

Assessment Cycle 2021- 2022 University Core Competency Assessment

Mathematics – Core Competency #2. To apply mathematical and analytical reasoning skills.

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Northwestern Mission. Northwestern State University is a responsive, student-oriented institution committed to acquiring, creating, and disseminating knowledge through innovative teaching, research, and service. With its certificate, undergraduate, and graduate programs, Northwestern State University prepares its increasingly diverse student population to contribute to an inclusive global community with a steadfast dedication to improving our region, state, and nation.

Northwestern Core Curriculum. Northwestern has a broadly-based core curriculum that is central to the University’s mission and consistent with the Louisiana Board of Regents’ requirements for general education survey courses applicable to all students regardless of their major. The core encompasses the knowledge and abilities that Northwestern believes are essential to college graduates. Its requirements are designed to improve students’ writing and speaking, to expand students’ aptitude in mathematics and its applications, to strengthen students’ understanding of biological, physical, social, and behavioral sciences, and to develop an appreciation and knowledge of the arts and humanities.

The goal of the core curriculum is for undergraduate students, depending on their respective degree program, to obtain appropriate learning outcomes for this general education competency.

Methodology: The assessment process includes:

(1) Students must complete one of the following Core sequences:

Course Name - Sequence	Methodology	Target	Term
Math 1020 & 1060	Quiz	70%	Fall and Spring
Math 1035 & 1060	Quiz	70%	Fall and Spring
Math 1020 & 1090	Quiz	70%	Fall and Spring
Math 1020 & 2010	Quiz	70%	Fall and Spring
Math 1810	Quiz	70%	Fall and Spring
Math 2100 & 2110	Quiz	70%	Fall and Spring

The first four sequences are offered online as well as face-to-face. The last two are only taught face-to-face at the Natchitoches campus.

We will administer a quiz near the end of each core class according to the schedule below. If the course is taught online, we will administer this quiz through Moodle or MyMathLab whether the class is an online section or not. Quizzes will be administered in-class to the students in courses that are only taught face-to-face.

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Course Name	Administration Semester
Math 1020	Fall
Math 1035	Fall
Math 1060	Spring
Math 1090	Spring
Math 2010	Spring
Math 1810	Fall and Spring
Math 2100	Fall and Spring
Math 2110	Fall and Spring

(2) Data from the assessment tools (direct & indirect and quantitative & qualitative) are collected and returned to the executive director at the end of each term indicated (see Student Learning Outcomes section, below, for details).

(3) The executive director will analyze the data to determine whether the applicable outcomes are met:

(4) Results from the assessment will be discussed with the appropriate staff members.

(5) The executive director, in consultation with the staff and senior leadership, will determine proposed changes to measurable outcomes, assessment tools for the next assessment period and, where needed, service changes.

Student Learning Outcomes (SLO):

SLO 1 Students will apply mathematics/analytical reasoning skills by translating a word problem into an appropriate mathematical model and translating the solution of a model into an answer to a practical problem.

Measure 1.1. Methodology: Direct Measure – Quiz administered in each class. Target: 70% of students will attain a score of 2 (Acceptable) on the questions that ask the student to pick an appropriate mathematical model for a problem.

Course Name	Methodology	Target	Term
Math 1020	Quiz	70%	Fall
Math 1035	Quiz	70%	Fall
Math 1060	Quiz	70%	Spring
Math 1090	Quiz	70%	Spring
Math 1810	Quiz	70%	Fall and Spring
Math 2010	Quiz	70%	Spring
Math 2100	Quiz	70%	Fall and Spring
Math2110	Quiz	70%	Fall and Spring

Finding: Target met.

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Analysis. In 2020-2021 the target was not met.

MATH1020 – 594 responses – 316 or 53.2% met goal.

MATH1035 – 89 responses – 51 or 65.1% met goal.

MATH1060 – 455 responses – 333 or 73.2% met goal.

MATH1090 – 96 responses – 88 or 91.7% met goal.

MATH2010 – 56 responses – 50 or 89.3% met goal.

MATH1810 – 15 responses – 6 or 40.0%met goal.

MATH2100 – 15 responses – 14 or 93.3% met goal.

MATH2110 – 7 responses – 7 or 100% met goal.

Looking at this data course by course, we see five of the courses – 1060, 1090, 2010, 2100, and 2110 – performed well meeting our goal of 70%. Two courses – 1020 and 1810 – fell far short of this goal, and 1035 showed improvement coming close to meeting the target. The three underperforming classes are all typically taken by first-time entering freshmen.

Based on our analysis of the results from AY2020 – 2021, we implemented the following changes for AY2021 – 2022. Faculty modeled the regular exams after the questions on the Assessment Quiz to ensure familiarity with the style of questions and all Assessment Quizzes were reviewed to ensure they were congruent in difficulty with the course material.

