Academic Cycle 2020 – 2021

Program – 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 committed to acquiring, creating, and disseminating knowledge through innovative teaching, research, and service. With its certificate, undergraduate, and graduate programs, Northwestern State University prepares its increasingly diverse student population to contribute to an inclusive global community with a steadfast dedication to improving our region, state, and nation.

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 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 our majors and to create a unique training environment for students wishing to pursue graduate or professional education.

NOTE: Since 2018, a focused effort has been made to make major adjustments to the Bachelor of Science in Physical Science to make it unique and viable program. As a result of those efforts, enrollment in the program has increased; specifically with biology majors taking a double-degree track. These students often make that change to their goals after they have taken their introductory science courses. Since these students comprise the bulk of the physical science program, they are often missed on assessments. Because the efforts to revitalize the program are relatively new and the SLOs were mapped to an older way of assessing, assessment targets have either been not met or not assessed due to lack of students. Therefore, data collection is limited and most SLOs are not able to be assessed. The SLO assessments are being revised to allow for more data to be collected from such a small pool. New faculty members have been brought in within the last 3 to 4 years and more new positions are being filled. The SLOs are being revised to map to a broader spectrum of courses with the goals of measuring both incoming students in introductory courses and students either switching majors or taking a double-degree path in higher-level courses.

Purpose (optional): The primary goal of the Physical Science program is to prepare students to enter 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 faculty of the School, will propose changes to measurable outcomes and/or assessment tools for the next assessment period and, where needed, curricula and program changes.

QEP Changes Statement

Due to the implementation of the QEP Capstone and Science Communication courses, all programs in the School of Biological and Physical Sciences have had to restructure. This necessitated a restructuring of most SLOs as well. In order to obtain an appropriate measurement, the SLOs and their respective Measures will be revised and mapped to different courses beginning in AC 2021-2022.

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Student Learning Outcomes:

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 ≥70%.

Findings: Target not met.

Analysis: In AC 2019 – 2020, the target was not met. There were no Physical Science students to assess in CHEM 1030. In AC 2020 – 2021 there were no Physical Science students to assess in CHEM 1030.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the 2020 - 2021 results, and to drive improvement, in AC 2021-2022, the SLO and Measure will be adjusted to provide relevant data.

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 of atomic structure 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.

Analysis: In AC 2019 – 2020, the target was not met. There were no Physical Science students to assess in CHEM 1030. In AC 2020 – 2021 there were no Physical Science students to assess in CHEM 1030.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the 2020 - 2021 results, and to drive improvement, in AC 2021-2022, the SLO and Measure will be adjusted to provide relevant data.

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 ≥70%.

Findings: Target not met.

Analysis: In AC 2019 – 2020, the target was not met. There were no Physical Science students to assess in CHEM 1030. In AC 2020 – 2021 there were no Physical Science students to assess in CHEM 1030.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the 2020 - 2021 results, and to drive improvement, in AC 2021-2022, the SLO and Measure will be adjusted to provide relevant data.

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 in atomic bonding 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.

Analysis: In AC 2019 – 2020, the target was not met. There were no Physical Science students to assess in CHEM 1030. In AC 2020 – 2021 there were no Physical Science students to assess in CHEM 1030.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the 2020 - 2021 results, and to drive improvement, in AC 2021-2022, the SLO and Measure will be adjusted to provide relevant data.

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

Course Map: CHEM1030 – General Chemistry I and CHEM1040 – General Chemistry II. All majors are required to complete CHEM1030 and CHEM1040.

Measure 3.1. (Direct – knowledge)

Throughout the courses, 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 ≥70%.

Findings: Target not met.

Analysis: In AC 2019 – 2020, the target was not met. There were no Physical Science students to assess in CHEM 1030 and CHEM 1040. In AC 2020 – 2021 there were no Physical Science students to assess in CHEM 1030 and CHEM 1040.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the AC 2020 - 2021 results, a new SLO will be defined and mapped to the appropriate class(es). The Director of the School of Biological and Physical Sciences will work closely with the new coordinator to create the new SLO and develop new measures that reflect the QEP curriculum implementation.

Due to the new quality enhancement requirements which state that each student needs to complete six hours of experiential learning, CHEM 4910, CHEM 4920, PHYS 4930, and PHYS 4940 have been incorporated into the physical science core. This change makes capstone labs consistent across BIOL, PHYS, and CHEM disciplines. The same assessments will be adopted once identified and implemented.

Measure 3.2. (Indirect – survey)

At the end of the courses, a survey is administered to students to gauge their appraisal of their understanding of the basic concepts of solution chemistry 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.

Analysis: In AC 2019 – 2020, the target was not met. There were no Physical Science students to assess in CHEM 1030 and CHEM 1040. In AC 2020 – 2021 there were no Physical Science students to assess in CHEM 1030 and CHEM 1040.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the AC 2020 - 2021 results, a new SLO will be defined and mapped to the appropriate class(es). The Director of the School of Biological and Physical Sciences will work closely with the new coordinator to create the new SLO and develop new measures that reflect the QEP curriculum implementation.

