Assessment Cycle 2023 – 2024

Program: (BS) Bachelor of Science Mathematics

Department of Mathematics

College of Arts and Sciences

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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.

College of Arts and Sciences' Mission. College of Arts and Sciences' Mission. The College of Arts & Sciences, the largest college at Northwestern State University, is a diverse community of scholars, teachers, and students, working collaboratively to acquire, create, and disseminate knowledge through transformational, high-impact experiential learning practices, research, and service. The College strives to produce graduates who are productive members of society equipped with the capability to promote economic and social development and improve the overall quality of life in the region. The College provides an unequaled undergraduate education in the social and behavioral sciences, English, communication, journalism, media arts, biological and physical sciences, and the creative and performing arts, and at the graduate level in the creative and performing arts, English, TESOL, and Homeland Security. Uniquely, the College houses the Louisiana Scholars' College (the State's designated Honors College), the Louisiana Folklife Center, and the Creole Center, demonstrating its commitment to community service, research, and preservation of Louisiana's precious resources.

Department of Mathematics. The Department of Mathematics is dedicated to the development of students for roles in academic, professional, and research careers in the various areas of the field of mathematics. The department also fosters the mathematical development of all students through our offerings in general education and support courses for other degree programs. We are committed to providing a modern, effective education to all students using traditional practices and current technology throughout our course offerings. The department delivers Bachelor of Science degrees in Mathematics with available concentrations in Healthcare Informatics and Actuarial Mathematics. A minor in Mathematics is also available.

Mathematics Program Mission Statement: The Department of Mathematics offers a Bachelor of Science in Mathematics. The coursework includes a foundation in the classic coursework in mathematics covering Calculus, Foundations, and Algebra which is

enhanced with a strong student research component. All coursework is delivered using appropriate, modern technology. Mathematics coursework is supplemented with a strong selection of courses in Biological, Physical, and Computer Sciences. Choice of upper-level electives allows for customization of the degree emphasizing preparation for graduate school or a professional career or a mixture of both. Concentrations in Healthcare Informatics and Actuarial Mathematics also require an Internship experience further preparing the student for a professional career.

Methodology: The assessment process for the BS program is as follows:

(1) Data from assessment tools (both direct – indirect, quantitative, and qualitative) are collected and returned to the department head.

(2) The department head will analyze the data to determine whether students have met measurable outcomes.

(3) Results from the assessment will be discussed with the faculty.

(4) The Department Head, in consultation with the Advisory Committee, will propose changes to measurable outcomes, assessment tools for the next assessment period and, where needed, curricula and program changes.

Student Learning Outcomes:

SLO 1. Students will gain a strong understanding of the fundamental ideas, concepts, and applications of mathematics

Course Map: Tied to course syllabus objectives.

MATH 2110: Analytic Geometry and Calculus II
MATH 3100: Modern Algebra I
MATH 4950: Mathematics – A Capstone Course

Measure 1.1. (Direct – other)

MATH 2110 (Analytic Geometry and Calculus II) is taken at the end of the freshman year. MATH 3100 (Modern Algebra 1) is the last explicitly required course before the student begins taking upper-level electives in mathematics. MATH 4950 (Mathematics – A Capstone Course) is the senior research project course taken shortly before graduation. By looking at the pass rate in each of these courses, we get a sense of whether majors are making progress. The target are 75% of Mathematics majors earn a grade of C or higher in MATH 2110, 90% of Mathematics majors earn a grade of C or higher in MATH 3100 and at least 50% of Mathematics majors earn a grade of B or higher in MATH 4950.

Finding: Target was not met.

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Analysis: In AC 2022 – 2023, the following results were measured:

- MATH 2110 – 100% met target.
- MATH 3100 – 50% of math majors met the target.
- MATH 4950 – 100% of math majors met the target.

Based on the analysis of the AC 2022-2023 results and to drive improvement, faculty implemented the following changes in AC 2023-2024: prerequisites for upper-level courses were strictly enforced, and the practice of giving feedback using the format of the unified rubric was implemented throughout the curriculum.

