New Mexico Common Course Assessment Reports Form

Reporting Institution: Central New Mexico Community College

New Mexico Common Core Area: Area II: Mathematics

Competency Number Assessed: (note that *not* all competencies have to be assessed – mark all that apply to this assessment) (link to list of competencies for each area)

State Competency 1 ☐	State Competency 2 ☐	State Competency 3 ☑
State Competency 4 ☑	State Competency 5 ☐	State Competency 6 ☐

Academic Year of Assessment: 2013-2014

Submission Date: January 2015

Institution Course Number: MATH 1315 and MATH 1330

NM Common Core Number (link to list of NMCC Numbers): MATH 1113 and MATH 2113

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Instructions: Fill in the text boxes in the table below for each course, area, or competency on which you are reporting assessment efforts.

Description of Assessment Procedure:

Standard test questions, internal and direct, with achievement targets as follows:
MATH 1315/1113: Average score of 2.0 on rubric whole number scale {0, 1, 2, 3}
MATH 1330/2113: Average score of 2.0 on rubric whole number scale {0, 1, 2, 3}

Report of Assessment Data and Results:

See addenda

Analysis and Interpretation/Reflection on Results or Trends:

MATH 1315/1113:

We introduced assessment of SLO#5 (which corresponds to State competency 3: Communicate problems scientifically) for AY2013/14 using standard test questions associated with the difference quotient, a long-time MATH 1315 course-level SLO topic that had no history of prior general education mathematics assessment within the department. Student performance was generally low, as measured by the mean rubric scores on Standard Test Question 1b (Fall 1.18, Spring 1.30) and Standard Test Question 1c (Fall 1.41, Spring 1.32). Triggered in part by the first-year run of the difference quotient assessment questions, faculty diversity of opinion precipitated a complete reformulation of standard test questions to be used in future years of assessment, culminating in the writing of the MATH 1315 Curriculum and Assessment Guide. The difference quotient remains an important topic for future assessment and is represented in the guide; however, due to the comprehensive redesign of the MATH 1315 assessment cycle plan it will not be assessed AY2014/15.

The benchmark 2.0 was achieved for SLO#4 (which corresponds to State competency 4: Apply quantitative analysis to scientific problems) on Standard Test Question 2 (Fall 2.01, Spring 2.14) but not on Standard Test Question 1a (Fall 1.45, Spring 1.43). Gaps in student understanding of the difference quotient likely caused the low scores for Standard Question 1a. Nonetheless, there is evidence that our students are developing expertise in SLO#4.

The benchmark 2.0 was greatly exceeded for SLO#2 (Apply the scientific method to formulate questions, analyze information/data and draw conclusionson) -- which does not directly correspond to any of the State competencies but is related -- on Standard Test Question 3 (Fall 2.61, Spring 2.69), suggesting our students are strong with their computational skills. Assessment during AY2013/14 was a charged year with much controversy surrounding the assessment of MATH 1315 – College Algebra. Math Chair Rachel Black orchestrated the departmental-wide effort in redesigning the standard test questions and wrote the MATH 1315 Curriculum and Assessment Guide. All College Algebra faculty are now fully informed of the kinds of assessment questions likely to be asked of their students and, more importantly, are attuned to the level of rigor associated with the course.

MATH 1330/2113:

We introduced assessment of SLO#5 (which corresponds to State competency 3: Communicate problems scientifically) for AY2013/14 using Standard Test Question 1c. Student performance hovered around the benchmark, as measured by the mean rubric scores (Fall 1.82, Spring 2.04). Parallel controversies ensued regarding the MATH 1330 assessment questions as were experienced in assessing MATH 1315. While a Curriculum and Assessment Guide was not drafted for MATH 1330, a complete reformulation of standard test questions was undertaken. Thus for MATH 1330 as well, there will be a loss in continuity of identical assessment question use.

The benchmark 2.0 was not achieved for SLO#4 (which corresponds to State competency 4: Apply quantitative analysis to scientific problems) on Standard Test Question 1b (Fall 1.30, Spring 1.95). Some faculty voiced the opinion that Standard Test Question 1b was not representative of the MATH 1330 curriculum, possibly explaining the somewhat poor performance. Perhaps the Spring scores are higher as faculty were better-informed of the assessment expectations during its second semester of implementation.

Again, the benchmark 2.0 was met for SLO#2 on Standard Test Question 1a (Fall 2.10, Spring 2.27), suggesting our students are strong with their computational skills.

Assessment in MATH 1330 – Introduction to Probability and Statistics for AY2013/14 also experienced challenges and disagreements, in part arising from my rookie year as the assessment coordinator. Math Chair Rachel Black, MATH 1330 Course Coordinator Erik Andries, and I solicited faculty to participate in the development of new assessment questions which are ready for implementation AY2014/15. While future refinements are likely in order, faculty consensus on the assessment questions to be used has been reached.

Plan for Improving the Assessment Process and/or Student Learning:

MATH 1315/1113:

The MATH 1315 Curriculum and Assessment Guide in conjunction with the complete reset and reformulation of the five year cycle plan are likely to greatly improve both pedagogy and student performance. As a department we are much clearer now on the level of rigor associated with College Algebra course-level SLOs. Furthermore, we have formulated an assessment protocol for college algebra that all instructors must adhere to. The protocol eliminates many sources of variation that are not associated with student mastery of the assessed SLOs, including no longer permitting un-proctored assessments nor open book assessments.

