

AC 2019 – 2020 Assessment

Bachelor of Science in Biology

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 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

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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 $\geq 70\%$.

Findings: Target not met.

Analysis: In AC 2018 – 2019 the target was not met. Due to this result, faculty spent more instructional time on the concepts of the molecular basis of life. As a result of this increased instruction, in AC 2019 – 2020, 57% (201/352) scored earned $\geq 70\%$ on the assessment. This performance is below (-43%) of the goal of 70% of students earning the target of $\geq 70\%$ on this assessment. This implies that students were not able to demonstrate appropriate knowledge of the molecular basis of life. This is a -9.89% reduction from the AC 2018 – 2019 performance.

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Decision: Based on the analysis of the AY2019 - 2020 results, the faculty will continue to improve informational delivery in the BIOL1010 course. The Director of the School of Biological and Physical Sciences will continue to work to reduce class sizes in these introductory-level courses and encourage faculty to employ active learning strategies in their classrooms to provide students with greater applicational understanding of the molecular basis of life. The Director will also meet with the instructors prior to the Fall and Spring semesters and discuss delivery of the content and the timing of the assessment.

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 2018 - 2019. Due to this result, in AC 2019-2020, Instructors spent more instructional time on the concepts of the molecular basis of life. As a result of this increased instruction in AC 2019 – 2020 39% (29/74) of students reported that they had an above-average or excellent understanding of basic cellular structure. Additionally, 39% (29/74) students reported that they had an above-average or excellent understanding of basic cellular function. This performance is below (-31% and -31%) the goal of 70% of students reporting above average or excellent understanding of the basic principles of cellular structure and function.

Decision: Based on the analysis of the 2019-2020 results, faculty will continue to work to improve informational delivery in the BIOL1010 course. The Director of the School of Biological and Physical Sciences will continue to work to reduce class sizes in these introductory-level courses and encourage faculty to employ active learning strategies in their classrooms to improve students' confidence in their understanding of the basic principles of cellular structure and function. The Director will also meet with the instructors prior to the Fall and Spring semesters and discuss delivery of the content and the timing of the assessment.

SLO 2. Students will recognize the basic features of animal and plant structure and physiology.

Course Map: BIOL1020 - Biological Principles II. All majors are required to complete BIOL1020.

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,

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plant reproduction and water movement, primary animal tissues, homeostasis, action potentials, muscle function, and body control (endocrine and nervous system functions). 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.

Analysis: In AC 2018 – 2019 the target was not met. Due to this result, in AC 2019-2020, Instructors spent more instructional time on the concepts of the structure and physiology of plants and animals. As a result of this increased instruction, in AC 2019 -2020, 49.23% (32/65) of students in BIOL 1020 attained a quiz grade of 70% or higher. This is -20.77% below the target of 70% and a net change of -0.54% from AC 2018-2019. 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 and thus the new curriculum does not align with old assessment.

Decision: Based on the analysis of the 2019 - 2020 results, faculty will continue to improve informational delivery in the BIOL1020 course. The Director of the School of Biological and Physical Sciences will continue to work to reduce class sizes in these introductory-level courses and encourage faculty to employ active learning strategies in their classrooms to provide students with greater applicational understanding of the basic structure and physiology of plants and animals. The Director of the School of Biological and Physical Science and a committee of professors will evaluate the assessment to ensure that it is reflective of the new material in BIOL 1020. The Director will also meet with the instructors prior to the Fall and Spring semesters and discuss delivery of the content and the timing of the assessment.

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 2018 – 2019 the target was not met. Based on the analysis of the 2018-2019 results, the instructors spent more instructional time on the concepts of the structure and physiology of plants and animals. As a result, in AC 2019 -2020, 16.6% (2/12) of students in BIOL 1020 reported above average or excellent understanding of basic plant anatomy and physiology. This performance was -53.4% below the goal of 70% of students' self-reporting their understanding level at above average or excellent. Additionally, 33.33% (4/12) of biology majors reported above average or excellent understanding of basic animal anatomy and physiology. This performance was -36.7% below the goal of 70% of students' self-reporting their understanding level at above

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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 and thus the new curriculum does not align with old assessment.

Decision: Based on the analysis of the 2019-2020 results, instructors will continue to work to create links between class concepts and providing students with relevance to how the information covered in class pertains to the biological world in an attempt to improve student confidence in their knowledge/understanding of plant and animal structure and physiology. The Director of the School of Biological and Physical Science and a committee of professors will evaluate the assessment to ensure that it is reflective of the new material in BIOL 1020. The Director will also meet with the instructors prior to the Fall and Spring semesters and discuss delivery of the content and the timing of the assessment.

