Academic Cycle 2020 – 2021

Program – Bachelor of Science in Biology

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.

Biology Program Mission Statement. The mission of the Northwestern State University Biology program is to provide a comprehensive education in biology 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 Biology 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 Biology 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.

Student Learning Outcomes:

SLO 1. Students will explain the basic concepts of the molecular basis of life.

Course Map: BIOL1010 - Biological Principles I. All majors are required to complete BIOL1010.

Measure 1.1. (Direct – knowledge)

Throughout the course, students will learn about the molecular basis of life including macromolecules, cellular structure, enzyme function, gene expression, cellular respiration, photosynthesis, DNA structure and function, genetics, and cellular division. 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 met.

Analysis: In AC 2019 – 2020, the target was not met with 57% (201/352) of biology majors scoring ≥70% on the assessment. Due to this result, in AC 2020-2021, instructors spent more instructional time on the concepts of the molecular basis of life. Additionally, prior to the start of AC 2020-2021 year the Director met with the instructors and discussed delivery of the content and the timing of the assessment.

As a result, AC 2020 – 2021, the target was met with 86% (117/136) students scoring ≥70% on the assessment. This performance is Above (+16%) of the goal of 70% of students earning the target of ≥70% on this assessment. This implies that students were able to demonstrate appropriate knowledge of the molecular basis of life. This is a +29% increase from the AC 2019 – 2020 performance.

Decision: In AC 2020-2021, the target was met. Based on the analysis of the AC 2020 - 2021 results, in AC 2021-2022 the faculty will adjust the content delivery and the order in which the content is delivered to be more intuitive for students in the BIOL1010 course. Additionally, NSU has approved a coordinator of Biology and Applied Microbiology that will over the see the assessment process in the School of Biological and Physical Sciences.

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 70% of the students report an above average or excellent knowledge of the indicated concepts.

Findings: Target not met.

Analysis: The target was not met in AC 2019 - 2020. Due to this result, in AC 2020-2021, instructors spent more instructional time on the concepts of the molecular basis of life. Additionally, prior to the start of AC 2020-2021 year the Director met with the instructors and discussed delivery of the content and the timing of the assessment.

As a result of this increased instruction in AC 2020 – 2021, 32% (38/118) of students reported that they had an above-average or excellent understanding of basic cellular structure. Additionally, 27% (32/118) students reported that they had an above average or excellent understanding of basic cellular function. This performance is below (-38% and -43%, respectively) the goal of 70% of students reporting above average or excellent understanding of the basic principles of cellular structure and function.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the 2020-2021 results, in AC 2021-2022 faculty will focus more lecture time and provide external resources on the topics on which students felt they did not understand well. Additionally, NSU has hired a coordinator of Biology and Applied Microbiology that will over the see the assessment process in the School of Biological and Physical Sciences.

SLO 2. Students will describe the role of evolution and ecology in the diversity of life.

Course Map: BIOL1020 - Biological Principles II. All majors are required to complete BIOL1020. Note: This SLO was replaced by the previous SLO 3 due to changes in the curriculum to implement the Universities QEP.

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Measure 2.1. (Direct – knowledge)

Throughout the course, students will learn about the structure and physiology of plants and animals. The topics covered include transpiration, plant tissues, flower structures, plant reproduction and water movement, the high level of diversity of organisms, evolution, populations, ecology, and behavior can influence this diversity. 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. Due to this result, in AC 2020-2021, Instructors spent more instructional time on the concepts of the structure and physiology of plants, evolution, and ecology. Additionally, prior to the start of AC 2020-2021 year the Director met with the instructors and discussed delivery of the content and the timing of the assessment.

As a result of this increased instruction, in AC 2020 -2021, 65% (51/78) of students in BIOL 1020 attained a quiz grade of 70% or higher. This is 5.0% below the target of 70% but a net improvement of +15% from AC 2019-2020. The BIOL 1020 course was restructured to accommodate the new quality enhancement requirements, which states that each student needs to complete six hours of experiential learning and thus BIOL 2020, 2021, and 4900 had to be discontinued *in lieu* of BIOL 4970, 4990, and 4995. That means the material in BIOL 2020 and 2021 had to be integrated into BIOL 1020. The AC 2020-2021 was the first assessment cycle to represent the new curriculum change for BIOL 1020.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the AC 2020 - 2021 results, in AC 2021-2022, in addition to restructuring lecture content and order, faculty will provide external resource to aid students in understanding transpiration, plant tissues, flower structures, plant reproduction and water movement, the high level of diversity of organisms, evolution, populations, ecology, and how behavior can influence this diversity. Additionally, NSU has hired a coordinator of Biology and Applied Microbiology that will over the see the assessment process in the School of Biological and Physical Sciences.