Due to the new quality enhancement requirements which state that each student needs to complete six hours of experiential learning, CHEM 4910, CHEM 4920, PHYS 4930, and PHYS 4940 have been incorporated into the physical science core. This change makes capstone labs consistent across BIOL, PHYS, and CHEM disciplines. The same assessments will be adopted once identified and implemented.

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

Course Map: CHEM1030 – General Chemistry I and CHEM1040 – General Chemistry II. All majors are required to complete CHEM1030 and CHEM1040.

Measure 4.1. (Direct – Ability)

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

Findings: Target not met.

Analysis: In AC 2019 – 2020, the target was not met. There were no Physical Science students to assess in CHEM 1030 and CHEM 1040. In AC 2020 – 2021 there were no Physical Science students to assess in CHEM 1030 and CHEM 1040.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the AC 2020 - 2021 results, a new SLO will be defined and mapped to the appropriate class(es). The Director of the School of Biological and Physical Sciences will work closely with the new coordinator to create the new SLO and develop new measures that reflect the QEP curriculum implementation.

Due to the new quality enhancement requirements which state that each student needs to complete six hours of experiential learning, CHEM 4910, CHEM 4920, PHYS 4930, and PHYS 4940 have been incorporated into the physical science core. This change makes capstone labs consistent across BIOL, PHYS, and CHEM disciplines. The same assessments will be adopted once identified and implemented.

Measure 4.2. (Direct – Ability)

At the end of the courses, a survey is administered to students to gauge their appraisal of their understanding of the basic concepts of chemical calculations 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.

Analysis: In AC 2019 – 2020, the target was not met. There were no Physical Science students to assess in CHEM 1030 and CHEM 1040. In AC 2020 – 2021 there were no Physical Science students to assess in CHEM 1030 and CHEM 1040.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the AC 2020 - 2021 results, a new SLO will be defined and mapped to the appropriate class(es). The Director of the School of Biological and Physical Sciences will work closely with the

new coordinator to create the new SLO and develop new measures that reflect the QEP curriculum implementation.

Due to the new quality enhancement requirements which state that each student needs to complete six hours of experiential learning, CHEM 4910, CHEM 4920, PHYS 4930, and PHYS 4940 have been incorporated into the physical science core. This change makes capstone labs consistent across BIOL, PHYS, and CHEM disciplines. The same assessments will be adopted once identified and implemented.

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

Course Map: CHEM1030 – General Chemistry I and CHEM1040 – General Chemistry II. All majors are required to complete CHEM1030 and CHEM1040.

Measure 5.1. (Direct – Skill)

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

Findings: Target not met.

Analysis: In AC 2019 – 2020, the target was not met. There were no Physical Science students to assess in CHEM 1030 and CHEM 1040. In AC 2020 – 2021 there were no Physical Science students to assess in CHEM 1030 and CHEM 1040.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the AC 2020 - 2021 results, a new SLO will be defined and mapped to the appropriate class(es). The Director of the School of Biological and Physical Sciences will work closely with the new coordinator to create the new SLO and develop new measures that reflect the QEP curriculum implementation.

Due to the new quality enhancement requirements which state that each student needs to complete six hours of experiential learning, CHEM 4910, CHEM 4920, PHYS 4930, and PHYS 4940 have been incorporated into the physical science core. This change makes capstone labs consistent across BIOL, PHYS, and CHEM disciplines. The same assessments will be adopted once identified and implemented.

Measure 5.2. (Direct – Skill)

At the end of the courses, a survey is administered to students to gauge their appraisal of their understanding of the basic concepts the periodic table and how the different groupings are used to name chemical compounds 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.
Analysis: In AC 2019 – 2020, the target was not met. There were no Physical Science students to assess in CHEM 1030 and CHEM 1040. In AC 2020 – 2021 there were no Physical Science students to assess in CHEM 1030 and CHEM 1040.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the AC 2020 - 2021 results, a new SLO will be defined and mapped to the appropriate class(es). The Director of the School of Biological and Physical Sciences will work closely with the new coordinator to create the new SLO and develop new measures that reflect the QEP curriculum implementation.

Due to the new quality enhancement requirements which state that each student needs to complete six hours of experiential learning, CHEM 4910, CHEM 4920, PHYS 4930, and PHYS 4940 have been incorporated into the physical science core. This change makes capstone labs consistent across BIOL, PHYS, and CHEM disciplines. The same assessments will be adopted once identified and implemented.

Comprehensive summary of key evidence of improvements based on analysis of results.

As a result of the findings of AC 2020-2021, several changes were implemented to improve student performance.

- In AC 2020 – 2021 there were no Physical Science students in to assess CHEM 1030 and CHEM 1040, but the School of Biological and Physical Sciences is developing pathways to increase Physical Science majors.

Plan of action moving forward.

To improve the program for AC 2021 – 2022 the director and faculty will implement the following changes to instruction and classes:

- SLOs and their respective Measures will be adjusted to provide relevant data.
- New SLOs will be defined and mapped to the appropriate class(es).