SLO 3. Students will describe the role of evolution and ecology in the diversity of life.

Course Map: BIOL2020 - Biological Principles III. All majors are required to complete BIOL2020.

Measure 3.1. (Direct – knowledge)

Throughout the course, students will learn about the high level of diversity of organisms. They learn how 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 $\geq 70\%$.

Findings: Target met.

Analysis: In AC 2018-2019 the target was met with 75.90% (63/83) of students earned a quiz grade of 70% or higher. Based on the analysis of the 2018-2019, instructors were encouraged to spend more time on the diversity of organisms. As a result, In AC 2019 – 2020 82% (73/88) of students earned a quiz grade of 70% or higher. This performance exceeds (+12%) the goal of students earning the target of $\geq 70\%$ on this assessment. This means that students were able to demonstrate appropriate knowledge of the role of evolution, populations, ecology and behavior has on the diversity of organisms.

Decision: Based on the analysis of the AC 2019 -2020 results, Instructors will be advised to spend more instructional time on the diversity of organisms. BIOL 2020 course will be discontinued in the AC 2020-2021 *in lieu* of BIOL 4970, 4990, and 4995 to accommodate the new quality enhancement requirements, which states that each student needs to complete six hours of experiential learning. This class will be replaced with BIOL 4970 or 4990 and a new assessment will be created to reflect the curriculum.

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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 $\geq 95\%$ of the students report an above average or excellent knowledge of the indicated concepts.

Findings: Target not met.

Analysis: In AC 2018-2019, the target was not met. Based on these results, Instructors spent more instructional time on the concept of the diversity of organism. During AC 2018-2019, 27.59% (16/58) of students reported that they had an above-average or excellent understanding of evolution, and 50.00% (29/58) students reported that they had an above-average or excellent understanding of ecology. As a result, in AC2019 – 2020, 60% (15/25) of students reported that they had an above-average or excellent understanding of evolution, and 31% (11/35) students reported that they had an above-average or excellent understanding of ecology. This is (-35% and -64%) below the target goal of 95% for reporting above-average or excellent understanding in evolution or ecology, respectively.

Decision: Based on the analysis of the AC 2019-2020 results, in AC 2020-2021 instructors will continue to work to create links between class concepts and providing students with relevance to how the information covered in class pertains to the biological world to improve student confidence in their knowledge/understanding of evolution and ecology and how they relate to the diversity of life. BIOL 2020 course will be discontinued in the AC 2020-2021 *in lieu* of BIOL 4970, 4990, and 4995 to accommodate the new quality enhancement plan for the University, which states that each student needs to complete six hours of experiential learning. This class will be replaced with BIOL 4970 or 4990 and a new assessment will be created to reflect the curriculum in AC 2020-2021.

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

Tied to course: BIOL 4900. All majors are required to complete BIOL 4900.

Measure 4.1. (Direct - Ability)

Throughout the course, students will read scientific articles 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 $\geq 90\%$.

Findings: Target met.

Analysis: In AC 2018-2019 the target was not met; 61.64% (45/73) of students earned a quiz grade of 90% or higher. Based on these results, in AC 2019-2020 all sections of BIOL 4900 were assigned to the same Instructor; the instructor spent more instructional time on the concept of how to read and interpret scientific literature. In AC2019-2020, 97% (79/81) of students earned a quiz grade of 90% or higher. This performance is above (+27%) the goal of 70%.

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Decision: Based on the analysis of the AC 2019-2020 results, in AC 2020-2021 instructors will continue to spend instructional time and develop active learning classroom strategies on the concept of how to read and interpret scientific literature. BIOL 4900 is being discontinued during the AC 2019 – 2020 and a new assessment will be developed to reflect the changes in curriculum in AC 2020-2021.

Measure 4.2. (Direct – Ability)

Throughout the course, students will read scientific articles from the primary literature and be required to write about their interpretation of the material. The target is to have 70% of students attain a final average written assignment grade of $\geq 90\%$.

Findings: Target met.

