GENERAL EDUCATION/CORE COURSE-LEVEL ASSESSMENT REPORT TEMPLATE/ REPORTING INSTITUTION: UNIVERSITY OF NEW MEXICO-VA

UNM-Valencia	Course: Math 121	Semester: 2013	Assessment Period: 2013
Comments on changes implemented this year from the previous assessment period (attach, in a separate document, evidence of changes-i.e., revised syllabus, additional or revised activities, etc.): **N/A (This section was not included in the previous reporting process.)**			
1: Student Learning Outcomes Being Measured	Provide a complete list of the SLOs being measured and identify the NM HED Core Area(s) and competency number(s) that the SLO targets (refer to *Numbered NMHED Core Competencies* document for guidance) **SAMPLE*: By the end of the course, students will be able to edit their writing to achieve appropriate diction, syntax, grammar, and mechanics. (Area I, Competency #4)***		
Students will be able to determine the key features of a function such as domain/range, intercepts, and asymptotes (Area II: Algebra, Competency #1).			
2: Description of Assessment Instrument(s) and Procedures	Provide a summary that addressed the following questions: 1) What assessment measures were used in the course? 2) What was the structure and/or process for assessing student learning in the course? 3) Who collects/reviews the assessment results? 4) What is the expected criteria for success or performance benchmark for successfully meeting the SLO? **SAMPLE: *The rubric utilizes a 5-point scale. Students are rated from 1 (No Mastery) to 5 (Mastered). Five sections of English 102 were assessed. Each taught by a different instructor, three 16 week face-to-face, and one first 8 week hybrid and one second 8 week online. The results were collected at the end of the Fall and Spring semesters by the English program director. 70% of the students were expected to receive a rate of 3 or higher on at least 4 of the 6 categories on the rubric.*** ***When you submit the report, attach a separate document entitled "Appendix_Course_Instructor". In this Appendix, please copy and paste a BLANK copy of the assessment instrument(s).**		
To assess students' ability to determine the key features of a function (i.e. domain, range, and asymptotes), the chosen course objectives were: Sketch the graph and indicate the vertical asymptote State the domain and range. These objectives were in relation to the graph of a logarithmic function that had been shifted vertically and horizontally. Answers were rated as acceptable if students could correctly indicate the vertical asymptote and correctly state the domain and range, with a goal of having 70% or more students' rate acceptable for the competency. The final exams for all 113 students in all sections for the Fall 2013 term were used in the assessment process.			

Column 3: Assessment Results	Provide a summary of the assessment results **SAMPLE:** ***A total of 44 students were assessed from five sections of English 102. 0% of the students received a score of 1 (No Mastery). 14% of the students received a score of 2 (Attempted). 59% of the students received a score of 3 (Skilled). 20% received a score of 4 (Acquired). 7% received a score of 5 (Mastered).*** ***When you submit the report, attach a separate document of aggregated assessment data/results.**
Competency I: 30 of the 113 students (26.5%) completed all three tasks correctly; 30 of the 113 students (26.5%) correctly completed two of the three tasks; 22 of the 113 students (19.5%) correctly completed only one of the three tasks; 8 of the 113 students (7.1%) did not attempt the problem; 23 of the 113 students (20.4%) attempted the problem but did not correctly complete any of the three tasks. It was also interesting to note that 10 of the 113 students (8.8%) incorrectly listed the domain as $x \neq -6$ rather than the correct domain of $x > -6$. In addition, 19 of the 113 students (16.8%) did not sketch the correct shape for the logarithmic graph (instead providing sketches that resembled quadratic, absolute value, or exponential functions).	
Column 4: Analysis and Interpretation/ Reflection on Results	Provide an analysis of assessment results by discussing strengths and/or weaknesses in students' performance/learning **SAMPLE:** ***Students scored the lowest at the level of Attempted and Mastered for this Student Learning Outcome. This implies students have improved since last year in this area but are still are not moving more into the Mastered area.***
Competency I: Only 30 of the 113 students (26.5%) performed acceptably on this task. This is far short of the goal of 70% or more rating acceptable. In Fall 2012, we assessed similar tasks but with an exponential function. In that semester, a common error students made was not being able to correctly state the range for the function. In this group of students, with the logarithmic function instead, 30 of the 113 students (26.5%) could correctly state the range and more were unable to correctly state the domain, which seems reasonable since the domain is restricted for logarithmic functions and the range is restricted for exponential functions, so the common error occurs with determining the correct restriction. Another result of note was that slightly more students could indicate the correct vertical asymptote (21 of the 113 students or 18.6%) than could list the correct domain (18 of the 113 students or 15.9%). As mentioned above, 8.8% of the students knew what value was of interest for the domain and/or vertical asymptote but apparently did not know how to correctly interpret how that value should be used.	
Column 5: Plan for Improving Process and/or Student Learning	Provide a summary for improving assessment process and/or student learning **SAMPLE:** ***Editing is large part of the curriculum, and a review of diction, syntax, grammar, and mechanics is now addressed in the curriculum. However, more focused attention on specific student improvement in these areas should be attended to.*** ***When you submit the report, attach available documentation of improvements/revisions made in the course's curriculum, syllabus, activitties, etc.**
Competency I: Anecdotally it seems that students have more difficulty with logarithmic functions than with exponential functions. And comparing the results of similar tasks for both types of function (Fall 2012 for exponential and Fall 2013 for logarithmic) it appears that this may be the case; 26.5% performing acceptably for the logarithmic function for this assessment and 64.6% performing acceptably for the exponential function in Fall 2012. The results of this assessment show that students in particular need more practice with determining domain restrictions for logarithmic functions, especially knowing that the	

result should be an inequality. Instructors will put more emphasis on correct interpretation of what the logarithmic equation represents.

