# Annual Program Assessment Report

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

Academic Year Assessed: 2021-2022
College: Agriculture
Department: LRES
Submitted by: Catherine Zabinski

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:*

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| --- | --- |
| **Majors/Minors/Certificate** | **Options** |
| Environmental Science | Environmental Sciences, Environmental Biology, Geospatial & Environmental Analysis, Land Rehabilitation, Soil and Water Sciences  |
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The Assessment Report should contain the following elements, which are outlined in this template:

1. Assessment Plan, Schedule, and Sources
2. What was done this assessment cycle – including rubrics, how data was collected, and who analyzed it
3. What was learned – including areas of strength and areas for improvement
4. How we responded and plans for improvement
5. Closing the loop

Sample reports and guidance can be found at: https://www.montana.edu/provost/assessment/program\_assessment.html

1. **Assessment Plan, Schedule and Data Source.**
2. ***Please provide a multi-year assessment schedule that will show when all program learning outcomes will be assessed, and by what criteria (data). (You may use the table provided, or you may delete and use a different format).***

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| ASSESSMENT PLANNING CHART |
| PROGRAM LEARNING OUTCOME | 2020-2021 | 2021-2022 | 2022-2023 | 2023-2024 | ***Data Source\**** |
| 1. An understanding of core theoretical principles and applications in evolutionary, ecological and physical environmental sciences.
 |  |  |  | X | Embedded exam questions, ENSC 461 |
| 1. Ability to access, read, and critically assess the quality and source of environmental information.
 |  |  | X |  | Embedded within ENSC 499 |
| 1. Knowledge of the theory and practice of data analysis in environmental sciences, including statistical analysis, model building, and graphical presentation of data.
 |  | X |  |  | Embedded in with assignments in ENSC 210  |
| 1. The ability to write and present scientific material effectively.
 |  |  |  | X | Final paper and presentation for ENSC 499 |
| 1. An understanding of the ethical implications of conducting and applying environmental science.
 | X |  | X |  | Embedded in final exam for ENSC 499 |

***\*Data sources can be items such as randomly selected student essays or projects, specifically designed exam questions, student presentations or performances, or a final paper. Do not use course evaluations or surveys as primary sources for data collection.***

1. ***What are your threshold values for which you demonstrate student achievement? (Example provided in the table should be deleted before submission)***

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| --- |
| **Threshold Values** |
| **PROGRAM LEARNING OUTCOME** | **Threshold Value** | **Data Source** |
| We have established rubrics for each of the learning outcomes that can be ranked from 1 (low) to 4 (high).  | The threshold value for this outcome is for 80% of assessed students to score above 1 in a 200-level course, 80% of the students scoring above 2 in a 300-level course, and 80% of the students scoring above a 3 on a 1-4 scoring rubric. | The data source varies with the class being used for the assessment, but includes a random selection of papers, presentations, and embedded questions.  |

1. **What Was Done**
2. **Was the completed assessment consistent with the plan provided?**

|  |  |  |
| --- | --- | --- |
| **Y** |  | **N** |
| **X** |  |  |

1. **If no, please explain why the plan was altered.**

Explanation, even though I said Yes to the above question: The focus of our assessment last year was Learning Outcome 3 (Knowledge of the theory and practice of data analysis in environmental sciences, including statistical analysis, model building, and graphical presentation of data) in a 200-level course. What we are focusing on right now is understanding how we introduce quantitative concepts in our 100- and 200-level courses, how that feeds into students’ capacity in our 300- and 400-level courses. To do this well, faculty in courses that have a quantitative component will discuss and work out a progressive approach to data analysis, statistical analysis and model building. The challenge for us in our department is that our courses are so multi-disciplinary. Courses with a quantitative component include courses in soils, plant ecology, hydrology, and geospatial modeling. The information we gathered this past year in ENSC 210 serves as the basis for that conversation.

## How were data collected? (Please include method of collection and sample size).

We extracted a set of questions in a class experiment, and selected a random subset of 19 assignments out of 51 students in the class. For each assignment, which included a series of questions related to population modeling of invasive species, we determined whether the question required students to interpret (explain information presented in mathematical forms), application/analysis (ability to make judgements and draw appropriate conclusions based on the quantitative analysis of data), or manage assumptions (ability to make and evaluate important assumptions in in estimation, modeling and data analysis. Five questions included an element of interpretation, four questions included application/analysis, and three questions required students to consider assumptions.

1. **Explain the assessment process, and who participated in the analysis of the data.**

Homework assignments were independently scored by one faculty (Catherine Zabinski) and one graduate student TA (Erin Teichroew), after discussion regarding what constituted a score of 1, 2, 3 or 4.

