# Assessment Cycle 2023-2024

## Mathematics – Core Competency #2

**To apply mathematical and analytical reasoning skills.**

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**Approved by: Dr. Greg Handel, Provost** **Date:**

**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**

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

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

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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 My Math Lab whether the class is an online section or not. The following table shows the semester in which the quiz is administered.

| 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 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 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 and assessment tools for the next assessment period, and, if 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: 90% 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 | 80% | Fall |
| Math 1035 | Quiz | 80% | Fall |
| Math 1060 | Quiz | 80% | Spring |
| Math 1090 | Quiz | 80% | Spring |
| Math 2010 | Quiz | 80% | Spring |
| Math 1810 | Quiz | 80% | Fall and Spring |
| Math 2100 | Quiz | 80% | Fall and Spring |
| Math 2110 | Quiz | 80% | Fall and Spring |

# Assessment Cycle 2023-2024

**Finding: Target not met.**

**Analysis**: In AC 2022-2023 the target was met. Overall, 1236 students were assessed (of which 250 were Dual Enrollment); 1147 met the target score or better. 92.8% of students reached the assessment goal.

| Course Name | Assessment Total | Total Students Meeting Target | % Meeting Target |
|---|---|---|---|
| Math 1020 | 669 | 660 | 98.7 |
| Math 1035 | 45 | 40 | 88.9 |
| Math 1060 | 363 | 318 | 87.6 |
| Math 1090 | 78 | 61 | 78.2 |
| Math 2010 | 45 | 40 | 88.9 |
| Math 1810 | 21 | 15 | 71.4 |
| Math 2100 | 9 | 7 | 77.8 |
| Math 2110 | 6 | 6 | 100.0 |

Based on the analysis of the AC 2022-2023 results and to drive further improvement, the following changes were implemented for AC 2023-2024:

- The Assessment Quiz was structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.
- Since the quiz was administered either in Moodle or My Math Lab, students turned in their written work to professors/instructors for evaluation.
- We maintained the overall target of 90% success on measure 1.1, Chapter 3 - Assignment (S)and set a new target for the individual courses: 80% of students in each course attain a score of 2.

As a result, the target was not met for AC 2023-2024. The following data was found: Overall, 1112 students were assessed (of which 72 were Dual Enrollment); 1071 met the target score or better. 96.3% of students reached the assessment goal.

# Assessment Cycle 2023-2024

| Course Name | Total Number of Students Assessed | Total Number of Students Meeting Target | % Meeting Target |
|---|---|---|---|
| Math 1020 | 532 | 521 | 97.9 |
| Math 1035 | 108 | 103 | 95.4 |
| Math 1060 | 368 | 348 | 94.6 |
| Math 1090 | 56 | 55 | 98.2 |
| Math 2010 | 26 | 24 | 92.0 |
| Math 1810 | 3 | 2 | 66.7 |
| Math 2100 | 6 | 6 | 100.0 |
| Math 2110 | 13 | 12 | 92.3 |

The overall target of 90% success was met. We saw meaningful improvement in Math 1035, 1060, 1090, 2010, and 2100. Math 2110 decreased, but the number of students being assessed increased by more than double. Only one student in 2110 did not meet the target. Math 1020 experienced a slight decrease in success, but nothing significant enough to cause concern. Math 1810 was the only course that did not meet the individual course goal of 80%. If this specific class achieved their objective, the overarching target would have been achieved. It is worth noting that only 3 students were assessed. The drop in students being assessed for 1810, can most likely be attributed to the number of students entering their freshman year with a dual enrollment credit for their first college math course.

**Decision or action to drive future improvement**. Based on the analysis of AC 2023-2024 results, the faculty will implement the following changes in AC 2024-2025 to drive the cycle of improvement:

- Course coordinators will ensure that all instructors receive the assessment during the first week of class to align class materials and instruction.
- Typically, the assessment has been administered towards the end of the last week of class. However, student participation has declined. Therefore, to increase student participation, the assessment will be made available to students once all class material has been covered.
- We have had varying success in Math 1810 for the last few years. In the Fall of 2024, Math 1810, currently a 6-credit hour course, will be split into two 3-credit hour courses, Math 1820 and 1830. In addition, a corequisite course will be offered in concurrence with 1820 to provide supplemental instruction for students with Math ACT scores of 18 and below.
- Prior to unit exams, instructor-led reviews will be conducted for the benefit of the student, with particular focus on mathematical models.

