General Education Core Curriculum: Mathematics (Core Competency #2)

Mathematics. To apply mathematical and analytical reasoning skills.

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Northwestern Mission. Northwestern State University is a responsive, student-oriented institution that is committed to the creation, dissemination, and acquisition of knowledge through teaching, research, and service. The University maintains as its highest priority excellence in teaching in graduate and undergraduate programs. Northwestern State University prepares its students to become productive members of society and promotes economic development and improvements in the quality of life of the citizens in its region.

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 the core classes according to the schedule below. If the course is taught online, we will administer this quiz through Moodle 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.

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.

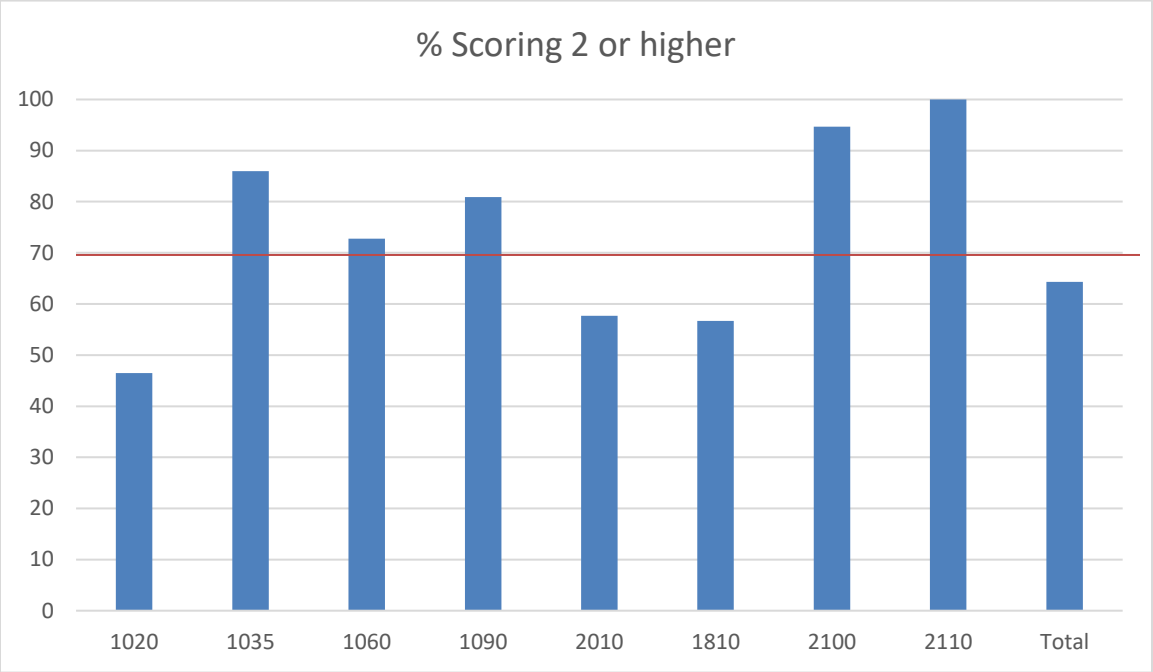
Measure 1.1. *Methodology:* Direct Measure – Quiz administered in each class. Target: 70% of students will attain a score of 2 (Acceptable) on choosing a Mathematical Model question on the quiz.

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

MATH1020 – 527 responses – 245 or 46.5% met goal
MATH1035 – 100 responses – 86 or 86.0% met goal
MATH1060 – 718 responses – 523 or 72.8% met goal
MATH1090 – 42 responses – 34 or 80.9% met goal
MATH2010 – 52 responses – 30 or 57.7% met goal
MATH1810 – 30 responses – 17 or 56.7%met goal
MATH2100 – 19 responses – 18 or 94.7% met goal
MATH2110 – 12 responses – 12 or 100% met goal

Finding. 1500 students were assessed 965 or 64.3% met the goal. Target not met.

Graph.



Analysis. In AY2017-2018, Mathematics was responsible for collecting data regarding two different learning outcomes: to reason and think critically and to use numerical data and statistics. This was addressed by a single measure. Our methodology involved collecting data from two classes, MATH1020 and MATH1060, so some students were not being assessed.

The University modified its General Education Core Curriculum to include six competencies which help to fulfill its mission and are in accordance with the Louisiana Board of Regents requirements for general education. The competency relevant to the Department of Mathematics is the following: to expand students' aptitude in mathematics and its applications. This new competency has two student learning outcomes with two different measures. New quiz-based assessments were developed for each of the eight core classes in mathematics. These were administered for the first time in AY2018-2019.

