

AC 2024-2025 Assessment

Natural Sciences. To understand the universe through the study of life and physical sciences.

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Approved by: Greg Handel, Provost

Date:

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.

Northwestern Core Curriculum. Northwestern has a broadly-based core curriculum that is central to the University's mission and consistent with the Louisiana Board of Regents' requirements for general education survey courses applicable to all students regardless of their major. The core encompasses the knowledge and abilities that Northwestern believes are essential to college graduates. Its requirements are designed to improve students' writing and speaking, to expand students' aptitude in mathematics and its applications, to strengthen students' understanding of biological, physical, social, and behavioral sciences, and to develop an appreciation and knowledge of the arts and humanities.

The goal of the core curriculum is for undergraduate students, depending on their respective degree program, to obtain appropriate learning outcomes for this general education competency.

Methodology: The assessment process includes:

- (1) Data from assessment tools (direct and quantitative) are collected and returned to the executive director:
- (2) The executive director will analyze the data to determine whether the applicable outcomes are met.
- (3) Results from the assessment will be discussed with the appropriate staff; Individual meetings will be held with staff as required.
- (4) The executive director, in consultation with the staff and senior leadership, will determine proposed changes to measurable outcomes, assessment tools for the next assessment period and, where needed, service changes.

NOTE: Each student is required to complete 3 separate natural science courses (9 credit hours total):

- One introductory physical science course (either SCI1010, CHEM1030, CHEM1070, or PHYS2030)

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- One introductory biological science course (either SCI1020, BIOL1010, or BIOL2250)
- Either a second physical science course (either SCI2010 or CHEM1040) or a second biological science course (either SCI2020 or BIOL2260).

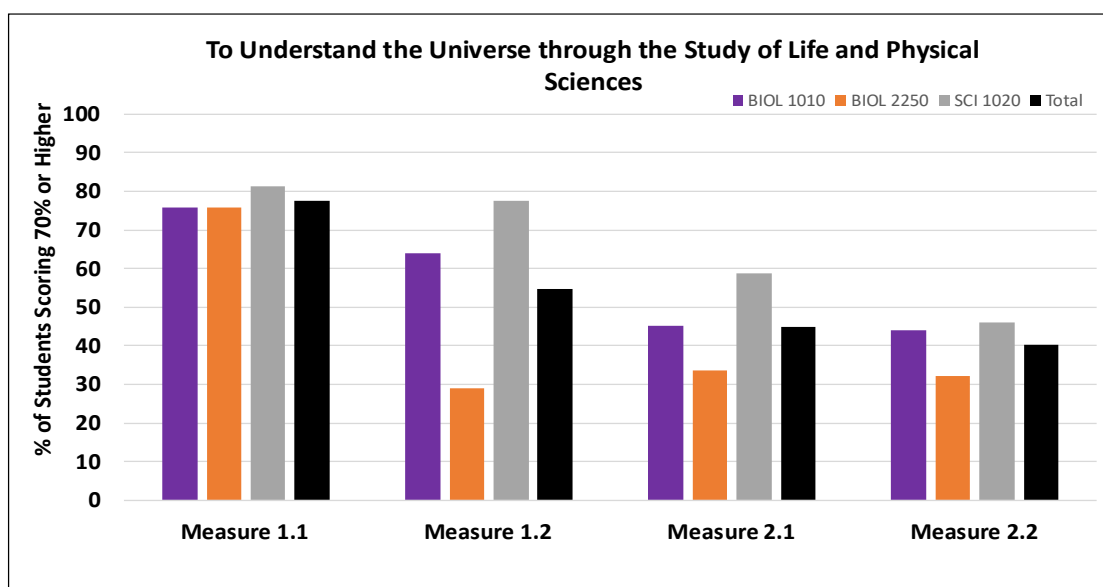
Students can be broadly categorized into three different groups: (1) non-science majors, (2) science majors, or (3) nursing/allied health majors. For each of these three groups of students, there is a typical series of natural science courses that are taken but the timing and order of these courses varies significantly among the groups. The course series taken by the different student groups is as follows:

- Non-science majors – SCI1010, SCI1020, and then either SCI2010 or SCI2020
- Science majors – BIOL1010, CHEM1030, and CHEM1040
- Nursing/allied health majors – BIOL2250, BIOL2260, and CHEM1070

If the natural science competencies were assessed in EACH of the natural science core courses, every student would be assessed three times which would be redundant and skew the collected data. Therefore, a representative set of courses were selected to assess the natural sciences competencies. The courses selected for assessment are:

- BIOL1010 – taken by all science majors
- BIOL2250 – taken by all nursing/allied health majors
- SCI1020 – taken by all non-science majors

By assessing students in EACH of these selected courses every Fall and Spring semesters, we are monitoring the learning outcomes of 75% of the students in university core natural science courses.



