

Degree/Certificate: Bachelor of Arts

Major/Option: Mathematics/Computer Science,Economics,Education,Mathematics,Statistics

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Part I – Program SLO Assessment Report for 2013-14

Part I – for the 2013-14 academic year: Because Deans have been asked to create College-Level Summary Reports annually, the template has been slightly modified for a) clarity for Chairs and Directors, and b) a closer fit with what the Deans and Associate Deans are being asked to report.

1. **Student Learning Outcome:** The student performance or learning objective as published either in the catalog or elsewhere in your department literature.

“Demonstrate the ability to create and understand mathematical arguments and proofs.”

2. **Overall evaluation of progress on outcome:** Indicate whether or not the SLO has been met, and if met, to what level.

_____ SLO is met after changes resulting from ongoing assessments, referencing assessment results from the previous year to highlight revisions;
_____ SLO is met, but with changes forthcoming;
_____ SLO met without change required

The SLO has not been met.

3. **Strategies and methods:** Description of assessment method and choices, why they were used and how they were implemented.

Students submitted solutions to a problem on an examination.

The statement of the problem reviewed definitions of continuity, gap, range, and unit circle.

The problem then asked students to complete the following tasks:

(7.1) Prove or disprove that every real-valued function that is continuous on the unit circle has a maximum.

(7.2) Prove or disprove that every real-valued function that is continuous on the unit circle has a minimum.

(7.3) Prove or disprove that there can be gaps in the range of f .

This problem was chosen because methods of solution require mathematics majors to invoke concepts and theorems from prerequisite courses (Calculus I–IV or Continuous Functions).

4. **Observations gathered from data:** Include findings and analyses based on the strategies and methods identified in item #3.

- a. Findings: The scores of the 19 students who took the exam in the winter of 2014 in a Senior Seminar (MATH 494) are in the table.

Score out of 2 points possible	Number of students with this score
2	0
1	2
0	17
Total	19

- b. Analysis of findings:

The two students who scored 1 proved that every real-valued function that is continuous on the unit circle has a maximum and a minimum by pointing out that the unit circle is closed and bounded (from Calculus) or compact (from Continuous Functions). No students connected the absence of gaps with the connectedness of the interval $[0, 2\pi]$ (from Calculus) or of the unit circle (from Continuous Functions).

5. **What program changes will be made based on the assessment results?**

- a) Describe plans to improve student learning based on assessment findings (e.g., course content, course sequencing, curriculum revision, learning environment or student advising).

We are revising our program to increase the success of our mathematics majors by introducing a course on one-dimensional reasoning and dropping the requirement of multidimensional reasoning.

- b) Provide a broad timeline of how and when identified changes will be addressed in the upcoming year.

We will submit CPAC paperwork for these changes in the fall of 2014.

6. Description of revisions to the assessment process the results suggest are needed and an evaluation of the assessment plan/process itself.

As in the past, the current round of assessments will succeed in removing, or making optional, courses and topics that may hamper or delay the graduation of mathematics majors.

NEW: PART II – CLOSING THE LOOP

FOLLOW-UP FROM THE 2012-13 PROGRAM ASSESSMENT REPORT

In response to the university's accrediting body, the [Northwest Commission on Colleges and Universities](#), this section has been added. This should be viewed as a follow up to the previous year's findings. In other words, begin with findings from 2012-13, and then describe actions taken during 2013-14 to improve student learning along, provide a brief summary of findings, and describe possible next steps.

Working definition for closing the loop: *Using assessment results to improve student learning as well as pedagogical practices. This is an essential step in the continuous cycle of assessing student learning. It is the collaborative process through which programs use evidence of student learning to gauge the efficacy of collective educational practices, and to identify and implement strategies for improving student learning.* Adapted 8.21.13 from <http://www.hamline.edu/learning-outcomes/closing-loop.html>.

1. **Student Learning Outcome(s)** assessed for 2012-13
2. **Strategies implemented** during 2013-14 to improve student learning, based on findings of the 2012-13 assessment activities.
3. **Summary of results** (may include comparative data or narrative; description of changes made to curriculum, pedagogy, mode of delivery, etc.): Describe the effect of the changes towards improving student learning and/or the learning environment.
4. What **further changes to curriculum, pedagogy, mode of delivery**, etc. are projected based on closing-the-loop data, findings and analysis?