

Annual Program Assessment Report

Academic Year Assessed: 2019-2020

College: College of Letters and Science

Department: Mathematical Sciences

Submitted by: Elizabeth Burroughs, Department Head

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

Program(s) Assessed:

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

Majors/Minors/Certificate	Options
Mathematics (Major)	Applied Math, Math, Math Teaching, Statistics
Mathematics (Minor)	
Statistics (Minor)	

Annual Assessment Process (CHECK OFF LIST)

1. Data are collected as defined by Assessment Plan
 YES NO
2. Population or unbiased samples of collected assignments are scored by at least two faculty members using scoring rubrics to ensure inter-rater reliability.
 YES NO
3. Areas where the acceptable performance threshold has not been met are highlighted.
 YES NO NA
4. Assessment scores were presented at a program/unit faculty meeting.
 YES NO
5. The faculty reviewed the assessment results, and responded accordingly
 Gather additional data to verify or refute the result.
 Identify potential curriculum changes to try to address the problem
 Change the acceptable performance threshold, reassess
 Choose a different assignment to assess the outcome
 Faculty may reconsider thresholds
 Evaluate the rubric to assure outcomes meet student skill level
 Use Bloom's Taxonomy to consider stronger learning outcomes
 Choose a different assignment to assess the outcome

OTHER:

This is the first year of an alternating year cycle; examine again after 2020-21 assessment to ensure completeness.

6. Does your report demonstrate changes made because of previous assessment results (closing the loop)? YES (First year of revised process)

1. Assessment Plan, Schedule and Data Source.

ASSESSMENT PLANNING CHART					
PROGRAM LEARNING OUTCOME	2019-2020	2020-2021	2021-2022	2022-2023	Data Source*
1. Students will demonstrate mathematical reasoning or statistical thinking	x		x		M 242 Signature Assignment
2. Students will demonstrate effective mathematical or statistical communication	x		x		M 242 Signature Assignment
3. Students will develop a range of appropriate mathematical or statistical methods for proving, problem solving, and modeling		x		x	M 384, M 329, and Stat 412 Signature Assignments

The Undergraduate Program Committee is responsible for annually assigning a *program assessment task force*. Members of the task force will be the two most recent faculty members to have taught the course in question; if they are not available, the Department Head will make a suitable alternate appointment. The assessment task force will select the signature assignments from the bank of signature assignments. The bank is initially populated with the signature assignments that have been used in the past five years and will be updated by the committee as necessary, based on results of the assessment.

The task force will determine whether to assess a census of the assignments from Math/Stat Majors/Minors in the course, or whether to assess a random selection. Where possible, a minimum of 10 student assignments should be assessed for each course.

The task force will report the results to the Undergraduate Program Committee and the Department Head, who will distribute it to the department. The first faculty meeting in September will annually be the forum at which the assessment report is discussed and action recommended.

b. What are your threshold values for which you demonstrate student achievement?

Threshold Values		
PROGRAM LEARNING OUTCOME	Threshold Value	Data Source
1. Students will demonstrate mathematical reasoning or statistical thinking.	The threshold value for this outcome is for 70% of assessed students to score acceptable or proficient on the scoring rubric.	M 242 Signature Assignment

2. Students will demonstrate effective mathematical or statistical communication.	The threshold value for this outcome is for 70% of assessed students to score acceptable or proficient on the scoring rubric.	M 242 Signature Assignment
3. Students will develop a range of appropriate mathematical or statistical methods for proving, problem solving, and modeling.	The threshold value for this outcome is for 70% of assessed students to score acceptable or proficient on the scoring rubric.	Not assessed this cycle. M 384, M 329, and Stat 412 Signature Assignments

2. What Was Done

- a) Was the completed assessment consistent with the plan provided? YES NO
- b) Please provide a rubric that demonstrates how your data were evaluated.