**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.

# Assessment Cycle 2023-2024

| Course Name | Methodology | Target | Term |
|---|---|---|---|
| Math 1020 | Quiz | 80% | Fall |
| Math 1035 | Quiz | 80% | Fall |
| Math 1060 | Quiz | 80% | Spring |
| Math 1090 | Quiz | 80% | Spring |
| Math 2010 | Quiz | 80% | Spring |
| Math 1810 | Quiz | 80% | Fall and Spring |
| Math 2100 | Quiz | 80% | Fall and Spring |
| Math 2110 | Quiz | 80% | Fall and Spring |

**Finding: Target not met.**

**Analysis**: In AC 2022-2023 the target was met. Overall, 1238 students were assessed (of which 250 were Dual Enrollment); 1188 met the target score or better. 96.0% of students reached the assessment goal.

| Course Name | Assessment Total | Total Students Meeting Target | % Meeting Target |
|---|---|---|---|
| Math 1020 | 669 | 649 | 97.0 |
| Math 1035 | 45 | 45 | 100.0 |
| Math 1060 | 365 | 356 | 97.5 |
| Math 1090 | 78 | 72 | 92.3 |
| Math 2010 | 45 | 37 | 82.2 |
| Math 1810 | 21 | 15 | 71.4 |
| Math 2100 | 9 | 8 | 88.9 |
| Math 2110 | 6 | 6 | 100.0 |

Based on the analysis of the AC 2022-2023 results and to drive further improvement, the following changes were implemented for AC 2023-2024:

- The Assessment Quiz was structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.
- Since the quiz was administered either in Moodle or My Math Lab, students turned in their written work to professors/instructors for evaluation.
- We increased the overall target to a 90% success on measure 1.2 and set a new target for the individual courses: 80% of students IN each course attain a score of 2.

As a result, the target was not met for AC 2023-2024. The following data was found: Overall, 1112 students were assessed (of which 72 were Dual Enrollment); 1072 met the target score or better. 96.4% of students reached the assessment goal.

# Assessment Cycle 2023-2024

| Course Name | Total Number of Students Assessed | Total Number of Students Meeting Target | % Meeting Target |
|---|---|---|---|
| Math 1020 | 532 | 516 | 97.0 |
| Math 1035 | 108 | 99 | 91.6 |
| Math 1060 | 368 | 363 | 98.6 |
| Math 1090 | 56 | 54 | 96.4 |
| Math 2010 | 26 | 23 | 88.0 |
| Math 1810 | 3 | 2 | 66.7 |
| Math 2100 | 6 | 5 | 83.3 |
| Math 2110 | 13 | 10 | 76.9 |

The overall target of 90% success was met. However, two courses did not reach the individual course goal of 80% success. As stated previously, only three students were assessed in 1810, a root cause of the decrease in success. Math 2110 had a significant drop in success as the number of students accessed doubled. Math 1020 and 1060, the university core classes with the highest population, maintained strong success rates.

**Decision or action to drive future improvement**. Based on the analysis of the AC 2023-2024 results, the faculty will implement the following changes in AC 2024-2025 to drive the cycle of improvement:

- Course coordinators will ensure that all instructors receive the assessment during the first week of class to align class materials and instruction.
- Typically, the assessment has been administered towards the end of the last week of class. However, student participation has declined. Therefore, to increase student participation, the assessment will be made available to students once all class material has been covered.
- We have had varying success in Math 1810 for the last few years. In the Fall of 2024, Math 1810, currently a 6-credit hour course, will be split into two 3-credit hour courses, Math 1820 and 1830. In addition, a corequisite course will be offered in concurrence with 1820 to provide supplemental instruction for students with Math ACT scores of 18 and below.
- Prior to unit exams, instructor-led reviews will be conducted for the benefit of the student, with particular focus on interpreting solutions to mathematical models.

**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: 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.

# Assessment Cycle 2023-2024

| Course Name | Methodology | Target | Term |
|---|---|---|---|
| Math 1020 | Quiz | 80% | Fall |
| Math 1035 | Quiz | 80% | Fall |
| Math 1060 | Quiz | 80% | Spring |
| Math 1090 | Quiz | 80% | Spring |
| Math 2010 | Quiz | 80% | Spring |
| Math 1810 | Quiz | 80% | Fall and Spring |
| Math 2100 | Quiz | 80% | Fall and Spring |
| Math 2110 | Quiz | 80% | Fall and Spring |

**Finding: Target not met.**

**Analysis**: In the AC 2022-2023 the target was met. Overall, 1239 students were assessed (of which 250 were Dual Enrollment); 1210 met the target score or better. 97.7% of students reached the assessment goal.

| Course Name | Assessment Total | Total Students Meeting Target | % Meeting Target |
|---|---|---|---|
| Math 1020 | 669 | 667 | 99.7 |
| Math 1035 | 45 | 44 | 97.8 |
| Math 1060 | 366 | 358 | 97.8 |
| Math 1090 | 78 | 69 | 88.5 |
| Math 2010 | 45 | 42 | 93.3 |
| Math 1810 | 21 | 17 | 81.0 |
| Math 2100 | 9 | 7 | 77.8 |
| Math 2110 | 6 | 6 | 100.0 |

Based on the analysis of the AC 2022-2023 results and to drive further improvement, the following changes were implemented for the AC 2023-2024:

- The Assessment Quiz was structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.
- Since the quiz was administered either in Moodle or My Math Lab, students turned in their written work to professors/instructors for evaluation.

