grade of $\geq 70\%$.

Findings: Target not met. 1/2 (50%) physical science majors earned $\geq 70\%$ on this quiz.

Analysis: Far less than 70% of students reached the target set for this outcome showing that lower-level students at the beginning of the program are not able to use numerical data to perform chemical calculations and cannot perform to the set target.

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Decision: The delivery of course material will be altered to improve student comprehension and retention. The target of this SLO will be maintained until $\geq 70\%$ of students to attain a final average quiz grade of $\geq 70\%$. With an increase in the number of physical science majors, future results will be more meaningful.

Measure 4.2. (Indirect – survey)

At the end of the course, a survey is administered to students to gauge their appraisal of their understanding of the basic concepts covered in the course. The target is to have 75% of the students report an above average or excellent knowledge of the indicated concepts.

Findings: Target not met. 0/1 (0%) physical science majors reported that they had an above average or excellent understanding of using numerical data to perform chemical calculations.

Analysis: Far less than 75% of students reached the target set for this outcome showing that lower-level students are not confident in their understanding or retention of using numerical data to perform chemical calculations and cannot perform to the set target.

Decision: The delivery of course material will be altered to improve student comprehension and retention. The target of this SLO will be maintained until $\geq 70\%$ of students are confident in their above average-to-excellent understanding of using numerical data to perform chemical calculations. With an increase in the number of physical science majors, future results will be more meaningful.

SLO 5. Students will apply critical thinking in the analysis of the periodic table elemental trends.

Course Map: CHEM1030 – General Chemistry I. All majors are required to complete CHEM1030.

Measure 5.1. (Direct – knowledge)

Throughout the course, students will learn about the periodic table and how the different groupings are used to name chemical compounds. Each student is required to pass a quiz covering these concepts. The target is to have 70% of students attain a quiz grade of $\geq 70\%$.

Findings: Target not met. 1/2 (50%) physical science majors earned $\geq 70\%$ on this quiz.

Analysis: Far less than 70% of students reached the target set for this outcome showing that lower-level students at the beginning of the program are not able to apply

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critical thinking in the analysis of the periodic table elemental trends and cannot perform to the set target.

Decision: The delivery of course material will be altered to improve student comprehension and retention. The target of this SLO will be maintained until $\geq 70\%$ of students to attain a final average quiz grade of $\geq 70\%$. With an increase in the number of physical science majors, future results will be more meaningful.

Measure 5.2. (Indirect – survey)

At the end of the course, a survey is administered to students to gauge their appraisal of their understanding of the basic concepts covered in the course. The target is to have 75% of the students report an above average or excellent knowledge of the indicated concepts.

Findings: Target met. 1/1 (100%) physical science majors reported that they had an above average or excellent in their general knowledge of basic periodic table or elemental trends.

Analysis: More than 75% of students reached the target set for this outcome showing that lower-level students are confident in their understanding or retention in their general knowledge of basic periodic table or elemental trends and can perform to the set target.

Decision: With only one student reporting, the data is not very convincing. The target of this SLO will be maintained until $\geq 70\%$ of students are confident in their above average-to-excellent in their general knowledge of basic periodic table or elemental trends. With an increase in the number of physical science majors, future results will be more meaningful.

Summary

Based on the findings described above, we need to make alterations to the delivery of the course content in CHEM1030. In this lower-level, survey course, the students were not only unable to perform to our set targets (direct knowledge assessment) but were also not confident in their understanding/knowledge (indirect survey assessment). More focus will be placed on information retention by students using techniques such as classroom flipping and repetitive exposure/quizzing on key concepts in these courses. Given the low number of Physical Science majors (only 4 students in the Spring 2017 semester), these results are difficult assess. With increased enrollment, the data will be more meaningful and the interpretation of the data will allow for better direction in terms of curriculum changes needed.