

Annual Program Assessment Report

Academic Year Assessed: Fall 2024 / Spring 2025

College: Letters and Science

Department: Ecology

Submitted by: Diane Debinski, Department Head

Undergraduate Assessment reports are to be submitted annually by program/s. The report deadline is October 15th.

Graduate Assessment reports are to be submitted annually by program/s. The report deadline is October 15th.

Program(s) Assessed:

Indicate all majors, minors, certificates and/or options that are included in this assessment:

Major

Biological Sciences

Options

Conservation Biology and Ecology,
Fish and Wildlife Ecology and Management,
Organismal Biology

1. Past Assessment Summary

Our program assessment is slightly different than the standard approach, and has recently focused on developing an assessment tool which is a pre-and post-instructional test focused on students' scientific reasoning skill. Dr. Kalinowski, who chairs our Program Assessment Committee, has been studying this topic and his analysis from last year showed that students' scientific reasoning skill was a strong predictor of grades in a variety of STEM courses associated with our Biological Science major. Scientific reasoning skill was also correlated with DFW rates, STEM retention, and MSU retention. For example, students in the highest quartile (bin) of scientific reasoning had a STEM retention rate from freshman to sophomore year almost twice as high as students in the lowest quartile.

2. Institutional Learning Outcome Assessment Data Request

We were not able to address this component of the assessment this year.

3. Actionable Research Question for Your Assessment

This year our goal was to use a test focused on scientific reasoning and to determine how the scores for incoming freshmen in our major differed from those of graduating seniors (who graduated within 4 years) in our major.

4. Assessment Plan, Schedule and Data Source

Overview

In the Fall of 2021, the Department of Ecology began a new method for assessing its graduating students. Starting that fall, incoming freshmen completed a pre-instruction test. Four academic years later, at the end of the

spring semester 2025, graduating students were given a post-instruction test. This testing strategy allows the Department of Ecology to assess students as they graduate and to measure learning gains spanning students' education at MSU.

The Department of Ecology will expand the concepts covered on its incoming and outgoing tests over time. So far, the incoming test has focused on scientific reasoning skill. The incoming test consisted of 24 multiple-choice scientific reasoning questions relating to hypothesis testing, control of variables, and correlations.

Future plans

The Department of Ecology will assess the scientific reasoning skill of graduating students for three additional years. This testing schedule will allow the Department to measure learning gains for students who began MSU Fall 2021 and Fall 2022, and assumes that some students will need up to six years to graduate.

During the next three spring semesters, the Department will also assess graduating students' ecology knowledge in addition to scientific reasoning. The topic of ecology was chosen because it is a foundational topic for all of the Department's options. A three-year assessment schedule was selected because this will allow the Department to develop, administer, and refine questions that best represent the Department's beliefs regarding the skills and disciplinary topics in which our graduating students should be proficient.

Further in the future, additional learning goals will be assessed, including communication and quantitative reasoning.

5. What Was Done

This past spring was the first time the Department assessed graduating students. Graduating students were asked the same scientific reasoning questions they answered as incoming freshmen. In addition, they were asked 4 evolution and 8 ecology questions. The sample size for Spring 2025 was 58 students. Of these students, 32 had answered the scientific reasoning questions four years earlier (Fall 2021) when they enrolled at MSU.

6. What Was Learned

Based on the analysis of the data, and compared to the threshold values provided, what was learned from the assessment?

The assessment identified some topics that our graduating students understood well, and other topics that students have not mastered. For example, a great majority of the students know how to design a controlled experiment. And, on the other hand, many students conflated correlation with causation.

7. How We Responded

The Department of Ecology discussed the results of the Spring 2025 assessment during a faculty meeting in September 2025, including tenure-track and non-tenure track faculty. Faculty expressed a wide range of opinions regarding the meaning of the results, and some wanted to revisit the set of questions asked.

8. Closing the Loop

The data collected during Spring 2025 provided the first opportunity that the Department of Ecology could assess graduating students with our new testing instrument. The process is new, and the Department does not yet have a consensus regarding the specific skills and disciplinary topics in which our graduating students should be proficient. In response to that, the Department has increased the size of the Department of Ecology's Program Assessment Committee and charged the committee to develop test questions that have broad support from the faculty. The Program Assessment Committee will use AY 25/26 to develop a set of questions focused on ecology to administer to graduating students Spring 2026.

In addition to these testing-based forms of assessment, the Ecology Department is also re-examining the coursework required for its 1) Fish and Wildlife Ecology and Management and 2) Conservation Biology and Ecology options, the two most popular options in our Biological Science degree program. Our goal is to reduce course bottlenecks, provide more curricular flexibility, and create more cohesion between the two subdisciplines. For over a year a new Curricular Options Committee has been meeting, surveying the faculty, reporting out, and discussing this topic in faculty meetings. Our goal is to determine whether we can create a new hybrid option that includes the coursework that the faculty deem essential for a degree in Biological Sciences. We hope to complete the proposal and, if there is broad faculty support for this change, start the CIM approval process in the coming year to replace these two current options with a new hybrid option for our curriculum.

NOTE: Student names must not be included in data collection. Dialog on successful completions, manner of assessment (publications, thesis/dissertation, or qualifying exam) may be presented in table format if they apply to learning outcomes. In programs where numbers are very small and individual identification can be made, focus should be on programmatic improvements rather than student success. Data should be collected through the year on an annual basis.

Submit report to programassessment@montana.edu