1. **Please provide a rubric that demonstrates how your data was evaluated.**

The rubric we applied was based on the Quantitative Literacy VALUE Rubric ([www.aacu.org/value/rubrics](http://www.aacu.org/value/rubrics)).

|  |  |  |
| --- | --- | --- |
|  | **Capstone**4 | **Milestones** 3 2 1 |
| **Interpretation***Ability to explain information presented in mathematical forms*  | Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information.  | Provides accurate explanations of information presented in mathematical forms.  | Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units.  | Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means.  |
| **Application / Analysis***Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis* | Uses the quantitative analysis of data as the basis for deep and thoughtful judgments, drawing insightful, carefully qualified conclusions from this work. | Uses the quantitative analysis of data as the basis for competent judgments, drawing reasonable and appropriately qualified conclusions from this work. | Uses the quantitative analysis of data as the basis for workmanlike (without inspiration or nuance, ordinary) judgments, drawing plausible conclusions from this work. | Uses the quantitative analysis of data as the basis for tentative, basic judgments, although is hesitant or uncertain about drawing conclusions from this work. |
| **Assumptions***Ability to make and evaluate important assumptions in estimation, modeling, and data analysis* | Explicitly describes assumptions and provides compelling rationale for why each assumption is appropriate.  | Explicitly describes assumptions and provides compelling rationale for why assumptions are appropriate. | Explicitly describes assumptions. | Attempts to describe assumptions. |

1. **What Was Learned
Based on the analysis of the data, and compared to the threshold values provided, what was learned from the assessment?**

From our data, we gleaned the following information:

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| --- | --- | --- |
| **Criteria** | **Percentage scoring****2 or above** | **Threshold** |
| Ability to explain information presented in graphical form | 71% | >80% |
| Ability to make judgements and draw appropriate conclusions based on quantitative analysis of data | 42% | >80% |
| Ability to make and evaluate important assumptions | 40% | >80% |

Students in our sophomore level course scored below the threshold we set for a sophomore-level course. Given that the thresholds were somewhat arbitrary, we are going to set up a working group to coordinate a review of how we approach quantitative literacy in each of our courses. While we have tracked pretty well what we want our graduating seniors to be able to achieve, this assessment represents stepping back from that to track progress from freshman to senior year. While this seems like a logical approach embedded within most curricula, it takes a good deal more work in a multi-disciplinary department like LRES.

 **4. How We Responded**

1. **Describe how “What Was Learned” was communicated to the department, or program faculty.**

This report was presented to the Curriculum Committee Chair and the Department Head, and we are initiating a plan to coordinate what we teach in regards to quantitative literacy in the courses that are required of all students in our department, regardless of which option they have chosen. We have discussed the quantitative literacy rubric at both assessment committee meetings and at a meeting of the LRES faculty as a whole, and determined that we would continue this conversation once our new faculty member was settled in the department. He will be teaching Spring 2023, and we will continue our discussions of cross-course coordination this spring.

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| --- | --- | --- |
| **Y** |  | **N** |
| X |  |  |

1. **Based on the faculty responses, will there be any curricular or assessment changes?**
2. **If Yes, what changes will be implemented (choose all that apply and describe specifically below under d)**

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| --- | --- |
| Gather additional data to verify or refute the result |   |
| Areas where the acceptable performance threshold has not been met are highlighted. |  |
| Change the acceptable performance threshold |  |
| Evaluate the rubric to assure outcomes meet student skill level |  |
| Identify potential curriculum changes to try to address the problem | X |
| Use Bloom’s Taxonomy to consider stronger learning outcomes |  |
| Choose a different assignment to assess the outcome |  |
| Other (please describe):  |

1. **Please include which outcome is targeted, and how changes will be measured for improvement. If other criteria is used to recommend program changes (such as exit surveys, or employer satisfaction surveys) please explain how the responses are driving department, or program decisions.**

First of all, we will meet as a faculty to discuss how to progressively teach quantitative skills across our curriculum. Our graduating seniors have the skills that we want, but our results of this assessment suggest that we might be able to increase skill levels at earlier points in the curriculum, to give students more practice throughout their four years in our classes.

Secondly, based on these discussions, we will adapt a better set of exercises that will help us more accurately assess student progression.

1. **When will the changes be next assessed?**Given our current assessment schedule, we will assess quantitative literacy again during the 2024-25 school year. It’s possible that after meeting and proposing additional activities within specific courses, that we will modify the schedule to assess this earlier. That will be part of the discussion during the upcoming academic year.

## 5. Closing the Loop

## a) Based on assessment from previous years, please describe program level changes that have led to outcome improvements.

## Previous year’s assessments have all shown that we have met our thresholds for each of our program learning outcomes. Our focus on quantitative literacy is inspired by having a new faculty and the capacity to incorporate curricular changes. We have added a new course, currently being offered under the rubric ENSC 391, titled Fundaments of Environmental Data Analysis. We have 24 students enrolled in that this spring, and we have the option to use that course to assess students in their junior year.

## Submit report to programassessment@montana.edu