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 70% 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. Due to this result, in AC 2020-2021, Instructors spent more instructional time on the concepts of the structure and

physiology of plants, evolution, and ecology. Additionally, prior to the start of AC 2020-2021 year the Director met with the instructors and discussed delivery of the content and the timing of the assessment.

In AC 2020 -2021, 44.4% (28/63) of students in BIOL 1020 reported above average or excellent understanding of basic concepts in evolution. This performance was 25.6% below the goal of 70% of students' self-reporting their understanding level at above average or excellent. Additionally, 27% (17/63) of biology majors reported above average or excellent understanding of basic concepts of anatomy. This performance was 43% below the goal of 70% of students' self-reporting their understanding level at above average or excellent.

The BIOL 1020 course was restructured to accommodate the new quality enhancement requirements, which states that each student needs to complete six hours of experiential learning and thus BIOL 2020, 2021, and 4900 had to be discontinued *in lieu* of BIOL 4970, 4990, and 4995. That means the material in BIOL 2020 and 2021 had to be integrated into BIOL 1020. The AC 2020-2021 was the first assessment cycle to represent the new curriculum change for BIOL 1020.

Decision: In AC 2020-2021, the target was not met. Based on the analysis of the AC 2020 - 2021 results, in AC 2021-2022 in addition to restructuring lecture content and order, faculty will provide external resource to aid students in understanding transpiration, plant tissues, flower structures, plant reproduction and water movement, the high level of diversity of organisms, evolution, populations, ecology, and how behavior can influence this diversity. In providing these resources, faculty will be enhancing students' self-perception of understanding. Additionally, NSU has hired a coordinator of Biology and Applied Microbiology that will over the see the assessment process in the School of Biological and Physical Sciences.

SLO 3. Undecided for AC 2020 - 2021

Course Map: BIOL2020 - Biological Principles III. All majors are required to complete BIOL2020. – These courses do not exist anymore due to QEP changes. A new SLO needs to be created and mapped to a course.

Measure 3.1. (Direct – knowledge)

Not determined

Findings: Not measured

Analysis: In AC 2019-2020, the target was met.

Due to the new quality enhancement requirements, which states that each student needs to complete six hours of experiential learning BIOL 2020, 2021, and 4900 had to be discontinued in lieu of BIOL 4970, 4990, and 4995. That means the material in BIOL

2020 and 2021 had to be integrated into BIOL 1020. A suitable replacement for SLO 3 was not determined for AC 2020-2021 as this was the first assessment cycle to represent the new curriculum change.

Decision: 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.

Measure 3.2. (Indirect – survey)

Not determined

Findings: Not measured

Analysis: In AC 2019-2020, the target was not met.

Due to the new quality enhancement requirements, which states that each student needs to complete six hours of experiential learning BIOL 2020, 2021, and 4900 had to be discontinued in lieu of BIOL 4970, 4990, and 4995. That means the material in BIOL 2020 and 2021 had to be integrated into BIOL 1020. A suitable replacement for SLO 3 was not determined for AC 2020-2021 as this was the first assessment cycle to represent the new curriculum change.

Decision: 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.

SLO 4: Students will employ critical thinking to interpret scientific literature.

Tied to course: BIOL 4900. All majors are required to complete BIOL 4900. – This course is no longer offered. In AC 2021 – 2022 the SLO will be changed to reflect the new QEP curriculum and mapped to BIOL 4990, 4970, CHEM 4910, or PHYS 4930

Measure 4.1. (Direct - Ability)

Throughout all sections of capstone courses, students will read the same scientific article from the primary literature and be required to pass quizzes over the material. The target is to have 70% of students attain a final average quiz grade of ≥90%.

Findings: Not measured

Analysis: In AC 2019-2020, the target was met.

Due to the new quality enhancement requirements, which states that each student needs to complete six hours of experiential learning BIOL 2020, 2021, and 4900 had to be discontinued in lieu of BIOL 4970, 4990, and 4995. That means BIOL 4900 was not offered during the AC 2020-2021. A suitable replacement for SLO 4 was identified and will be implemented across all capstone sections in AC 2021 – 2022. AC 2020-2021 represents the first year the new QEP curriculum was implemented to represent the new curriculum change.

Decision: Based on the analysis of the AC 2020 -2021 results a new SLO was defined and mapped to the capstone class(es). The Director of the School of Biological and Physical Sciences will work closely with the new coordinator of biology and applied microbiology to help collect and assess this new SLO.

Measure 4.2. (Direct – Ability)

Throughout all sections of capstone courses, students will write a proposal about their capstone project The target is to have 70% of students attain a final average written assignment grade of ≥90% based on a standard rubric.

Findings: Not measured.

Analysis: In AC 2019-2020, the target was met.