In AC 2023-2024, our targets were:

- MATH 2110 – 75% or higher of mathematics majors would earn C or better.
- MATH 3100 – 90% or higher of mathematics majors would earn C or better, and 50% would earn a B or better.
- MATH 4950 – 90% or higher of mathematics majors would earn C or better, and 50% would earn a B or better.

The following results were measured.

- MATH 2110 – 100% of mathematics majors earned a C or better. (Fall 2022 no mathematics majors enrolled, Spring 2023 – 1 of 1 mathematics majors enrolled)
- MATH 3100 – 100% of mathematics majors earned a C or better, 0% of mathematics majors earned a B or better. (Fall 2023 – 0 of 0, Spring 2024 1 of 1, 0 of 1 respectively)
- MATH 4950 – 67% of mathematics majors earned a C or better, 0% of mathematics majors earned a B or better. (Fall 2023 – 2 of 3, 0 of 3, respectively, Spring 2024 course is not taught)

Based on the results analysis of AC 2022-2023, the faculty implemented the following changes in AC 2023-2024. The standardization of topics in MATH 2110 continues to benefit these students, although it is hard to draw conclusions from our very limited data over the last two academic years. Students in MATH 3100 clearly benefited from flipped-classroom pedagogy; the one student who did not meet the secondary target was allowed to take the course while completing its prerequisite to allow him to complete the degree before losing eligibility for financial aid. While that was a laudable reason, the results are less than ideal. Results in MATH 4950 were adversely affected by one student opting to stop participating two weeks before the end of the course. Performances by the remaining students were strong although, as will be seen later in some of the measures that are more granular than this one, their performance was not uniform across all categories. The students still struggled with calculator competency.

As a result, in AC 2023-2024, the target was not met.

Decision*:* In AC 2023-2024, the target was not met. Based on the analysis of the AC 2023-2024 results and to drive improvement, faculty will do the following in AC 2024-2025:

- The instrument for measuring calculator competency will be administered at the beginning of MATH 2110 as well as at the completion. This will allow us to better gauge the effectiveness of the course at fostering these skills.
- A committee will be established to conduct a review of prerequisites within mathematics courses.
- Students in MATH 4950 will receive a report on their progress using the Unified Rubrics for Oral and Written Communication at 5 weeks, mid-term, two weeks before the end of the semester, and at the completion of the course.

The faculty believes these changes will contribute to greater student success in these areas.

Measure 1.2. (Indirect – Attitude)

Students make a self-assessment of their preparation in the Reflection Paper Assignment they complete as a part of MATH 4950. We looked at student responses to the prompt "Describe yourself as a mathematician and as a member of the mathematics profession. What can you contribute to the mathematics community and our larger society?"

Finding: Target was not met.

Analysis: In AC 2022-2023, 100% of students (Fall 2022 – 2 of 2, Spring 2023 course not taught) gave answers indicating they felt a part of the mathematical community and 50% (Fall 2022 1 of 2, Spring 2023 course not taught) gave answers to indicate they thought they had the relevant skills. Based on the analysis of the 2022-2023 the following changes were made in 2023-2024 to drive improvement: discussions were held about these two questions at the beginning of MATH4950, so that students had a chance to reflect on the issues as they carried out their projects.

Based on the AC 2022-2023 results analysis, the faculty implemented the following changes in AC 2023-2024. In AC 2023-2024, the new target was that at least 90% of students will give a response indicating they feel they are capable of contributions to the larger community and at least 75% of students will report strengths appropriate to the research project. The following results were measured: 50% of students (Fall 2023, 1 of 2, Spring 2024 course not taught) gave answers indicating they felt a part of the mathematical community and 50% (Fall 2023 1 of 2, Spring 2024 course not taught) gave answers to indicate they thought they had the relevant skills. The students struggled to see themselves as a member of the mathematics community within our society.