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1: Student Learning Outcomes Being Measured	

Students will be able to use the equation of a function to perform function operations (Area II: Algebra, Competency #2).

2: Description of Assessment Instrument(s) and Procedures	

Competency I: Anecdotally it seems that students have more difficulty with logarithmic functions than with exponential functions. And comparing the results of similar tasks for both types of function (Fall 2012 for exponential and Fall 2013 for logarithmic) it appears that this may be the case; 26.5% performing acceptably for the logarithmic function for this assessment and 64.6% performing acceptably for the exponential function in Fall 2012. The results of this assessment show that students in particular need more practice with determining domain restrictions for logarithmic functions, especially knowing that the result should be an inequality. Instructors will put more emphasis on correct interpretation of what the logarithmic equation represents.

Column 3: Assessment Results	Provide a summary of the assessment results **SAMPLE:** ***A total of 44 students were assessed from five sections of English 102. 0% of the students received a score of 1 (No Mastery). 14% of the students received a score of 2 (Attempted). 59% of the students received a score of 3 (Skilled). 20% received a score of 4 (Acquired). 7% received a score of 5 (Mastered).*** ***When you submit the report, attach a separate document of aggregated assessment data/results.**
Competency II: 65 of the 113 students (57.6%) were able to answer completely correctly (all the way to writing the function in simplest terms); an additional 7 of the 113 students (6.2%) were able to correctly set up the composition and correctly find the square of a binomial, but lost the constant term or made other arithmetic errors in their simplification; an additional 17 of the 113 students (15.0%) set up the composition correctly $(f \circ g)(n)$ but did not simplify correctly (did not find the correct square of the binomial); and an additional 9 of the 113 students (8.0%) set up the composition correctly $(f \circ g)(n)$ but then stopped. At least one of the instructors apparently did not require her/his students to simplify the result of the composition, so that only 9 stopped after the initial step is noteworthy. Only 4 out of the 113 students (3.5%) did not attempt the problem (left it blank) and only 1 student (0.9%) performed the opposite composition. Also 10 of the 113 students (8.8%) attempted the problem but did not demonstrate correct understanding of composition. In short, 98 of the 113 (86.7%) students knew how to correctly set up the composition of two polynomial functions. Another troubling outcome was that 12 of the 113 students (10.6%) set their expression equal to 0 and attempted to solve it.	
Column 4: Analysis and Interpretation/ Reflection on Results	Provide an analysis of assessment results by discussing strengths and/or weaknesses in students' performance/learning **SAMPLE:** ***Students scored the lowest at the level of Attempted and Mastered for this Student Learning Outcome. This implies students have improved since last year in this area but are still are not moving more into the Mastered area.***
Competency II: In Fall 2012 only 45 of the 96 students or 46.9% could correctly set up the composition of two rational functions and 34 out of 96 students (35.6%) didn't know how to correctly set up the composition or didn't attempt the problem. In that assessment the thought was that some students may not have attempted the question because they did not know how to work with a rational function, not because of any lack of understanding of composition. In this assessment, asking students to perform the composition of polynomial functions, we see that only 15 out of 113 (13.3%) didn't know how to correctly set up the composition or didn't attempt the problem. This seems to give credence to the conjecture that students were put off by rational functions in the past.	
Column 5: Plan for Improving Process and/or Student Learning	Provide a summary for improving assessment process and/or student learning **SAMPLE:** ***Editing is large part of the curriculum, and a review of diction, syntax, grammar, and mechanics is now addressed in the curriculum. However, more focused attention on specific student improvement in these areas should be attended to.*** ***When you submit the report, attach available documentation of improvements/revisions made in the course's curriculum, syllabus, activitties, etc.**
Competency II: Our plan after the Fall 2012 assessment was to give the students a question on a subsequent final exam asking them to find the composition of two functions that were not rational functions so that we can differentiate the errors. It appears that we have found that the majority of students (86.4% in	

Fall 2013) *do* understand how to correctly set up the composition of familiar functions. In the future we will address the issues of students attempting to solve an expression (something that is not an equation to solve) and review how to square a binomial. We will also give them more practice with composing functions that are not polynomials.

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1: Student Learning Outcomes Being Measured	

Student will be able to describe the implications of key features of a function with respect to its graph (Area II: Algebra, Competency #3).