Our target of 70% was not met with only 64.3% of responding students reaching a score of 2 or higher on the quizzes. As this is our first year collecting data under the new paradigm, we have no comparable data from previous years to compare. We do feel this assessment gives us better detail than our previous approach and will enable us to better analyze and refine our instructional practices.

Decision or action to drive future improvement.
Based on our analysis of the results from AY2018-2019, we will implement the following changes for AY2019-2020:

- Focus more instructional time on the process of mathematical modeling
- Increase instructional time on choosing an appropriate mathematical model

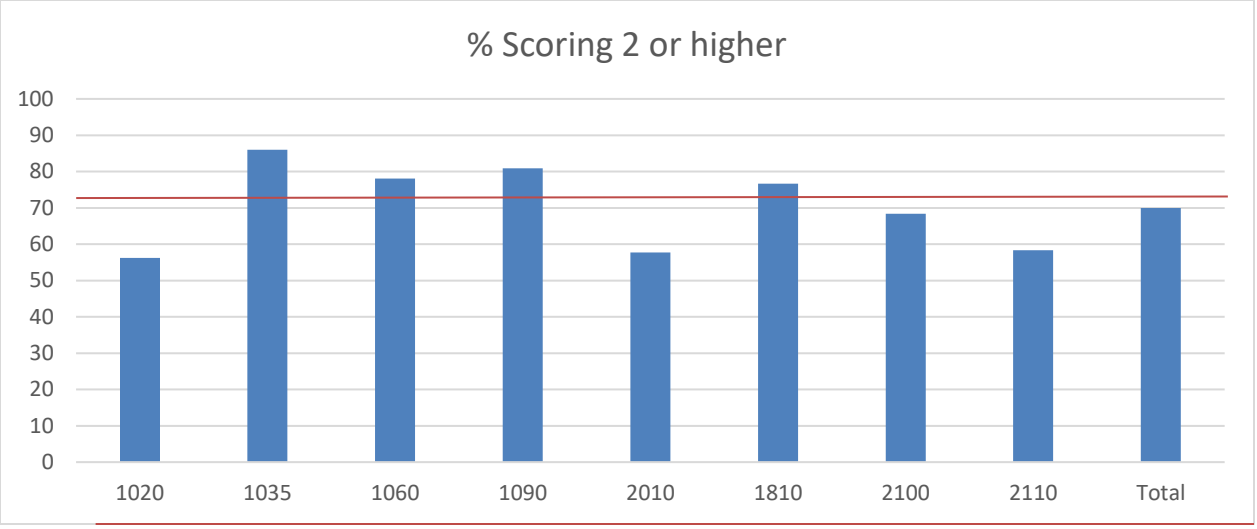
Measure 1.2. *Methodology*: Direct measure – Quiz administered in each class. Target: 70% of students will attain a score of 2 (Acceptable) on the Critiquing a Mathematical Model question on the quiz.

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

MATH1020 – 527 responses – 296 or 56.2% met goal
MATH1035 – 100 responses – 86 or 86% met goal
MATH1060 – 723 responses – 565 or 78.1% met goal
MATH1090 – 42 responses – 34 or 80.9% met goal
MATH2010 - 52 responses – 30 or 57.7% met goal
MATH1810 – 30 responses – 23 or 76.7%met goal
MATH2100 – 19 responses – 13 or 68.4% met goal
MATH2110 – 12 responses – 7 or 58.3% met goal

Finding. 1054 students were assessed.1054 or 70.0% met the goal. Target met.

Graph.



Analysis. In AY2017-2018, Mathematics was responsible for collecting data regarding two different learning outcomes: to reason and think critically and to use numerical data and statistics. This was addressed by a single measure. Our methodology involved collecting data from two classes, MATH1020 and MATH1060, so some students were not being assessed.

The University modified its General Education Core Curriculum to include six competencies which help to fulfill its mission and are in accordance with the Louisiana Board of Regents requirements for general education. The competency relevant to the Department of Mathematics is the following: to expand students' aptitude in mathematics and its applications. This new competency has two student learning outcomes with two different measures. New quiz-bases assessments were developed for each of eight core classes in mathematics. These were administered for the first time in AY2018-2019.

Our target of 70% was exactly met with 70.0% of responding students reaching a score of 2 or higher on the quizzes. Adjustments in pedagogy will be made to ensure we sustain this performance. As this is our first year collecting data under the new paradigm, we have no comparable data from previous years to compare. We do feel this assessment gives us better detail than our previous approach and will enable us to better analyze and refine our instructional practices.