As a result, in AC 2023-2024, the target was not met.

Decision: In AC 2023-2024, the target was not met. Based on the analysis of the AC 2023-2024 results and to drive improvement, faculty will do the following in AC 2024-2025. Discussions will be held regarding the two questions "Describe yourself as a mathematician and as a member of the mathematics profession. What can you contribute to the mathematics community and our larger society?" at the beginning of MATH 4950. This will allow the students to have a chance to reflect on the issues as they carry out their projects. Similar discussions will take place at social events such as our Pi Day Celebration. If we can generate sufficient student interest, we will reactivate our chapter of Kappa Mu Epsilon Mathematics honor society. The faculty believe these changes will contribute to greater student success in these areas. Targets will remain the same.

Measure: 1.3. **(Direct – Skill/Activity)**

All mathematics majors will take the ETS Major Field Exam in Mathematics during the semester they take MATH 4950. Our target is 75% or more of mathematics majors will score above the 50th percentile on the exam.

Findings: Target not met.

Analysis: In AC 2022 – 2023, 0% of students (0 of 2 mathematics majors) scored above the 50th percentile.

Based on the analysis of the AC 2022-2023, the following changes were made in AC 2023-2024. The assessment was discussed with the students at the beginning of the class, and the assessment was offered during a regular class meeting. The students struggled with standardized test taking.

As a result, in AC 2023 – 2024, 33% of students (1 of 3 mathematics majors) scored above the 50th percentile.

Therefore, in AC 2023-2024, the target was not met.

Decision: In AC 2023-2024, the target was not met. Based on the analysis of the AC 2023-2024 results and to drive improvement, faculty will do the following in AC 2024-2025: test-taking strategies for a standardized test where a significant number of questions may be outside of their experience will be reviewed and discussed. The faculty believes these changes will contribute to greater student success in these areas.

SLO 2. Students will demonstrate a college-level proficiency in oral communication of mathematical concepts.

Course Map: Tied to course syllabus below.

MATH1010: Introduction to Mathematics
MATH2080: Fundamentals of Proof

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MATH4950: Mathematics – A Capstone Course

Measure: 2.1. **(Direct – Skill/Activity)**

All mathematics majors take MATH 1010 (Introduction to Mathematics) the first fall semester they are the major. Their final project in this course is to make a presentation on a career in mathematics which they have researched. Using our evaluating Oral Communications of Mathematical Ideas rubric, students were evaluated in the categories of Organization, Delivery, and Visual Support; they are given a score of 0-2 in each category. Our target is that 85% of students will score at least 5 out of 6 possible points, and at least 50% will score 6 out of 6 possible points.

Findings: Target not met.

Analysis: In AC 2022-2023, 100% of students (1 of 1 mathematics majors in this class) scored at least 5 of 6 points. However, 0% of students (0 of 1) scored 6 out of 6, so the secondary goal was not met. Students were introduced to the Oral Communication portion of the Unified Rubric early in the semester. This allowed them to better understand how they would be evaluated.

Based on the analysis of the AC 2022-2023 results, in AC 2023-2024, the faculty implemented the following changes. The faculty dedicated an entire class meeting to discuss the Unified Rubric and its usage in evaluating their work. The students struggled with producing a relevant PowerPoint presentation and understanding the Unified Rubric.

In AC 2023-2024, 75% of students (3 of 4 mathematics majors in this class) scored at least 5 of 6 points. 50% of students (2 of 4) scored 6 out of 6.

As a result, in AC 2023-2024, the target was not met.

Decision: In AC 2023-2024, the target was not met. Based on the analysis of the AC 2023-2024 results and to drive improvement, faculty will begin in AC 2024-2025 to not only dedicate an entire class meeting to a thorough discussion of the Unified Rubric but also discuss the rubric in the class meeting dedicated to creating an appropriate PowerPoint presentation. Feedback on the mid-term presentation using the Unified Rubric will still be given. This will give the students more granular feedback and allow them to craft a stronger final presentation. Our target will remain the same. The faculty believes these changes will contribute to greater student success in these areas.