As a result, in 2021-2022 the target was met. 1323 students (of whom 87 were Dual Enrollment) were assessed 1155 met the goal (87.3%).

MATH1020 – 615 responses – 591 or 96.1% met goal.

MATH1035 – 73 responses – 63 or 86.3% met goal.

MATH1060 – 466 responses – 359 or 77.0% met goal.

MATH1090 – 110 responses – 89 or 80.9% met goal.

MATH2010 – 40 responses – 35 or 87.5% met goal.

MATH1810 – 9 responses – 8 or 88.9%met goal.

MATH2100 – 4 responses – 4 or 100% met goal.

MATH2110 – 6 responses – 6 or 100% met goal.

We saw dramatic improvement in MATH1020, 1035, and 1810, modest improvement 1060 and 2100. MATH2110 maintained its 100% success rate. There were slight declines in MATH1090 and 2010 no more than 2 percentage points. It appears the actions we took were very effective.

Decision or action to drive future improvement. Based on the analysis of the 2021-2022 results, the faculty will implement the following changes in 2022-2023 to drive the cycle of improvement:

- The Assessment Quiz will now be integrated into either a homework assignment or a test so that students perceive this assessment as part of their regular work rather than a special assignment with no impact on their grade.

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- To build on the work we have done and to support the effort above in addition to including problems like the problems on the Assessment Quiz on exams, similar questions will be included in homework assignments.
- To increase the granularity of the data, the number of questions for each measure on the Assessment Quiz will be increased.

In addition, we have set a new target for 2022 – 2023: 90% of students will attain a score of 2 (Acceptable) or better on questions that ask the student to pick an appropriate mathematical model for a problem.

Measure 1.2. Methodology: Direct measure – Quiz administered in each class. Target: 80% of students will attain a score of 2 (Acceptable) on questions that ask the student to interpret the solution to a mathematical model as an answer to a practical problem. Further in each course, at least 70% of students will attain a score of 2.

Course Name	Methodology	Target	Term
Math 1020	Quiz	70%	Fall
Math 1035	Quiz	70%	Fall
Math 1060	Quiz	70%	Spring
Math 1090	Quiz	70%	Spring
Math 1810	Quiz	70%	Fall and Spring
Math 2010	Quiz	70%	Spring
Math 2100	Quiz	70%	Fall and Spring
Math2110	Quiz	70%	Fall and Spring

Finding. Target not met.

Analysis. In 2020-2021 the target was not met. The overall goal of 80% was achieved in the aggregate, but we did not meet the subsequent goal of 70% or higher in each course.

MATH1020 – 594 responses – 480 or 80.8% met goal.

MATH1035 – 89 responses – 51 or 60.6% met goal.

MATH1060 – 455 responses – 387 or 85.1% met goal.

MATH1090 – 96 responses – 96 or 100% met goal.

MATH2010 - 56 responses – 50 or 89.4% met goal.

MATH1810 – 15 responses – 6 or 40.0%met goal.

MATH2100 – 15 responses – 15 or 100% met goal.

MATH2110 – 7 responses – 7 or 100% met goal.

Based on our analysis of the results from AY2020 – 2021, we implemented the following changes for AY2021 – 2022. Faculty modeled the regular exams after the questions on the Assessment Quiz to ensure familiarity with the style of questions and all Assessment Quizzes were reviewed to ensure they were congruent in difficulty with the course material.

As a result, in 2021-2022 the target was not met. 1323 students (of whom 87 were

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Dual Enrollment) were assessed 1095 met the goal (91.3%). Two of the eight courses did not meet the goal of 70%. Target not met.

MATH1020 – 615 responses – 578 or 94.0% met goal.

MATH1035 – 73 responses – 47 or 64.4% met goal.

MATH1060 – 466 responses – 427 or 91.6% met goal.

MATH1090 – 110 responses – 107 or 97.3% met goal.

MATH2010 - 40 responses – 34 or 85.0% met goal.

MATH1810 – 9 responses – 5 or 55.6% met goal.

MATH2100 – 4 responses – 4 or 100% met goal.

MATH2110 – 6 responses – 6 or 100% met goal.

We saw dramatic improvement in MATH1020 and 1810 and modest improvement in 1035 and 1060. MATH2100 and 2110 maintained their 100% success rate. There were slight declines in MATH1090 and 2010 no more than 4 percentage points. It appears the actions we took were effective although 1810 is still not meeting the secondary target.