Analysis: In AC2018-2019 the target was met; 80.82% (59/73) of students earned a quiz grade of 90% or higher on the assessment. Based on these results in AC 2019-2020 all sections of BIOL 4900 were assigned to the same Instructor; the instructor spent more instructional time on the concept of how to read and interpret scientific literature. In AC 2019-2020, 100% (81/81) of students earned a quiz grade of 90% or higher on the assessment. This is above (+10%) of the $\geq 90\%$ goal.

Decision: Based on the analysis of the AC 2019-2020 results, instructors will continue to spend instructional time and develop active learning classroom strategies on the concept of how to read and interpret scientific literature. BIOL 4900 is being discontinued during the AC 2019 – 2020 and a new assessment will be developed to reflect the changes in curriculum in AC 2020-2021.

SLO 5: Students will demonstrate professional development.

Tied to course: BIOL 4900. All majors are required to complete BIOL 4900.

Measure 5.1. (Direct - Skill)

Students will be required to formulate a resume that conforms to guidelines set forth in the course. The target is to have 100% of students develop a resume that meets $\geq 90\%$ of the prescribed guidelines.

Findings: Target not met.

Analysis: In AC2018-2019 the target was not met; 67.12% (49/73) students earned the target of $\geq 90\%$ on this assessment. Based on these results, in AC 2019-2020 all sections of BIOL 4900 were assigned to the same Instructor; the instructor spent more instructional time on the concept of how to develop a resume. In AC 2019-2020, 28% (23/81) students earned the target of $\geq 90\%$ on this assessment. This performance was well below (-62%) the goal of $\geq 90\%$ on the resume assessment.

Decision: Based on the analysis of the AC 2019-2020 results, the department will continue to modify their efforts by encouraging faculty to assist students in the

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development of professional writing skills by using additional rounds of feedback on this assessment piece as well as the implementation of templates to further clarify expectations of the assignment. BIOL 4900 is being discontinued during the AC 2019 – 2020 and a new assessment will be developed to reflect the changes in curriculum in AC 2020-2021.

Measure 5.2. (Direct - Skill)

Students will be required to formulate a cover letter targeted to a specific job listing that conforms to guidelines set forth in the course. The target is to have 100% of students develop a cover letter that meets $\geq 90\%$ of the prescribed guidelines.

Findings: Target not met.

Analysis: In AC2018-2019 the target was not met; 60.27% (44/73) students earned the target of $\geq 90\%$ on this assessment. Based on these results, all sections of BIOL 4900 were assigned to the same Instructor; the instructor spent more instructional time on the concept of how to develop a cover letter. In AC 2019-2020, 93% (76/81) students earned the target of $\geq 90\%$ on this assessment. This is below (-7%) the goal of 100% of students earning the target of $\geq 90\%$ on this assessment.

Decision: Based on the analysis of the AC 2019-2020 results, the department will continue to modify their efforts by encouraging faculty to assist students in the development of professional writing skills by using additional rounds of feedback on this assessment piece as well as the implementation of templates to further clarify expectations of the assignment. BIOL 4900 is being discontinued during the AC 2019 – 2020 and a new assessment will be developed to reflect the changes in curriculum.

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

As a result of the findings of AC 2019-2020, several changes were implemented to improve student performance. More specifically, the Director:

- Encouraged faculty to use more active learning exercises/approaches to informational delivery.
- The BIOL 1020 course was restructured to accommodate the new quality enhancement requirements
- Some targets were increased to further challenge the students' performance on some assessments.
- Encouraged faculty spent more instructional time on the concepts.
- Sections of BIOL 4900 were all put under the same instructor

As a result of these changes, improvements were observed in 4/10 specific measures.

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Plan of action moving forward.

In order to improve the program for AC 2020 – 2021 the director and faculty will implement the following changes to the instruction and classes:

- The Director of the School of Biological and Physical Sciences will continue to work to reduce class sizes in these introductory-level courses and encourage faculty to employ active learning strategies in their classrooms to provide students with greater applicational understanding of the molecular basis of life.
- The assignment tied to measuring 5.1 and 5.2 will have additional rounds of feedback on the assessment piece as well as the implementation of templates to further clarify expectations of the assignment.
- The Director will meet with the instructors prior to the Fall and Spring semesters and discuss delivery of the content and the timing of the assessment.
- Curriculum will be evaluated for BIOL 1020 and a new assessment will be created that is reflective of the class material.
- *In lieu* of BIOL 2020 and 4900 new capstone classes BIOL 4970, 4990, and scientific communication BIOL 4995 will be offered to comply with the University's QEP; thus, new assessments will be created and offered to reflect this new experiential learning curriculum.