Measure: 2.2. (Direct – Skill/Activity)

Mathematics majors take MATH 2080 (Fundamentals of Proof) the fall of their sophomore year. In this course, students are required to present solutions of proofs on the board. Student presentations are evaluated using the Unified Rubric for use in evaluating Oral Communications of Mathematical Ideas. Students were evaluated in the categories of

Mathematics and Delivery; they were given a score of 0-2 in each category for each presentation. Our target is that 85% of students will have an average score at least 3.25 out of 4 possible points.

Findings: Target was met.

Analysis: In AC 2022-2023, there were no mathematics majors enrolled in MATH 2080, so no data was collected.

The instructor decided to return to flipped classroom pedagogy.

In AC 2023-2024, 100% of students (4 of 4 mathematics majors) had a score of 3.25 or higher. Students did well with producing presentations that were relevant to this SLO. However, they continue to struggle with understanding the expectations of the Unified Rubric.

As a result, in AC 2023-2024, the target was met.

Decision: In AC 2023-2024, the target was met. Based on the analysis of the AC 2023-2024 results and to drive improvement, faculty will begin in AC 2024-2025 to give feedback on each presentation using the Unified Rubric. This is in addition to a thorough discussion of the Unified Rubric at the beginning of the semester. We will raise our goal to 85% of students will have an average score of at least 3.25 out of 4 and 50% will have an average score of at least 3.5 out of 4. The faculty believe these changes will contribute to greater student success in these areas.

Measure: 2.3. (Direct – Skill/Activity)

All mathematics majors take MATH 4950 (Mathematics – Capstone Course) either the last or next to last semester before graduation. This class involves an independent research project which culminates in a paper and a public presentation. We use a Unified Rubric to evaluate Oral Communications of Mathematical Ideas. Students were evaluated in all five categories: Organization, Central Message, Mathematics, Delivery, and Visual Support; they will be given a score of 1-4 in each category. Our target is that 70% of students will score at least 18 out of 20 possible points.

Findings: Target not met.

Analysis: In AC 2022-2023, 50% (1 of 2 students) scored 18 out of 20. The faculty gave feedback to the students using only the benchmarks for the Unified Rubric, with particular attention paid to the midterm presentation.

Based on the analysis of the AC 2022-2023 data, faculty implemented the following changes in AC 2023-2024. The faculty devoted most of a class period near the beginning of the semester to discussing the Unified Rubric for Oral Communications and the level

of mastery that was expected to be displayed by the end of the course. The students still struggled with understanding the level of expectation through the Unified Rubric.

In AC 2023 – 2024, 0% of mathematics majors met the target (0 of 3 mathematics majors), although one student came within one point of the target.

As a result, in AC 2023-2024, the target was not met.

Decision: Based on the analysis of the AC 2023-2024 results and to drive improvement, the faculty in AC 2024-2025 students will receive a report on their progress using the Unified Rubrics for Oral Communication at 5 weeks, mid-term, two weeks before the end of the semester, and at the completion of the course. This is in addition to most of a class period near the beginning of the semester being devoted to discussing the Unified Rubric for Oral and Written Communications and the level of mastery we are expecting them to display by the end of the course. The faculty believe these changes will contribute to greater student success in these areas. The target will remain the same.

SLO 3. The students will demonstrate proficiency in written communication of mathematical concepts.

Course Map: Tied to course syllabus below.

MATH 3100: Modern Algebra I
MATH 4950: Mathematics – A Capstone Course

Measure 3.1. (Direct – Skill/Activity)

MATH 3100 (Modern Algebra I) is the last required course before majors begin their upper-level elective courses in mathematics. Responses to questions on the final exam will be analyzed to determine if students are writing about mathematics at the appropriate level. Using the Unified Rubric for evaluating Written Communications of Mathematical Ideas, students are evaluated on two questions from their final exam using the Logical Rigor, Thoroughness and Depth, and Conventions sections of the rubric. Each category is scored from 1-3. Our target is that 100% of students score at least 15 points out of 18 on the assessment and at least 75% score at least 17 out of 18.