Decision or action to drive future improvement.
Based on our analysis of the results from AY2018-2019, we will implement the following changes for AY2019-2020:

- Focus more instructional time on the critique of a mathematical model
- Increase instructional time on determining when a mathematical model is inappropriate for the given application

SLO 2. Students will demonstrate the ability to solve a mathematical problem through algebraic, graphical/geometrical, or numerical/statistical methods as appropriate, and translating that solution back into an answer to the original problem.

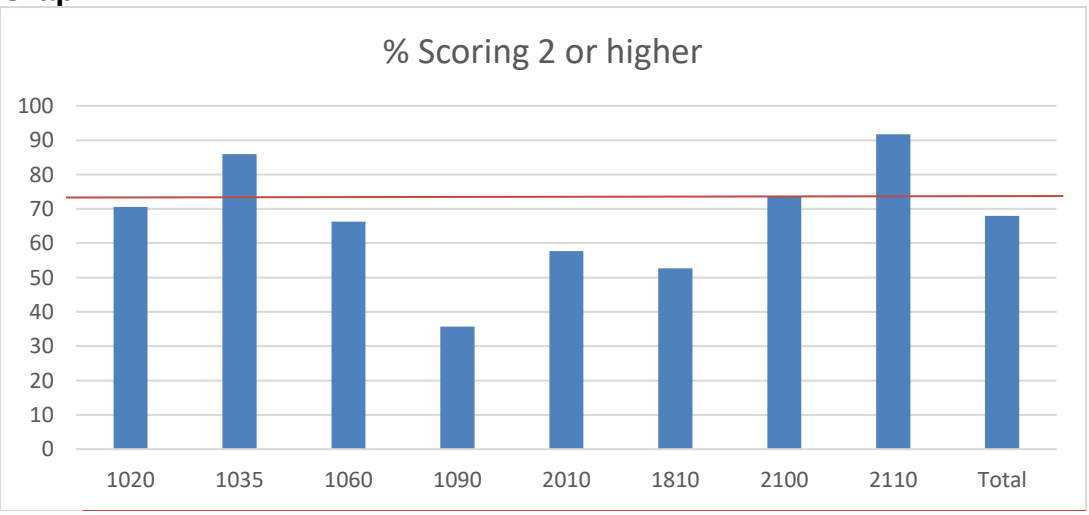
Measure 2.1 *Methodology*: Direct measure – Quiz administered in each class. Target: 70% of students will attain a score of 2 (Acceptable) on the Direct Problem-Solving questions on the quiz.

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

MATH1020 – 527 responses – 372 or 70.6% met goal
MATH1035 – 100 responses – 86 or 86% met goal
MATH1060 – 722 responses – 479 or 66.3% met goal
MATH1090 – 42 responses – 15 or 35.7% met goal
MATH2010 – 52 responses – 30 or 57.7% met goal
MATH1810 – 30 responses – 16 or 52.7%met goal
MATH2100 – 19 responses – 14 or 73.7% met goal
MATH2110 – 12 responses – 11 or 91.7% met goal

Finding. 1504 students were assessed.1023 or 68.0% met the goal. Target not met.

Graph.



Analysis. In AY2017-2018, Mathematics was responsible for collecting data regarding two different learning outcomes: to reason and think critically and to use numerical data and statistics. This was addressed by a single measure. Our methodology involved collecting data from two classes, MATH1020 and MATH1060, so some students were not being assessed.

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Our target of 70% was not met with only 68.0% of responding students reaching a score of 2 or higher on the quizzes. We were close to meeting our goal. Hopefully, modest adjustments in pedagogy can get us to our target. As this is our first year collecting data under the new paradigm, we have no comparable data from previous years to compare. We do feel this assessment gives us better detail than our previous approach and will enable us to better analyze and refine our instructional practices.

Decision or action to drive future improvement.
Based on our analysis of the results from AY2018-2019, we will implement the following changes for AY2019-2020:

- Focus more instructional time on the process of mathematical modeling
- Increase instructional time on choosing an appropriate mathematical model

Measure 2.2. *Methodology*: Direct measure – Quiz administered in each class. Target: 70% of students will attain a score of 2 (Acceptable) on interpreting the Solution of a Mathematical Model question on the quiz.