MATH 1330/2113:

The reformulation of the MATH 1330 assessment questions will facilitate an improved assessment process, with greater faculty buy-in and clearer expectations of student performance. In parallel with College Algebra, we have formulated an assessment protocol for Introduction to Probability and Statistics that all instructors must adhere to. The protocol eliminates many sources of variation that are not associated with student mastery of the assessed SLOs, including no longer permitting un-proctored assessments nor open book assessments.

Addendum 1: Assessment Data and Results for MATH 1315/1113:

General Education Mathematics SLO#4 – Standard Test Question 1a

A rocket is launched straight up into the air with a launch velocity of 64 ft/sec. The height of the rocket in feet, as a function of time, t, in seconds, is given by $s(t) = -16t^2 + 64t$. Find the difference quotient of s(t) defined as

$$\frac{s(t+h) - s(t)}{h}$$

Numerical Assessment Problem #1a	0	1	2	3
Answer	Not answered or non-mathematical 'attempt'	Mathematical attempt but major conceptual or calculational error	Mathematical attempt with minor calculational error	$-32t - 16h + 64$

Fall and Spring mean rubric scores on Question 1a were 1.45 and 1.43, respectively. The distributions differ statistically between Fall and Spring, but no obvious implication can be inferred.

General Education Mathematics SLO#5 – Standard Test Question 1b

State another name for the difference quotient.

Numerical Assessment Problem #1b	0	1	2	3
Answer	Not answered	Attempt but major conceptual error	Attempt with minor conceptual error	Slope or Average rate of change or Slope of secant line

Fall and Spring mean rubric scores on Question 1b were 1.18 and 1.30, respectively. The distributions differ statistically between Fall and Spring, with Spring scores more polarized toward rubric score 0 and toward rubric score 3.

General Education Mathematics SLO#5 – Standard Test Question 1c

What are the units associated with the difference quotient?

Numerical Assessment Problem #1c	0	1	2	3
Answer	Not answered	Attempt but major conceptual error	Attempt with minor conceptual error	feet/second

Fall and Spring mean rubric scores on Question 1c were 1.41 and 1.32, respectively. The distributions did not differ between Fall and Spring.

General Education Mathematics SLO#4 – Standard Test Question 2

Solve the exponential equation $3^{x+1} = 11$.

Numerical Assessment Problem #2	0	1	2	3
Answer	Not answered or non-mathematical 'attempt'	Mathematical attempt but major conceptual or calculational error	Mathematical attempt with minor calculational error	$x = \frac{\ln(11)}{\ln(3)} - 1$ $x = \frac{\log 11}{\log 3} - 1$ $x = \log_3 11 - 1$ $x \approx 1.183$

Fall and Spring mean rubric scores on Question 2 were 2.01 and 2.14, respectively. The distributions did not differ between Fall and Spring.

General Education Mathematics SLO#2 – Standard Test Question 3

Let $f(x) = 3x^3 - x^2 + 4x - 7$. Evaluate $f(2)$ without a calculator.

Numerical Assessment Problem #3	0	1	2	3
Answer	Not answered or non-mathematical 'attempt'	Mathematical attempt but major conceptual error.	Mathematical attempt with minor conceptual error.	$f(2) = 21$

Fall and Spring mean rubric scores on Question 3 were 2.61 and 2.69, respectively. The distributions did not differ between Fall and Spring.

Addendum 2: Assessment Data and Results for 1330/2113:

General Education Mathematics SLO#2 – Standard Test Question 1a

Suppose that for a particular tire shop, the population of customers arriving with x tires improperly inflated has the following distribution:

X	P(x)
0	.18
1	.39
2	.31
3	k + .10
4	k

Find the probability that no more than two tires are improperly inflated.

Numerical Assessment Problem #1a	0	1	2	3
Answer	Not answered or non-mathematical 'attempt'	Mathematical attempt but major conceptual or calculational error	Mathematical attempt with minor calculational error	0.88

Fall and Spring mean rubric scores on Question 1a were 2.10 and 2.27, respectively. The distributions did not differ between Fall and Spring.

General Education Mathematics SLO#4 – Standard Test Question 1b

Find $P(2 \leq X \leq 4)$.

Numerical Assessment Problem #1b	0	1	2	3
Answer	Not answered	Attempt but major conceptual error	Attempt with minor conceptual error	$2k + .41$

Fall and Spring mean rubric scores on Question 1b were 1.30 and 1.95, respectively. The distributions differ statistically between Fall and Spring, with Spring scores higher.

General Education Mathematics SLO#5 – Standard Test Question 1c

Determine if $k = 0.01$ is possible. Why or why not?

Numerical Assessment Problem #1c	0	1	2	3
Answer	Not answered	Attempt but major conceptual error	Attempt with minor conceptual error	Yes, b/c all probabilities add up to 1.

Fall and Spring mean rubric scores on Question 1c were 1.82 and 2.04, respectively. The distributions did not differ between Fall and Spring.