Findings: Target not met.

Analysis: In AC 2022-2023, 50% of mathematics majors (1 of 2 students registered in the class) scored 15 points out of 18 or better on the rubric and 0% of students (0 of 2) scored 17 out of 18 or better. The classes were taught via flipped classroom pedagogy with newly recorded videos designed for this purpose.

Based on the analysis of the AC 2022-2023 data, the faculty implemented the following changes in AC 2023-2024. The faculty devoted most of a class period near the beginning of the semester to discussing the Unified Rubric for Written Mathematics and the level of mastery we were expecting them to display by the end of the course. The students still struggled with multiple sections of the Unified Rubric. Those sections included logical rigor, thoroughness and depth, and conventions sections.

As a result of these changes in AC 2023 - 2024, 100% of mathematics majors (1 of 1 student registered in the class) scored 15 points out of 18 or better, and 0% of mathematics majors (0 out of 1 student registered in the class) scored 17 out of 18 or better.

Decision: Based on the analysis of the AC 2023-2024 results and to drive improvement, the faculty in AC 2024-2025 will give feedback on each of the three regular exams using the Unified Rubric for Written Communication in the Logical Rigor, Thoroughness, and Depth, and Conventions sections. Our targets will remain the same. The faculty believe these changes will contribute to greater student success in these areas.

Measure: 3.2. (Direct – Skill/Activity)

All mathematics majors take MATH 4950 either the last or next to last semester before graduation. This class involves an independent research project which culminates in a paper and a public presentation. Using the Unified Rubric for evaluating Written Communications of Mathematical Ideas, students are evaluated in all five categories: Context, Organization, Logical Rigor, Thoroughness and Depth, and Conventions; they are given a score of 1-4 in each category. Our target is that 70% of students will score at least 18 out of 20 possible points.

Findings: Target was not met.

Analysis: In AC 2022-2023, the results measured were 50% of students (1 of 2 students registered for the course) scored 18 out of 20 or higher. The faculty gave feedback to students using the rubric's benchmarks, with particular attention to the mid-term paper, which allowed them to better grasp what they needed to improve in their written communications.

Based on the analysis of the AC 2022-2023 data, the faculty implemented the following changes in AC 2023-2024. The faculty devoted most of a class period near the beginning of the semester to discussing the Unified Rubric for Written Communication and the level of mastery we were expecting them to display by the end of the course. The students continued to struggle with written communications based on the Unified Rubric.

In AC 2023-2024, the results measured were 0% of students (0 of 2 students registered for the course) scored 18 out of 20 or higher.

As a result, in AC 2023-2024, the target was not met.

Decision: Based on the analysis of the AC 2023-2024 results and to drive improvement, in AC 2024-2025 students will receive a report on their progress using the Unified Rubrics for Written Communication at 5 weeks, mid-term, two weeks before the end of the semester, and at the completion of the course. This will be in addition to most of a class period near the beginning of the semester being devoted to discussing the Unified Rubric for Oral and Written Communications and the level of mastery we are expecting them to display by the end of the course. The faculty believe these changes will contribute to greater student success in these areas. The target will remain the same.

SLO 4. Students will demonstrate proficiency in the use of technology for problem-solving and communication.

Course Map: Tied to course syllabus below.

MATH 2110: Analytic Geometry and Calculus II
MATH 4950: Mathematics – A Capstone Course

Measure 4.1. (Direct – Skill/Activity)

MATH 2110 is the second semester of Calculus. The use of technology is integrated into this course. We are in the process of developing a standard instrument to use to assess competence with computer algebra systems and graphing calculators. Our target is that 75% of students will demonstrate competence.

Findings: Target met.