Decision or action to drive future improvement. Based on the analysis of the 2021-2022 results, the faculty will implement the following changes in 2022-2023 to drive the cycle of improvement:

- The Assessment Quiz will now be integrated into either a homework assignment or a test so that students perceive this assessment as part of their regular work rather than a special assignment with no impact on their grade.
- To build on the work we have done and to support the effort above in addition to including problems like the problems on the Assessment Quiz on exams, similar questions will be included in homework assignments.
- To increase the granularity of the data, the number of questions for each measure on the Assessment Quiz will be increased.

SLO 2. Students will demonstrate the ability to solve a mathematical problem through algebraic, graphical/geometrical, or numerical/statistical methods as appropriate.

Measure 2.1 Methodology: Direct measure – Quiz administered in each class. Target: 75% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a problem stated in mathematical symbology. Further in each course, at least 70% of students will attain a score of 2.

Course Name	Methodology	Target	Term
Math 1020	Quiz	70%	Fall
Math 1035	Quiz	70%	Fall
Math 1060	Quiz	70%	Spring

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Math 1090	Quiz	70%	Spring
Math 1810	Quiz	70%	Fall and Spring
Math 2010	Quiz	70%	Spring
Math 2100	Quiz	70%	Fall and Spring
Math2110	Quiz	70%	Fall and Spring

Finding. Target met.

Analysis. In 2020-2021 the target was not met. The overall goal of 75% was achieved in the aggregate, but we did not meet the subsequent goal of 70% or higher in each course.

- MATH1020 – 594 responses – 571 or 96.1% met goal.
- MATH1035 – 89 responses – 61 or 68.5% met goal.
- MATH1060 – 455 responses – 272 or 59.8% met goal.
- MATH1090 – 96 responses – 82 or 85.4% met goal.
- MATH2010 - 56 responses – 52 or 92.9% met goal.
- MATH1810 – 15 responses – 6 or 40.0%met goal.
- MATH2100 – 15 responses – 14 or 93.3% met goal.
- MATH2110 – 7 responses – 7 or 100% met goal.

Based on our analysis of the results from AY2020 – 2021, we implemented the following changes for AY2021 – 2022. Faculty modeled the regular exams after the questions on the Assessment Quiz to ensure familiarity with the style of questions and all Assessment Quizzes were reviewed to ensure they were congruent in difficulty with the course material.

As a result, in 2021-2022 the target was met. 1323 students (of whom 87 were Dual Enrollment) were assessed 1237 met the goal (93.4%). All eight courses met the secondary goal of 70%.

- MATH1020 – 615 responses – 608 or 98.9% met goal.
- MATH1035 – 73 responses – 60 or 82.2% met goal.
- MATH1060 – 466 responses – 421 or 90.3% met goal.
- MATH1090 – 110 responses – 95 or 86.4% met goal.
- MATH2010 - 40 responses – 36 or 90.0% met goal.
- MATH1810 – 9 responses – 8 or 88.9%met goal.
- MATH2100 – 4 responses – 3 or 75.0% met goal.
- MATH2110 – 6 responses – 6 or 100% met goal.

We saw dramatic improvement in MATH1035, 1060, and 1810 and modest improvement in 1020 and 1090. MATH2110 maintained its 100% success rate. There was a slight decline in MATH2010 no more than 3 percentage points. There was a dramatic decline in the percentage for MATH2100, but the sample size was so small that it only took 1 student to cause this. Despite the decline MATH2100 still met both targets. It appears the actions we took were effective.

Decision or action to drive future improvement. Based on the analysis of the

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2021-2022 results, the faculty will implement the following changes in 2022-2023 to drive the cycle of improvement:

- The Assessment Quiz will now be integrated into either a homework assignment or a test so that students perceive this assessment as part of their regular work rather than a special assignment with no impact on their grade.
- To build on the work we have done and to support the effort above in addition to including problems like the problems on the Assessment Quiz on exams, similar questions will be included in homework assignments.
- To increase the granularity of the data, the number of questions for each measure on the Assessment Quiz will be increased.

In addition, we have set a new target for 2022 – 2023: 95% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a problem stated in mathematical symbology. Further in each course, at least 80% of students will attain a score of 2.

Measure 2.2. Methodology: Direct measure – Quiz administered in each class. Target: 70% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a word problem.

Course Name	Methodology	Target	Term
Math 1020	Quiz	70%	Fall
Math 1035	Quiz	70%	Fall
Math 1060	Quiz	70%	Spring
Math 1090	Quiz	70%	Spring
Math 1810	Quiz	70%	Fall and Spring
Math 2010	Quiz	70%	Spring
Math 2100	Quiz	70%	Fall and Spring
Math2110	Quiz	70%	Fall and Spring

Finding. Target met.

Analysis. In 2020-2021 the target was not met.