Due to the new quality enhancement requirements, which states that each student needs to complete six hours of experiential learning BIOL 2020, 2021, and 4900 had to be discontinued in lieu of BIOL 4970, 4990, and 4995. That means BIOL 4900 was not offered during the AC 2020-2021. A suitable replacement for SLO 4 was identified and will be implemented across all capstone sections in AC 2021 – 2022. AC 2020-2021 represents the first year the new QEP curriculum was implemented to represent the new curriculum change.

Decision: Based on the analysis of the AC 2020 -2021 results a new SLO was defined and mapped to the capstone classes. The Director of the School of Biological and Physical Sciences will work closely with the new coordinator of biology and applied microbiology to help collect and assess this new SLO.

SLO 5: Students will demonstrate professional development.
Tied to course: BIOL 4900. All majors are required to complete BIOL 4900. – This course is no longer offered. In AC 2021 – 2022 the SLO will be changed to reflect the new QEP curriculum and mapped to BIOL 4990, 4970, CHEM 4910, or PHYS 4930.

Measure 5.1. (Direct - Skill)

Students will be required to give a final presentation graded by a standard rubric across all sections of capstone classes. The target is to have 100% of students give a final presentation that meets ≥70% of the prescribed guidelines.

Findings: Not measured.

Analysis: In AC 2019-2020, the target was not met.

Due to the new quality enhancement requirements, which states that each student needs to complete six hours of experiential learning BIOL 2020, 2021, and 4900 had to be discontinued in lieu of BIOL 4970, 4990, and 4995. That means BIOL 4900 was not offered during the AC 2020-2021. A suitable replacement for SLO 5 was identified and will be implemented across all capstone sections in AC 2021 – 2022. AC 2020-2021 represents the first year the new QEP curriculum was implemented to represent the new curriculum change.

Decision: Based on the analysis of the AC 2020 -2021 results a new SLO was defined and mapped to the capstone class(es). The Director of the School of Biological and Physical Sciences will work closely with the new coordinator of biology and applied microbiology to help collect and assess this new SLO.

Measure 5.2. (Direct - Skill)

Students will be required to relate their project to a specific entry level-job that conforms to guidelines set forth in the course. The target is to have 100% of students relate their capstone projects to available workforce opportunities that meets ≥90% of the prescribed guidelines.

Findings: Not Measured.

Analysis: In AC 2019-2020, the target was not met.

Due to the new quality enhancement requirements, which states that each student needs to complete six hours of experiential learning BIOL 2020, 2021, and 4900 had to be discontinued in lieu of BIOL 4970, 4990, and 4995. That means BIOL 4900 was not offered during the AC 2020-2021. A suitable replacement for SLO 5 was identified and will be implemented across all capstone sections in AC 2021 – 2022. AC 2020-2021 represents the first year the new QEP curriculum was implemented to represent the new curriculum change.

Decision: Based on the analysis of the AC 2020 -2021 results a new SLO was defined and mapped to the capstone class(es). The Director of the School of Biological and Physical Sciences will work closely with the new coordinator of biology and applied microbiology to help collect and assess this new SLO.

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.

- Instructors spent more instructional time on the concepts of the molecular basis of life.
- Prior to the start of AC 2020-2021 year, the Director met with the instructors and discussed delivery of the content and the timing of the assessment processes, goals, and requirements.
- Instructors spent more instructional time on the concepts of the structure and physiology of plants, evolution, and ecology.
- Curriculum was evaluated for BIOL 1020, and a new assessment was created to reflect the new class material.
- In lieu of BIOL 2020 and 4900 new capstone classes BIOL 4970, 4990, and BIOL 4995 will be offered to comply with the University's QEP; thus, new assessments were created and offered to reflect this new experiential learning curriculum.

Plan of action moving forward.

In order to continue program improvement, for AC 2021 – 2022, the Director and faculty will implement the following changes to our instruction and classes:

- Faculty will adjust the content delivery and the order in which the content is delivered to be more intuitive for students in the BIOL1010 course.
- Faculty will focus more lecture time and provide external resources on the topics on which students felt they did not understand well based on the survey results of AC 2020-2021.
- Faculty will restructure lectures and provide external resource to aid students in understanding transpiration, plant tissues, flower structures, plant reproduction and water movement, the high level of diversity of organisms, evolution, populations, ecology, and how behavior can influence this diversity.
- The Director will continue to encourage instructors to stress concepts such as Evolution and Ecology to increase performance.
- The Director is working with instructors to qualify the survey responses i.e., what does excellent, above average, average, and below average mean to students.
- The Director and new Coordinator of Biology along with the instructors will work to create new SLOs and measures that will reflect the new 'core' biology and capstone classes.
- BIOL 4995 Scientific Communication will be offered in Spring 2022 for the first time as part of the new QEP curriculum. It will need to be integrated into the above SLOs.
- The Director will be working with closely with the new Coordinator of Biology and Applied Microbiology to devise ways of collecting assessment data for the newly devised SLOs.