Analysis: In AC 2022-2023, 100% (1 of 1 student registered in this course) demonstrated competence.

Based on the analysis of AC 2022-2023 data, the following changes were made in AC 2023-2024. A new instrument was designed and implemented.

Results collected in AC 2023-2024: The results measured were 100% (Fall 2023, 0 of 0 mathematics majors registered for the class, Spring 2024, 1 of 1 mathematics majors registered for the class) displayed competency. The student still struggled with demonstrating competence in some aspects of computer algebra systems.

As a result, in AC 2023-2024, the target was met.

Decision: Based on the analysis of the AC 2022-2023 results and to drive improvement, the faculty in AC 2024-2025 will administer the instrument at the beginning of the course as well as at the completion. This will allow us to better gauge the effectiveness of the

course at fostering these skills. We will leave our target the same since we have such limited data collected. The faculty believe these changes will contribute to greater student success in these areas.

Measure 4.2. (Direct – Skill/Activity)

All mathematics majors take MATH 4950 either the last or next to last semester before graduation. This class involves an independent research project which culminates in a paper and a public presentation using presentation software. Using the Unified Rubric for evaluating Oral Communications of Mathematical Ideas. Students are evaluated in all five categories: Organization, Central Message, Mathematics, Delivery, and Visual Support; they will be given a score of 1-4 in each category. For this measure, Organization and Visual Support will be used as they cover the technical aspects of the presentation. Our target is that 90% of students will score at least 6 out of 8 and 50% will score at least 7.

Findings: Target was not met.

Analysis: In AC 2022 – 2023, 100% of students (2 of 2 students registered) scored 6 points or better, and 100% of students (2 of 2 students registered) scored 7 or better. The faculty gave all feedback to students using the benchmarks of this rubric to allow them to better grasp what they need to do to improve in the technical aspects of their presentation.

Based on the analysis of the AC 2022-2023 data, the faculty implemented the following changes in AC 2023-2024. The faculty devoted the majority of a class period near the beginning of the semester to discussing the Unified Rubric for Oral Communications and the level of mastery we were expecting them to display by the end of the course. The students still struggled with some technical aspects of their presentation.

Results measured in AC 2023 – 2024 were 67% of students (2 of 3 students registered) scored 6 points or better, and 67% of students (2 of 3 students registered) scored 7 or better.

As a result, in AC 2023-2024, the target was not met.

Decision: Based on the analysis of the AC 2023-2024 results and to drive improvement, the faculty in AC 2024-2025 students will receive a report on their progress using the Unified Rubrics for Oral Communication at 5 weeks, mid-term, two weeks before the end of the semester, and at the completion of the course. This is in addition to most of a class period near the beginning of the semester being devoted to discussing the Unified Rubric for Oral and Written Communications and the level of mastery we are expecting them to display by the end of the course. The faculty believes these changes will contribute to greater student success in these areas. The target will remain the same.

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Measure 4.3. (Direct – Student Artifact)

All mathematics majors take MATH4950 either the last or next to last semester before graduation. This class involves an independent research project which culminates in a paper and a public presentation. Using the unified rubric for evaluating Written Communications of Mathematical Ideas, students were evaluated in all five categories: Context, Organization, Logical Rigor, Thoroughness and Depth, and Conventions; they will be given a score of 1-4 in each category. The categories in our rubric covering the technical aspects of writing are Context and Conventions. Our target is that 70% of students will score at least 6 out of 8 possible points and 50% of students will score 7 or better.

Findings: Target not met.

Analysis: In AC 2022-2023, 67% of students (2 of 3 students registered) scored 6 points or better, and 33% of students (1 of 3 students registered) scored 7 or better. The faculty gave all feedback to students using the benchmarks of this rubric to allow them to better grasp what they needed to improve in the technical aspects of their paper.

Based on the analysis of the AC 2022-2023 data, the faculty implemented the following changes in AC 2023-2024. The faculty devoted most of a class period near the beginning of the semester to discuss the Unified Rubric for Written Mathematics and the level of mastery that was expected by the end of the course. The students still struggled with written communications based on the Unified Rubric.