MATH1020 – 594 responses – 420 or 70.7% met goal.

MATH1035 – 89 responses – 51 or 57.3% met goal.

MATH1060 – 455 responses – 273 or 60.0% met goal.

MATH1090 – 96 responses – 88 or 91.7% met goal.

MATH2010 - 56 responses – 52 or 92.9% met goal.

MATH1810 – 15 responses – 6 or 40.0%met goal.

MATH2100 – 15 responses – 14 or 93.3% met goal.

MATH2110 – 7 responses – 7 or 100% met goal.

Based on our analysis of the results from AY2020 – 2021, we implemented the following changes for AY2021 – 2022. Faculty modeled the regular exams after the

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questions on the Assessment Quiz to ensure familiarity with the style of questions and all Assessment Quizzes were reviewed to ensure they were congruent in difficulty with the course material.

As a result, in 2021-2022 the target was met. 1323 students (of whom 87 were Dual Enrollment) were assessed. 1163 met the goal (87.9%).

MATH1020 – 615 responses – 587 or 95.4% met goal.

MATH1035 – 73 responses – 61 or 83.6% met goal.

MATH1060 – 466 responses – 376 or 80.7% met goal.

MATH1090 – 110 responses – 89 or 80.9% met goal.

MATH2010 - 40 responses – 35 or 87.5% met goal.

MATH1810 – 9 responses – 6 or 66.7%met goal.

MATH2100 – 4 responses – 3 or 75.0% met goal.

MATH2110 – 6 responses – 6 or 100% met goal.

We saw dramatic improvement in MATH1020, 1035, 1060, and 1810. MATH2110 maintained its 100% success rate. There was a slight decline in MATH2010 no more than 5 percentage points. MATH1090 went from a very high rate to one 10 percentage points lower but still well above target; some consideration of the instrument for this class will be undertaken. There was a dramatic decline in the percentage for MATH2100, but the sample size was so small that it only took 1 student to cause this. Despite the decline MATH2100 still met the target. It appears the actions we took were effective.

Decision or action to drive future improvement. Based on the analysis of the 2021-2022 results, the faculty will implement the following changes in 2022-2023 to drive the cycle of improvement:

- The Assessment Quiz will now be integrated into either a homework assignment or a test so that students perceive this assessment as part of their regular work rather than a special assignment with no impact on their grade.
- To build on the work we have done and to support the effort above in addition to including problems like the problems on the Assessment Quiz on exams, similar questions will be included in homework assignments.
- To increase the granularity of the data, the number of questions for each measure on the Assessment Quiz will be increased.

In addition, we have set a new target for 2022 – 2023: 90% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a word problem. Further in each course, at least 80% of students will attain a score of 2.

Comprehensive Summary of Key Evidence of improvement based on the analysis

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of results. The following reflects all the changes implemented to drive the continuous process of seeking improvement in AC 2021-2022. These changes are based on the knowledge gained through the analysis of AC 2020-2021 results.

- Questions like those used in the Assessment Quiz were included on regular exams throughout the course. This was to insure we were not asking a question on the Assessment Quiz unlike anything they had seen before.
- A committee was appointed to review all Assessment Quizzes to ensure that the questions were of appropriate difficulty for the course and congruent with the material taught and that the Assessment Quizzes for all courses were of the same challenge level.

Plan of Action moving forward: We are pleased with the results of last year's changes which helped to familiarize students with the types of questions asked on the Assessment Quiz. We seek to build upon those efforts. We have also received feedback that students were not trying hard on the Assessment Quiz seeing it as something extra outside their class work. Further, some faculty expressed concerns on the quality of the data sets we are collecting. To address these concerns, we will adopt the following strategies:

- The Assessment Quiz will now be integrated into either a homework assignment or a test so that students perceive this assessment as part of their regular work rather than a special assignment with no impact on their grade.
- To build on the work we have done and to support the effort above in addition to including problems like the problems on the Assessment Quiz on exams, similar questions will be included in homework assignments.
- To increase the granularity of the data, the number of questions for each measure on the Assessment Quiz will be increased.

Areas to be addressed in specific courses:

- MATH1090 and 2010 saw downturns in their results this year. Faculty in these areas will be asked to again review their assessment instrument to insure it is consistent with how the material in the class is taught and assessed.
- MATH1810 remains a bit of an outlier from the other classes. Faculty in this area will be asked to again review their assessment instrument to insure it is consistent with how the material in the class is taught and assessed.
- MATH1020, 1060, and 1090 have developed a format for reporting the assessment data that facilitates aggregation of the data into this report. MATH1035, 1810, 2010, 2100, and 2110 will move to reporting their data in this format.