

Degree/Certificate: Bachelor of Arts in Mathematics
Major/Option: BA including all options
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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.

SLO # 1: 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

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

Course:

Math 485: Theoretical Probability and Mathematical Statistics

Assessment Question:

The two-part question (see below) appeared on a final exam Spring 2014 and accounted for 12.5% of the points on the exam (same question appeared in 2010 and 2012).

3. Consider an i.i.d. sample Y_1, Y_2, \dots, Y_n , each with the distribution:

$$f(y) = \begin{cases} \frac{3y^2}{\theta} e^{-y^3/\theta} & y \geq 0 \\ 0 & y < 0 \end{cases}$$

- a) Show that the statistic $U = \sum_{i=1}^n Y_i^3$ has a gamma distribution and parameters (α, β) for this distribution.

- b) Show that the estimator $\hat{\theta} = \frac{U}{n}$ is a minimal variance unbiased estimator for θ .

Rubric Used on Exam:

0-25 pts Based on correctness of method used, completeness and quality of explanations and correctness of proofs.
(12.5 points per question)

Rubric Used for Assessing Goal:

0-5 0-2 = Not meeting goal
3-4= Minimally meeting goal
5= Fully Meeting goal

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

a. Findings:

Results

Student	Exam Score on Question		Total Score on Final Exam	Course Grade	Assessment Score
	a	b	(out of 200 points)		
1	12.5	12.5	182	4.0	5
2	6.5	4.5	142	2.9	2
3	12.5	9.5	152	3.5	4
4	6.5	0	130	2.6	1
5	8.5	12.5	153	2.8	4
6	8.5	2.5	130	3.1	2
7	12.5	12.5	187	3.9	5

Students fully meeting goal (5): 29%
Students minimally meeting goal (3-4): 29%
Students not meeting goal (0-2): 43%

b. Analysis of findings:

The SLOs for the BA in Mathematics were revised during AY 2013/14. However, a previous SLO was assessed using the same question on final exams for the two previous offerings of the Math 485 course (S2010 and S2012) allowing for some comparison of results. The percentage of students minimally or fully meeting the SLO being assessed increased from 17% in 2010 to 40% in 2012 and 58% in 2014. Although the SLOs differ, overall student performance with respect to writing and understanding mathematical arguments and proofs is believed to be increasing. This is believed to be in part due to changes in the style in which the course is being taught. Over the past three offerings the course has changed from being an instructor-oriented lecture type course to being a student-oriented course focusing on student independent learning with minimal lecturing and student presentations being the main activity during class time. Because student participation is now a major

portion of the course grade, passing rates (at 2.0 or better) have increased from 17% to 100% based on students completing course. Unfortunately, the course is still experiencing low enrollment and relatively high dropout which the passing rates reported above do not accurately reflect.

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).

The probability and statistics course sequence MATH 385/386/485/486 is being revised from a four course sequence into a three course sequence (15 credits total remaining the same). This is believed to provide a more uniform student experience throughout the sequence with increasing emphasis on student independent learning and projects involving undergraduate student research.

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

Proposals expected to be submitted Fall 2014.

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

SLOs will be revisited following a revision of the BA in Mathematics. Details will follow.

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.

Assessment process and results for “closing the loop” are integrated into the above report.