*SLO 1 Students will identify the parts of the scientific method and design scientifically-sound experiments.
Measure 1.1 – Students will identify the parts of the scientific method.*

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Measure 1.2 – Students will demonstrate the ability to recognize scientifically – sound experiments.
SLO 2 Students will analyze scientific data to draw conclusions about the natural and physical world.
Measure 2.1 – Students will demonstrate their ability to make experimental predictions.
Measure 2.2 – students will analyze scientific data to draw conclusions about the natural and physical world.

Service Learning Outcomes (SLO):

SLO 1. Students will identify the parts of the scientific method and design scientifically-sound experiments.

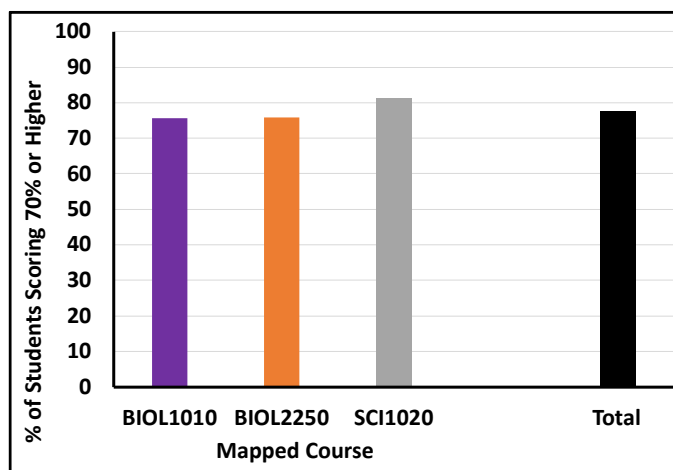
Measure 1.1. Students will identify the parts of the scientific method.

Throughout the indicated courses, students will learn about the parts of the scientific method including observations, hypotheses, and the various forms of experimental variables. Each student is required to pass a quiz covering these concepts. The target is to have 80% of students attain a quiz grade of $\geq 70\%$.

Course Name	Methodology	Target	Term
BIOL 1010	Quiz	75.725% (209/276)	Fall and Spring
BIOL2250	Quiz	75.89% (277/365)	Fall and Spring
SCI1020	Quiz	69.277% (246/306)	Fall and Spring
Total		77.614% (735/947)	

Finding. Target Not Met. 948 Students assessed: 648 in Fall 2024 and 299 in Spring 2025; 49 dual enrollment students assessed: 9 in Fall 2024 and 40 in Spring 2025.

Graph.



Measure 1.1 – Students will identify the parts of the scientific method. Data from AC 2024 – 2025.

Analysis. In AC 2017-2018, the natural sciences core competency consisted of a single student learning outcome with a single measure. The University modified its General Education Core Curriculum, ensuring that its six key competencies are central

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to the mission and are consistent with the Louisiana Board of Regents' requirements for general education. In response, the natural sciences' core competency was changed to the following: To understand the universe through the study of life and physical sciences. This new core competency has two different student learning outcomes, each with two different measures. New quiz-based assessments were designed and implemented for the first time during AC 2018-2019. In AC 2024-2025, the target was not met with 77.614% (735/947) of students scoring 70% or higher on the quiz. This is below (-2.386%) our goal of 80% of students in BIOL 1010, BIOL 2250, and SCI 1020 scoring $\geq 70\%$ on the quiz, but higher (+25.843%) than the AC 2023-2024 (51.771%; 380/734). Based on the analysis of the 2023-2024 results, the director met with the faculty and discussed a new plan to elucidate the scientific method and improve student performance. The instructors provided a practice assessment and then discussed the results focusing on each aspect of the scientific method prior to the actual assessment. Based on the analysis of these results, we enhanced the instruction of the individual parts of the scientific method with emphasis on the different aspects of the scientific method.