Results measured in AC 2023-2024 were 50% of students (1 of 2 students registered) scored 6 points or better, and 0% of students (0 of 2 students registered) scored 7 or better.

As a result, in AC 2023-2024, the target was not met.

Decision: Based on the analysis of the AC 2023-2024 results and to drive improvement, the faculty will implement the following changes in AC 2024-2025. The students will receive a report on their progress using the Unified Rubrics for Written Communication at 5 weeks, mid-term, two weeks before the end of the semester, and at the completion of the course. This is in addition to most of a class period near the beginning of the semester being devoted to discussing the Unified Rubric for Oral and Written Communications and the level of mastery we are expecting them to display by the end of the course. The faculty believe these changes will contribute to greater student success in these areas. The target will remain the same.

SLO 5. Students will develop the ability to think in an analytical fashion.

Course Map: Tied to course syllabus below.

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MATH 2080: Fundamentals of Proof
MATH 4950: Mathematics – A Capstone Course

Measure 5.1. (Direct - Skill)

MATH 2080 is the first course in the mathematics major where students are expected to write at length about mathematics. Responses to questions on the final exam in this course will be evaluated regarding whether the student can write about mathematics in a clear and logically rigorous manner. Using the Unified Rubric for evaluating Written Communications of Mathematical Ideas, students are evaluated in the categories of Logical Rigor, Thoroughness and Depth, and Conventions; they will be given a score of 0-2 in each category. Our target is that 90% of students will score 6 out of 6 possible points.

Findings: Target not met.

Analysis: In AC 2022-2023, there were no mathematics majors enrolled in MATH 2080, so no data was collected.

In AC 2023-2024, the instructor decided to return to flipped classroom pedagogy.

In AC 2023-2024, 50% of students (2 of 4 mathematics majors) scored 6 out of 6 possible points.

As a result, in AC 2023-2024, the target was not met.

Decision: Based on the analysis of the AC 2023-2024 results and to drive improvement, the faculty in AC 2024-2025 will give feedback on each of the three regular exams using the Unified Rubric for Written Communication in the Logical Rigor, Thoroughness, and Depth, and Conventions sections. Our targets will remain the same. The faculty believe these changes will contribute to greater student success in these areas.

Measure 5.2. (Direct - Knowledge)

All mathematics majors take MATH 4950 either the last or next to last semester before graduation. This class involves an independent research project which culminates in a paper and a public presentation. Using the Unified Rubric for evaluating Written Communications of Mathematical Ideas, students are evaluated in all five categories: Context, Organization, Logical Rigor, Thoroughness and Depth, and Conventions; they will be given a score of 1-4 in each category. The categories covering analytical thinking are Organization, Logical Rigor, and Thoroughness and Depth. Our target is that 90% of students will score at least 9 out of 12 and 50% will score at least 10.

Findings: Target met.

Analysis: In AC 2022-2023, 100% of students (2 of 2 students registered) scored 9 points or better, and 50% of students (1 of 2 students registered) scored 10 or better.

Based on the analysis of the AC 2021-2022 data, faculty devoted most of a class period near the beginning of the semester to discussing the Unified Rubric for Written Communication and the level of mastery that was expected by the end of the course.

Results measured in AC 2023-2024 were 100% of students (2 of 2 students registered) scored 9 points or better, and 50% of students (1 of 2 students registered) scored 10 or better.

As a result, in AC 2023-2024, the target was met.

Decision: Based on the analysis of the AC 2023-2024 results and to drive improvement, in AC 2024-2025 students will receive a report on their progress using the Unified Rubrics for Written Communication at 5 weeks, mid-term, two weeks before the end of the semester, and at the completion of the course. This will be in addition to most of a class period near the beginning of the semester being devoted to discussing the Unified Rubric for Oral and Written Communications and the level of mastery we are expecting them to display by the end of the course. The faculty believe these changes will contribute to greater student success in these areas. Our target will become 90% of students will score at least 9 out of 12 and 75% will score at least 10.