2: Description of Assessment Instrument(s) and Procedures	

Competency III: To assess students' ability to describe key features of a function with respect to its graph, students were given a circle equation in general form, $x^2 + y^2 + ax + by + c = 0$, and were asked to find the center and radius of the circle. The item was rated acceptable if students could correctly state the center and radius of the circle. The goal was to have 70% or more students rate acceptable on this competency. The final exams for all students (n=113) in all sections for the Fall 2012 term were used in the assessment process.

Column 3: Assessment Results

Competency III: 44 of the 113 students (38.9%) were able to correctly state the center and radius of the circle; 18 of the 113 students (15.9%) were able to set up a correct method to find these parts of the graph but made mistakes in their final answers; 16 of the 113 students (14.2%) had a correct method for one part of the asked for information (correct set up for center points or correct set up for radius) but did not have a correct method of solution for the other part; 18 of the 113 students (15.9%) attempted the problem but did not have a correct method of solution in any part; 17 of the 113 students (15.1%) did not attempt the problem or wrote an answer but had no work.

Column 4: Analysis and Interpretation/ Reflection on Results

Competency III: Only 44 of the 113 students (38.9%) performed acceptably on this task, which is far short of our goal for 70% of students to do this. However, 62 of the 113 students (54.9%) had the correct method of solution. Of those who had at least a partially correct method, 22 of them made errors in simplification or in interpreting the results; in particular 11 out of the 113 (9.7%) had the wrong sign on the center points (did not interpret x – h or y – k correctly) and 12 out of 113 (10.6%) did not know how to handle the radius (put $\sqrt{4}$ or 4^2 when the radius was actually 4).

Column 5: Plan for Improving Process and/or Student Learning

Competency III: It is troubling that close to 30% (35 out of 113) of the students either did not attempt the problem or did not demonstrate even a partial understanding of how to correctly find the required information. Clearly we need to spend more time on circle equations; in particular on how to interpret what information the equation gives us. Another issue with this problem is that not all instructors teach the same method for finding the center and radius of a circle. Some of the instructors wish the students to be able to rewrite the circle equation into standard form $(x-h)^2+(y-k)^2=r^2$, whereas other instructors focused on numerical methods to just find the wanted information without rewriting the circle equation. First, all the instructors for this course need to determine the desired outcome: finding center and radius or rewriting the circle equation and from this finding the center and radius. Second, we need to provide more opportunities for students to learn how to correctly achieve this objective and help them in the interpretation of the equation.

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1: Student Learning Outcomes Being Measured	

Students will be able to solve application problems including those requiring exponential growth & decay (Area II, Algebra: Competency #4).

2: Description of Assessment Instrument(s) and Procedures	

Competency IV: To assess students' ability to solve an application problem requiring exponential growth, students were asked to find the doubling time for an investment that was compounded continuously. The objectives in this question were:

Use the correct formula (continuous compounding rather than periodic)

Use the inverse logarithmic function correctly to find the time (which is in the exponent).

Answers were rated as acceptable if students could correctly complete all objectives, with a goal of having 70% or more of students rate acceptable for the competency. The final exams for all students (n=113) in all sections for the Fall 2013 term were used in the assessment process.

Column 3: Assessment Results
Competency IV: 54 of the 113 students (47.8%) were able to answer all parts correctly; 5 of the 113 students (4.4%) used the correct formula and knew that ln was the correct inverse function but made arithmetic or calculation errors; 11 of the 113 students (9.7%) used the continuous compounding formula to set up the problem but did not know how to correctly proceed from there to a solution; 13 of the 113 students (11.5%) attempted to use the periodic compounding formula and of these, 4 used the logarithmic inverse to attempt to find a solution; 9 of the 113 students (8.0%) did not attempt the problem; and 21 of the 113 students (18.6%) made an attempt at a solution but did not use either of the compounding formulas. It was interesting to note that 2 students set up the problem correctly (used the continuous compounding formula) then proceeded to attempt a solution using trial and error.
Column 4: Analysis and Interpretation/ Reflection on Results
Competency IV: 59 of the 113 students (52.2%) performed acceptably on this task (used the correct compounding formula and used the logarithm to find the exponent). This is better than the 26 of the 96 students (27.1%) who performed acceptably on a doubling exponential growth problem from Fall 2012. The context this time around, however, was compound interest rather than population growth and so there were fewer steps to a correct solution and students this time were not asked to find the growth rate. The performance was still short of the 70% desired and students did not demonstrate knowledge of how to use the logarithm as an inverse to the exponential to determine a value for the variable in the exponent. Since 70 out of the 113 students (61.9%) knew which formula to use, it is clear that close to an acceptable number recognized the type of problem and how to initially set it up.
Column 5: Plan for Improving Process and/or Student Learning
Competency IV:) Since a majority of those who had the correct set up could then solve the problem (70 set the problem up correctly and 54 proceeded to a correct solution, so 77.1% of those who had the correct formula could then solve the problem) the focus in the future will be on differentiating when to use the continuous compounding formula and when to use the periodic formula (11.5% used periodic instead of continuous). Also, instructors will give more practice in knowing how to set up a problem involving exponential growth.