Decision or action to drive future improvement. Based on the analysis of the results from AC 2024-2025, in AC 2025-2026, we will implement the following changes to drive the cycle of continuous improvement:

- The Director of STEM and Department Head of Biology and Microbiology will meet with all BIOL 1010, 2250, and SCI 1020 course stewards to make sure they understand the assessment process.
- Ensure that the practice scientific method exam and discussion/review occurs prior to the assessment.
- Based on the data we will increase instructional time on the different types of experimental variables, which is a difficult concept for many students.

Measure 1.2. Students will demonstrate the ability to recognize scientifically-sound experiments.

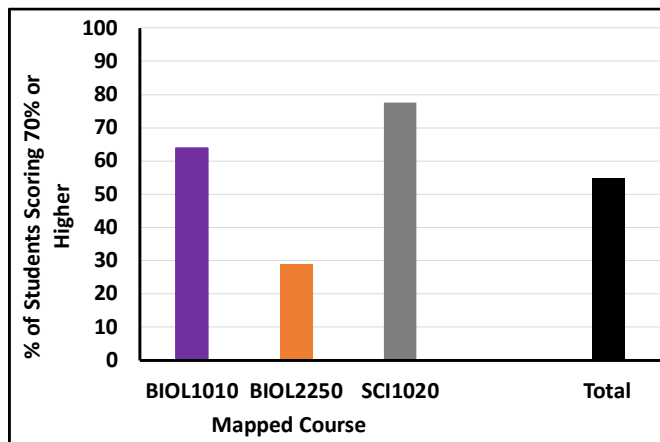
Throughout the indicated courses, students will learn how to use their knowledge of the parts of the scientific method to design scientifically-sound experiments. This will require the ability to identify relevant dependent and independent variables and understand how to use them to design appropriate experiments to test a given hypothesis. Each student is required to pass a quiz covering these concepts. The target is to have 80% of students attain a quiz grade of $\geq 70\%$.

Course Name	Methodology	Target	Term
BIOL 1010	Quiz	63.899% (177/277)	Fall and Spring
BIOL2250	Quiz	29.041% (106/365)	Fall and Spring
SCI1020	Quiz	77.451% (237/306)	Fall and Spring
Total		54.852% (520/948)	

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Measure 1.2 – Students will demonstrate the ability to recognize scientifically – sound experiments. Data from AC 2024 – 202.

Analysis. In AC 2017-2018, the natural sciences core competency consisted of a single student learning outcome with a single measure. The University modified its General Education Core Curriculum, ensuring that its six key competencies are central to the mission and are consistent with the Louisiana Board of Regents' requirements for general education. In response, the natural sciences' core competency was changed to the following: To understand the universe through the study of life and physical sciences. This new core competency has two different student learning outcomes, each with two different measures. New quiz-based assessments were designed and implemented for the first time during AC 2018-2019. In AC 2024-2025, the target was not met with 54.852% (520/948) of students scoring 70% or higher on the quiz. This is below (-25.148%) our goal of 80% of students in BIOL 1010, BIOL 2250, and SCI 1020 scoring $\geq 70\%$ on the quiz; this is higher (+16.892%) than the AC 2023-2024 assessment. Based on the analysis of the 2023-2024 results, the director met with the faculty and discussed a new plan to elucidate the scientific method and improve student performance. The instructors provided a practice assessment and then discussed the results focusing on each aspect of the scientific method prior to the actual assessment. Based on the analysis of these results, we enhanced the instruction of the individual parts of the scientific method with emphasis on the different aspects of the scientific method.

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- The Director of STEM and Department Head of Biology and Microbiology will meet with all BIOL 1010, 2250, and SCI 1020 course stewards to make sure

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they understand the assessment process.

- Ensure that the practice scientific method exam and discussion/review occurs prior to the assessment.
- Based on the data we will increase instructional time on the different types of experimental variables, which is a difficult concept for many students.

