

Assessment Cycle Plan

Academic Year 2016 – 2017

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

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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 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 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 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:

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. 8/47 (17.02%) biology 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 explain basic concepts of the molecular basis of life 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 $\geq 70\%$.

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. 15/47 (31.91%) biology majors reported that they had an above average or excellent understanding of basic cellular structure. 15/47 (31.91%) biology majors reported that they had an above average or excellent understanding of basic cellular function.

Analysis: Far less than 70% 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 cellular structure and function 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 cellular structure and function.

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, 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 $\geq 70\%$.

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Findings: Target not met. 56/88 (63.64%) biology majors earned $\geq 70\%$ on this quiz.

Analysis: Close to 70% of students reached the target set for this outcome showing that lower-level students at the beginning of the program are somewhat able to explain the basic features of animal and plant structure and physiology and are close to performing 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 $\geq 70\%$.

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. 26/88 (29.55%) biology majors reported that they had an above average or excellent understanding of basic plant structure and function. 41/88 (46.59%) biology majors reported that they had an above average or excellent understanding of basic animal structure and function.

Analysis: Far less than 70% 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 plant and animal structure and function 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 plant and animal structure and function.

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

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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 not met. 22/43 (51.16%) biology majors earned $\geq 70\%$ on this quiz.

Analysis: Close to 70% of students reached the target set for this outcome showing that students in the program can evaluate the role of evolution and ecology on the diversity of life and are close to performing 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 $\geq 70\%$.

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

Findings: Target not met. 13/43 (30.23%) biology majors reported that they had an above average or excellent understanding of basic concepts in evolution. 13/43 (30.23%) biology majors reported that they had an above average or excellent understanding of basic concepts in evolution.

Analysis: Far less than 70% of students reached the target set for this outcome showing that lower-level students are not confident in their understanding or retention of the role of evolution and ecology on the diversity of life 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 the role of evolution and ecology on the diversity of life.

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 $\geq 70\%$.

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Findings: Target met. 24/31 (77.4%) students finished the course with an average of $\geq 70\%$ on quizzes. 7/31 students finished the course with $\geq 70\%$ on quizzes.

Analysis: More than 70% of students reached the target set for this outcome showing that upper-level students nearing the end of the program are able to think critically about scientific literature and perform to the set target.

Decision: The target should be raised to a higher lever to raise the caliber of training. The future target of this SLO will be for $\geq 70\%$ of students to attain a final average quiz grade of $\geq 90\%$.

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 $\geq 70\%$.

Findings: Target met. 27/31 (77.4%) students finished the course with an average of $\geq 70\%$ on quizzes. 4/31 students finished the course with $\geq 70\%$ on quizzes.

Analysis: More than 70% of students reached the target set for this outcome showing that upper-level students nearing the end of the program are able to think critically about scientific literature and perform to the set target.

Decision: The target should be raised to a higher lever to raise the caliber of training. The future target of this SLO will be for $\geq 70\%$ of students to attain a final average quiz grade of $\geq 90\%$.

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. Of 43 students submitting a final resume, the following was found:

- 12 students did not meet $\geq 90\%$ (missing two or more of the 12 guidelines)
- 31 students met $\geq 90\%$ (missing one or none of the 12 guidelines)
- Five students did not submit a final resume

31/43 students = $\sim 72.1\%$ of students (target = 100%)

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Analysis: The target for this measure was not met. More than half of all students met $\geq 90\%$ of the provided guidelines in the final copy of their resume. This is the first time this particular list of resume guidelines was instituted in the course, and upon review of final resumes it became evident that these guidelines are insufficient in that resumes meeting the guidelines are often still inadequate for submission to prospective employers. Some resumes technically did not violate any guidelines but were much less professional and/or were missing key components while others that were quite professional in appearance and closer to an acceptable document fell short of two or more set guidelines.

Decision: We believe all students graduating from this program should demonstrate professional development through formulating an acceptable resume, ready for submission to prospective employers in a science field, to graduate schools, and/or to professional schools. Therefore, a 100% target will remain in place for this SLO. Additionally, faculty instructing this course will meet and decide on appropriate guidelines that raise the standard of acceptable resumes. These guidelines will then be instituted in future sections of the course.

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. Of 37 students submitting a final cover letter, the following was found:

- 7 students did not meet $\geq 85\%$ (missing three or more of the 13 guidelines)
- 30 students met $\geq 85\%$ (missing two or less of the 13 guidelines)
- 10 students did not submit a final cover letter

30/37 students = $\sim 81.1\%$ of students (target = 100%)

Analysis: The target for this measure was not met. The majority of students met $\geq 85\%$ of the provided guidelines in the final version of their cover letter. The list of guidelines was compiled by students from internet sources and this was the first time that this list of guidelines was used. Several cover letters were insufficient for submission to a prospective employer despite meeting $\geq 85\%$ of provided guidelines.

Decision: We believe all students graduating from this program should demonstrate professional development through formulating a cover letter that would be acceptable for submission to prospective employers in a science field. Therefore, a 100% target will remain in place for this SLO. Additionally, faculty instructing this course will meet and evaluate the standing guidelines for cover letters. Guidelines may be retained, eliminated, refined, or increased. These guidelines will then be instituted in future sections of the course.

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Summary

Based on the findings described above, we need to make alterations to the delivery of the course content in BIOL1010, BIOL1020, and BIOL2020. In each of these lower-level, survey courses, 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. In BIOL4900, our students demonstrated the ability to read and interpret scientific literature to meet our defined targets. We will raise our target expectations of this student learning outcome. Finally, students were unable to demonstrate the expected professional development. We believe that some of these skills need to be introduced earlier in the students' academic careers. We will pilot programs during the 2017-2018 academic year to expose students to professional development workshops during their freshman and sophomore years to improve their performance later in the program.