Outcome	Unacceptable 1	Acceptable 2	Proficient 3
1. Students will demonstrate mathematical reasoning or statistical thinking.	Displays limited or inappropriate reasoning strategies in the mathematical or statistical content focus. In neither problem does the student demonstrate an understanding of appropriate mathematical reasoning	Adequately displays appropriate reasoning strategies in the mathematical or statistical content focus. In at least one problem, the student demonstrates an acceptable level of mathematical understanding. Some errors may occur, but the spirit of the problem is correctly addressed through mathematical reasoning.	Displays thorough and appropriate reasoning strategies in the mathematical or statistical content focus. In both problems, the student demonstrates understanding of mathematical understanding. Minor errors may be present in one or both problems.
2. Students will demonstrate effective mathematical or statistical communication.	Communication is incomplete or unclear. Terms are used improperly or key definitions are missing. In neither problem does the student demonstrate appropriate use of mathematical communication	Terms are properly used and flow is logical, though organization lacks the attention to detail that would lead to a clearly communicated result. In at least one problem, the student demonstrates appropriate use of mathematical communication.	Work is fully correct and complete with relevant terms properly employed. Ideas are well-organized into a logical sequence. In both problems, the student demonstrates appropriate use of mathematical communication.

3. How Data Were Collected

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

All final portfolios were collected by the instructor and shared with the Department Head. The Department Head identified 10 exams from a list of math majors at random, removed identifying information, and stored them in a secure Box file for the Task Force to access and assess.

b) Explain the assessment process, and who participated in the analysis of the data. Include the signature assignment (for faculty review; delete before posting to the web because signature assignments may be reused on future exams).

The undergraduate program members are Mary Alice Carlson, Jack Dockery, Stacey Hancock, and Tianyu Zhang. They appointed Tianyu Zhang and Jennifer Luebeck to the program assessment task force (neither of the two most recent faculty who taught M 242 are currently instructional faculty).

The signature assignment chosen was the final portfolio. The two problems assessed are from the bank of comparable prior final exam problems. (Problems blinded for posting but are maintained in department records.)

Ten students who are math majors were selected at random from the 38 students enrolled in the two sections of the course (3 math teaching option; 2 math option; 1 stat option; 4 applied math option).

Report of Assessment

	Level of Outcome 1	Level of Outcome 2
Student 1	3	2
Student 2	1	1
Student 3	3	2
Student 4	3	3
Student 5	3	3
Student 6	2	2
Student 7	3	3
Student 8	3	3
Student 9	2	2
Student 10	3	3
Overall results:	90% of students are acceptable or proficient at outcome 1 (70% are proficient)	90% of students are acceptable or proficient at outcome 2 (50% are proficient)

4. What Was Learned

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

a) Areas of strength

The experiences provided in M 242 are sufficient to meet the threshold of at least 70% of students at acceptable or better. The course prepares more students to be proficient at mathematical reasoning than mathematical communication.

b) Areas that need improvement

The experiences in courses that have M 242 as a prerequisite should continue to focus on mathematical and statistical communication, with an aim to ensuring more students move beyond acceptability and achieve proficiency in their junior- and senior- level coursework.

5. How We Responded

a) Describe how “What Was Learned” was communicated to the department, or program faculty. Was there a forum for faculty to provide feedback and recommendations?

The task force submitted the results below to the undergraduate program committee and the DH on September 8. It was circulated among the faculty and discussed at the (online) September faculty meeting on September 11.

b) Based on the faculty responses, will there any curricular or assessment changes (such as plans for measurable improvements, or realignment of learning outcomes)?

YES _____ NO _____

If yes, when will these changes be implemented?

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.

c) When will the changes be next assessed?

n/a

6. Program Action

a) Based on assessment from previous years, can you demonstrate program level changes that have led to outcome improvements?

Since our last program assessment, we have refined our program outcomes and realigned our assessment process. This is our first round of assessment with the new outcomes and process.

Submit report to programassessment@montana.edu by September 15 annually.