SLO 2. Students will analyze scientific data to draw conclusions about the natural and physical world

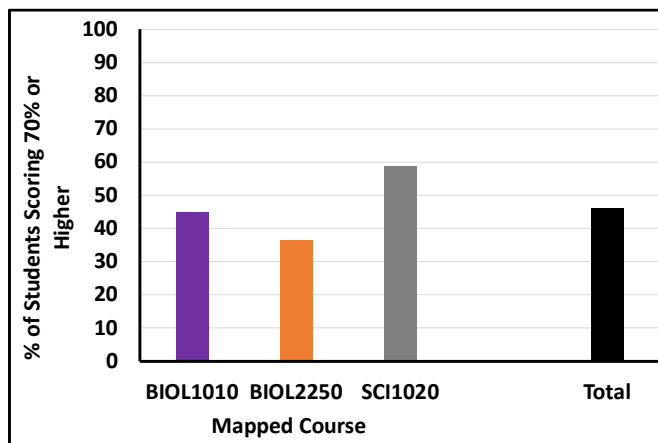
Measure 2.1. Students will demonstrate their ability to make experimental predictions.

Throughout the indicated courses, students will learn how to use their knowledge of the scientific method and experimental design to make predictions of experimental results. This will require the ability to interpret experimental design to use those interpretations to predict the results of the executed experiments. Each student is required to pass a quiz covering these concepts. The target is to have 80% of students attain a quiz grade of $\geq 70\%$.

Course Name	Methodology	Target	Term
BIOL 1010	Quiz	45.126% (125/277)	Fall and Spring
BIOL2250	Quiz	36.438% (133/365)	Fall and Spring
SCI1020	Quiz	58.824% (180/306)	Fall and Spring
Total		46.203% (438/948)	

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Measure 2.1 – Students will demonstrate their ability to make experimental predictions. Data from AC 2024 -2025.

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Analysis. In AC 2017-2018, the natural sciences core competency consisted of a single student learning outcome with a single measure. The University modified its General Education Core Curriculum, ensuring that its six key competencies are central to the mission and are consistent with the Louisiana Board of Regents' requirements for general education. In response, the natural sciences' core competency was changed to the following: To understand the universe through the study of life and physical sciences. This new core competency has two different student learning outcomes, each with two different measures. New quiz-based assessments were designed and implemented for the first time during AC 2018-2019. In AC 2024-2025, the target was not met with 46.203% (438/948) of students scoring 70% or higher on the quiz. This is below (-33.797%) our goal of 80% of students in BIOL 1010, BIOL 2250, and SCI 1020 scoring $\geq 70\%$ on the quiz but is higher (+8.873%) than the AC 2023-2024 assessment. Based on the analysis of the 2023-2024 results, the director met with the faculty and discussed a new plan to elucidate the scientific method and improve student performance. The instructors provided a practice assessment and then discussed the results focusing on each aspect of the scientific method prior to the actual assessment. Based on the analysis of these results, we enhanced the instruction of the individual parts of the scientific method with emphasis on the different aspects of the scientific method.

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- The Director of STEM and Department Head of Biology and Microbiology will meet with all BIOL 1010, 2250, and SCI 1020 course stewards to make sure they understand the assessment process.
- Ensure that the practice scientific method exam and discussion/review occurs prior to the assessment.
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Measure 2.2. Students will analyze scientific data to draw conclusions about the natural and physical world.

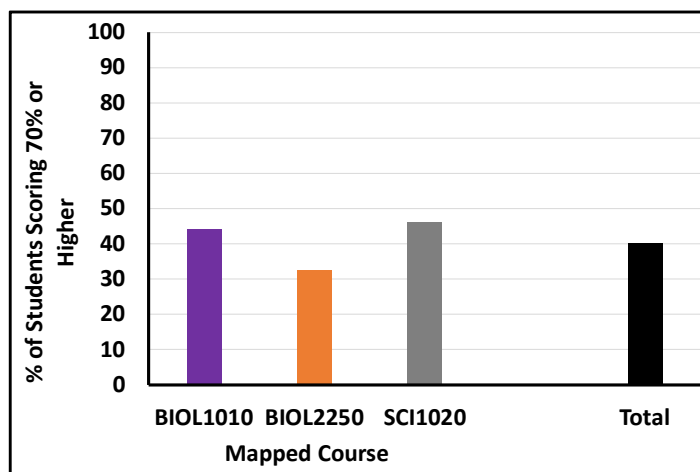
Throughout the indicated courses, students will learn how to use their knowledge of the scientific method and experimental design to analyze scientific data and to make conclusions based on that data analysis. This will require the ability to interpret scientific data presented in verbal, tabular, or graphic form then use those interpretations to provide scientific explanations for those results. Each student is required to pass a quiz covering these concepts. The target is to have 80% of students attain a quiz grade of $\geq 70\%$.