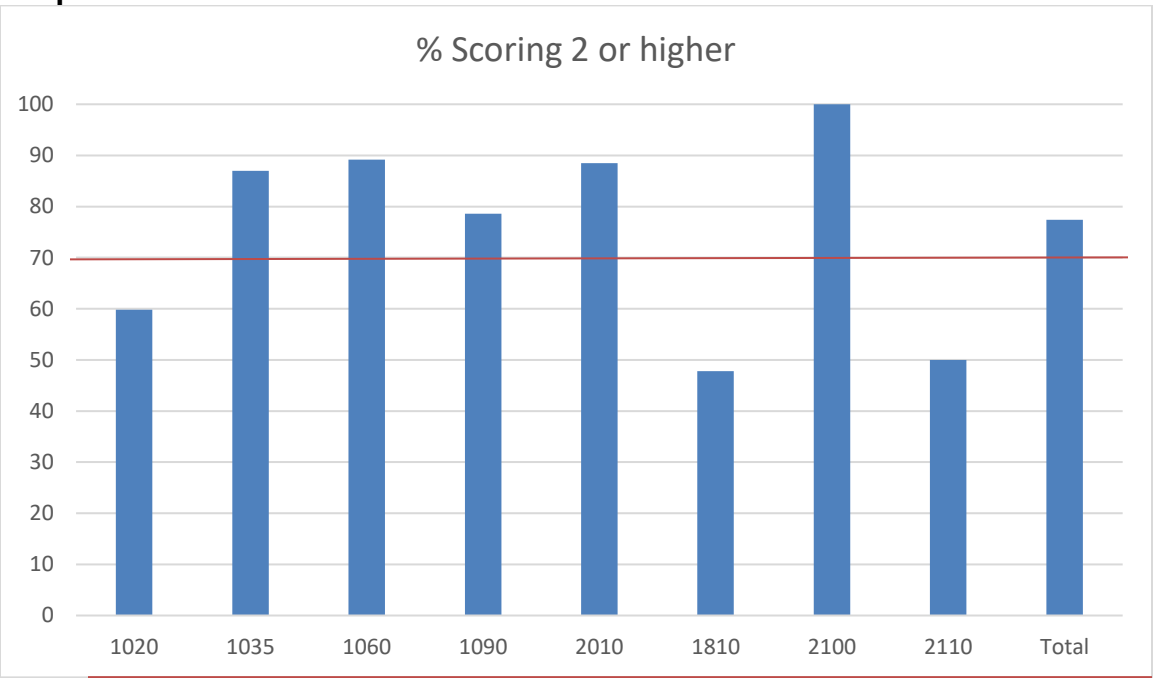
Course Name	Methodology	Target	Term
Math 1020	Quiz	70%	Fall
Math 1035	Quiz	70%	Fall
Math 1060	Quiz	70%	Spring
Math 1090	Quiz	70%	Spring
Math 1810	Quiz	70%	Fall and Spring
Math 2010	Quiz	70%	Spring
Math 2100	Quiz	70%	Fall and Spring
Math2110	Quiz	70%	Fall and Spring

MATH1020 – 527 responses – 315 or 59.8% met goal
MATH1035 – 100 responses – 87 or 87% met goal
MATH1060 – 721 responses – 643 or 89.2% met goal
MATH1090 – 42 responses – 33 or 78.6% met goal

MATH2010 – 52 responses – 46 or 88.5%met goal
MATH1810 – 30 responses – 14 or 47.8%met goal
MATH2100 – 19 responses – 19 or 100% met goal
MATH2110 – 12 responses – 6 or 50% met goal

Finding. 1503 students were assessed.1163 or 77.4% met the goal. Target met.

Graph.



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Our target of 70% was met with only 77.4% of responding students reaching a score of 2 or higher on the quizzes. As this is our first year collecting data under the new paradigm, we have no comparable data from previous years to compare. We do feel

this assessment gives us better detail than our previous approach and will enable us to better analyze and refine our instructional practices.

Decision or action to drive future improvement. Based on our analysis of the results from AY2018-2019, we will implement the following changes for AY2019-2020:

- Focus more instructional time on the process of mathematical modeling
- Increase instructional time on choosing an appropriate mathematical model

Summary Comments: The faculty feel that a realignment of our SLOs and Measures would provide a clearer picture of student achievement in mathematics classes. To that end, we would like to move forward with these modifications:

SLO 1. Students will apply mathematical/analytical reasoning skills by translating a word problem into an appropriate mathematical model and translating that 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.

Measure 1.2. *Methodology*: Direct measure – Quiz administered in each class. Target: 70% 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.

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: 70% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a problem stated in mathematical symbology.

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.