As a result, the target was not met for AC 2023-2024. The following data was found: Overall, 1112 students were assessed (of which 72 were Dual Enrollment); 1083 met the target score or better. 97.4% of students reached the assessment goal.

# Assessment Cycle 2023-2024

| Course Name | Total Number of Students Assessed | Total Number of Students Meeting Target | % Meeting Target |
|---|---|---|---|
| Math 1020 | 532 | 528 | 99.2 |
| Math 1035 | 108 | 101 | 93.5 |
| Math 1060 | 368 | 364 | 98.9 |
| Math 1090 | 56 | 51 | 91.1 |
| Math 2010 | 26 | 21 | 81.0 |
| Math 1810 | 3 | 2 | 66.7 |
| Math 2100 | 6 | 6 | 100.0 |
| Math 2110 | 13 | 10 | 76.9 |

The overall target success rate of 95% was met for measure 2.1. However, two courses (1810 and 2110) did not meet the individual goals of 80% in each course. Math 1020 and 1060 continued to show excellent scores for this measure. Math 1090 and Math 2100 showed improvement, while Math 2010 and 2110 decreased.

**Decision or action to drive future improvement**. Based on the analysis of the AC 2023-2024 results, the faculty will implement the following changes in AC 2024-2025 to drive the cycle of improvement:

- Course coordinators will ensure that all instructors receive the assessment during the first week of class to align class materials and instruction.
- Typically, the assessment has been administered towards the end of the last week of class. However, student participation has declined. Therefore, to increase student participation, the assessment will be made available to students once all class material has been covered.
- We have had varying success in Math 1810 for the last few years. In the Fall of 2024, Math 1810, currently a 6-credit hour course, will be split into two 3-credit hour courses, Math 1820 and 1830. In addition, a corequisite course will be offered in concurrence with 1820 to provide supplemental instruction for students with Math ACT scores of 18 and below.
- Prior to unit exams, instructor-led reviews will be conducted for the benefit of the student, with particular focus on problem solving when given mathematical symbology.

**Measure 2.2** Methodology: Direct measure – Quiz administered in each class. Target: 90% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a word problem.

# Assessment Cycle 2023-2024

| Course Name | Methodology | Target | Term |
|---|---|---|---|
| Math 1020 | Quiz | 80% | Fall |
| Math 1035 | Quiz | 80% | Fall |
| Math 1060 | Quiz | 80% | Spring |
| Math 1090 | Quiz | 80% | Spring |
| Math 2010 | Quiz | 80% | Spring |
| Math 1810 | Quiz | 80% | Fall and Spring |
| Math 2100 | Quiz | 80% | Fall and Spring |
| Math 2110 | Quiz | 80% | Fall and Spring |

**Finding: Target not met.**

**Analysis**: In the AC 2022-2023 the target was met. Overall, 1238 students were assessed (of which 250 were Dual Enrollment); 1117 met the target score or better. 90.2% of students reached the assessment goal.

| Course Name | Assessment Total | Total Students Meeting Target | % Meeting Target |
|---|---|---|---|
| Math 1020 | 669 | 644 | 96.3 |
| Math 1035 | 45 | 42 | 93.3 |
| Math 1060 | 365 | 315 | 86.3 |
| Math 1090 | 78 | 55 | 70.5 |
| Math 2010 | 45 | 38 | 84.4 |
| Math 1810 | 21 | 13 | 61.9 |
| Math 2100 | 9 | 4 | 44.4 |
| Math 2110 | 6 | 6 | 100.0 |

Based on the analysis of the AC 2022-2023 results and to drive further improvement, the following changes were implemented for the AC 2023-2024:

- The Assessment Quiz was structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.
- Since the quiz was administered either in Moodle or My Math Lab, students turned in their written work to professors/instructors for evaluation.
- We increased our focus on solving word problems in the classroom. This included the addition of extra word problems into our assignments and giving special attention to word problems during lectures.