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Course Name	Methodology	Target	Term
BIOL 1010	Quiz	44.043% (122/277)	Fall and Spring
BIOL2250	Quiz	32.329% (118/365)	Fall and Spring
SCI1020	Quiz	46.078% (141/306)	Fall and Spring
Total		40.19% (381/948)	

Finding. Target Not Met. 948 Students assessed: 649 in Fall 2024 and 299 in Spring 2025; 49 dual enrollment students assessed: 9 in Fall 2024 and 40 in Spring 2025.

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Measure 2.2 – Students will analyze scientific data to draw conclusions about the natural and physical world. Data collected from AC 2023 - 2024.

Analysis. In AC 2017-2018, the natural sciences core competency consisted of a single student learning outcome with a single measure. The University modified its General Education Core Curriculum ensuring that its six key competencies are central to the mission and are consistent with the Louisiana Board of Regents' requirements for general education. In response, the natural sciences core competency was changed to the following: To understand the universe through the study of life and physical sciences. This new core competency has two different student learning outcomes each with two different measures. New quiz-based assessments were designed and implemented for the first-time during AC 2018-2019. In AC 2024-2025, the target was not met with 40.19% (381/948) scoring 70% or higher on the quiz. This is below (-39.81%) our goal of 80% of students in BIOL 1010, BIOL 2250, and SCI 1020 scoring $\geq 70\%$ on the quiz and is lower (-3.13%) than the AC 2023-2024 assessment. Based on the analysis of the 2023-2024 results, the director met with the faculty and discussed a new plan to elucidate the scientific method and improve student performance. The instructors provided a practice assessment and then discussed the results focusing on each aspect of the scientific method prior to the actual assessment. Based on the analysis of these results, instruction was enhanced for each individual part of the scientific method with emphasis on the different aspects

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of the scientific method.

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- Ensure that the practice scientific method exam and discussion/review occurs prior to the assessment.
- Based on the data we will increase instructional time on the different types of experimental variables, which is a difficult concept for many students.

Comprehensive Summary of Key Evidence of improvement based on the analysis of results. Based on the analysis of the assessment results from AC 2023 – 2024 year, instructors of the indicated courses made the following adjustments to increase student performance based in 2024-2025:

- The director met with the faculty and discussed a new plan to elucidate the scientific method and improve student performance.
- **Instruction was enhanced for each** individual part of the scientific method with emphasis on the different aspects of the scientific method
- The timing of the assessment was discussed and delivered directly after discussion of the scientific method in class.
- Instructors implemented a practice scientific method exam and reviewed the practice test prior to taking the actual assessment.

The implementation of these changes resulted in improvements in student performance for measure 1.1 (+25.843%), 1.2 (+16.892%), 2.1 (+8.873%), and 2.2 (-3.13%) from AC 2023 – 2024 to AC 2024 – 2025.

Plan of action moving forward. Based on the analysis of the results in AC 2024-2025, in AC 2025-2026, we will implement the following changes to drive the cycle of continuous improvement:

- The director of STEM and Department Head of Biology and Microbiology will meet with the course stewards for BIOL 1010, 2250, and SCI 1020 will meet prior to the AC 2025 – 2026 assessment cycle and will make sure they understand the assessment process. should be formatted
- Course Stewards will provide a practice scientific method quiz to the instructors that will be discussed and reviewed prior to the scientific method quiz assessment.

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- Increase instructional time on the parts of the scientific method.
- Focus more instructional time on
 - the different types of experimental variables
 - how those variables are used in proper experimental design
 - the analysis of scientific data with focus on the understanding of tabular and graphical representations of data
- Provide more examples of applications of the scientific method with the parts identified and discussed, the use of specific variables and how they can be used to make predications of experimental results, and how those predictions can be used to draw conclusions of the scientific world.
- Ensure course stewards know to collect the data prior to 5-week grades and that it is exported in the correct format.