Comprehensive Summary of Key Evidence of Improvement Based on Analysis of Results. The following reflects all the changes implemented to drive the continuous process of seeking improvement in AC 2023-2024. These changes are based on the knowledge gained through the analysis of AC 2022-2023 results.

- In Measure 1.1, the standardization of topics in MATH 2110 continues to benefit these students, although it is hard to draw conclusions from our very limited data over the last two academic years. Students in MATH 3100 clearly benefited from flipped-classroom pedagogy; the one student who did not meet the secondary target was allowed to take the course while completing its prerequisite to allow him to complete the degree before losing eligibility for financial aid. While that was a laudable reason, the results are less than ideal. Results in MATH 4950 were adversely affected by one student opting to stop participating two weeks before the end of the course. Performances by the remaining students were strong although, as will be seen later in some of the measures that are more granular than this one, their performance was not uniform across all categories.

- In Measure 1.2, the new target was that at least 90% of students will give a response indicating they feel they are capable of contributing to the larger community and at least 75% of students will report strengths appropriate to the research project.

- In Measure 1.3, the assessment was discussed with the students at the beginning of the class, and the assessment was offered during a regular class meeting.
- In Measure 2.1, the faculty implemented the following changes. The faculty dedicated an entire class meeting to discuss the Unified Rubric and its usage in evaluating their work.
- In Measure 2.2, the instructor decided to return to flipped classroom pedagogy.
- In Measure 2.3, the faculty devoted most of a class period near the beginning of the semester to discussing the Unified Rubric for Oral Communications and the level of mastery that was expected to be displayed by the end of the course.
- In Measure 3.1, the faculty devoted most of a class period near the beginning of the semester to discussing the Unified Rubric for Written Mathematics and the level of mastery we are expecting them to display by the end of the course.
- In Measure 3.2, the faculty devoted most of a class period near the beginning of the semester to discussing the Unified Rubric for Written Communication and the level of mastery we were expecting them to display by the end of the course
- In Measure 4.1, A new instrument was designed and implemented.
- In Measure 4.2, the faculty implemented the following changes in AC 2023-2024. The faculty devoted most of a class period near the beginning of the semester to discussing the Unified Rubric for Oral Communications and the level of mastery we were expecting them to display by the end of the course.
- In Measure 4.3, the faculty devoted most of a class period near the beginning of the semester to discussing the Unified Rubric for Written Mathematics and the level of mastery that was expected by the end of the course.
- In Measure 5.1, in Math 2080, the instructor decided to return to flipped classroom pedagogy.
- In Measure 5.2, faculty devoted most of a class period near the beginning of the semester to discussing the Unified Rubric for Written Communication and the level of mastery that was expected by the end of the course.

Plan of Action Moving Forward

- A committee will be established which will conduct a review of prerequisites for all mathematics courses.
- Discussions about “what it means to be a mathematician” and “how we contribute to the mathematical community” will be held at social gatherings such as our Pi Day Celebration.
- Reactivation of our chapter of Kappa Mu Epsilon Mathematics Honor Society will be explored.

- In MATH2110, the instrument for measuring calculator competency will be administered at the beginning as well as at the completion.
- In MATH1010, the Unified Rubric for Oral Communication will be discussed during the class period devoted to creating an appropriate PowerPoint presentation.
- Students in MATH2080 will receive feedback on each presentation and exam using the Unified Rubric for Oral and Written Communication, respectively.
- Students in MATH3100 will receive feedback on each exam using the Unified Rubric for Written Communication.
- Students in MATH4950 will receive a report on their progress using the Unified Rubrics for Oral and Written Communication at 5 weeks, mid-term, two weeks before the end of the semester, and at the completion of the course.
- Test taking strategies for the ETS major field exam will be discussed in MATH4950.