As a result, the target was not met for AC 2023-2024. The following data was found: Overall, 1112 students were assessed (of which 72 were Dual Enrollment); 1040 met the target score or better. 93.5% of students reached the assessment goal.

# Assessment Cycle 2023-2024

| Course Name | Total Number of Students Assessed | Total Number of Students Meeting Target | % Meeting Target |
|---|---|---|---|
| Math 1020 | 532 | 520 | 97.7 |
| Math 1035 | 108 | 92 | 85.1 |
| Math 1060 | 368 | 350 | 95.1 |
| Math 1090 | 56 | 43 | 76.7 |
| Math 2010 | 26 | 20 | 77.0 |
| Math 1810 | 3 | 1 | 33.0 |
| Math 2100 | 6 | 4 | 66.6 |
| Math 2110 | 13 | 10 | 76.9 |

While our overall target of 90% success was met, only three courses met the individual course goal of 80%. In addition, the individual courses' success varied significantly. Math 1020, 1060, 1090, and 2100 showed improvement; Math 1035, 2010, 1810, and 2110 dropped. The changes we implemented had mixed results. Clearly, students find measure 2.2 more challenging than the others.

**Decision or action to drive future improvement.** Based on the analysis of the AC 2023-2024 results, the faculty will implement the following changes in AC 2024-2025 to drive the cycle of improvement:

- Course coordinators will ensure that all instructors receive the assessment during the first week of class to align class materials and instruction.
- Typically, the assessment has been administered towards the end of the last week of class. However, student participation has declined. Therefore, to increase student participation, the assessment will be made available to students once all class material has been covered.
- We have had varying success in Math 1810 for the last few years. In the Fall of 2024, Math 1810, currently a 6-credit hour course, will be split into two 3-credit hour courses, Math 1820 and 1830. In addition, a corequisite course will be offered in concurrence with 1820 to provide supplemental instruction for students with Math ACT scores of 18 and below.
- Prior to unit exams, instructor-led reviews will be conducted for the benefit of the student, with particular focus on solving word problems.

# Assessment Cycle 2023-2024

**Comprehensive Summary of Key Evidence of Improvement Based on Analysis of Results**. We are pleased to report that the mathematics department, on the whole, was able to meet the overall goal for each respective measure in which students were assessed over AC 2022-2023. That is, the target was met when the data was considered comprehensively. However, in some instances, individual courses did not meet their intended target. In addition, the following courses showed a consistent student success rate across each measurement: Math 1020, 1035, and 1060. Math 1090, 2010, and 2100 had success rates that fluctuated across the measurements. Math 1810 and 2110 need the most improvement.

The following reflects all the changes implemented in AC 2023-2024 to drive the continuous process of seeking improvement. The changes are based on the knowledge gained through the analysis of the AC 2022-2023 results.

SLO1.

Measure 1.1

- The Assessment Quiz was structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.
- Since the quiz is administered either in Moodle or My Math Lab, students turned in their written work to professors/instructors for evaluation.
- We maintained the overall target of 90% success on measure 1.1, and set a new target for the individual courses: 80% of students in each course attain a score of 2.

Measure 1.2

- The Assessment Quiz was structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.
- Since the quiz was administered either in Moodle or My Math Lab, students turned in their written work to professors/instructors for evaluation.
- We increased the overall target to a 90% success on measure 1.2 and set a new target for the individual courses: 80% of students in each course attain a score of 2.

SLO2.

Measure 2.1

- The Assessment Quiz was structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.
- Since the quiz was administered either in Moodle or My Math Lab, students turned in their written work to professors/instructors for evaluation.

Measure 2.2

- The Assessment Quiz was structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.

# Assessment Cycle 2023-2024

- Since the quiz was administered either in Moodle or My Math Lab, students turned in their written work to professors/instructors for evaluation.
- We increased our focus on solving word problems in the classroom. This included the addition of extra word problems into our assignments and giving special attention to word problems during lectures.

**Plan of action moving forward**. Target success will remain the same for each measure since the individual class goals were not met during this academic year. Overall, to drive the cycle of improvement, we will implement the following changes:

- Course coordinators will ensure that all instructors receive the assessment during the first week of class to align class materials and instruction.
- To increase student participation, the assessment will be made available to students once all class material has been covered.
- During the Fall of 2024, Math 1810, currently a 6-credit hour course, will be split into two 3-credit hour courses, Math 1820 and 1830. In addition, a corequisite course will be offered in concurrence with 1820 to provide supplemental instruction for students with Math ACT scores of 18 and below.
- Prior to unit exams, instructor-led reviews will be conducted for the benefit of the student, with particular focus on each measurement found in the assessment.