Annual Assessment Report 2022-2023

BS Mathematics

Mathematics & Statistics

College of Science

CONTACT
Name of Program Assessment Lead Stacy A Brown
Name of Person Completing Report Stacy A Brown

DISCIPLINARY ACCREDITATION No

DEVELOPMENT AND DOCUMENTATION OF STUDENT LEARNING OUTCOMES
How were the program's SLOs developed? (select all that apply)
  o   We developed them as a program/department using our own knowledge and expertise of the field.

Other than the [CPP Catalog](#) and the [Office of Assessment and Program Review website](#), where else are your SLOs published? Select all that apply.
- Not currently published

ASSESSMENT ACTIVITIES IN 2022-2023

This section provides the opportunity for programs to share and discuss assessment activities conducted in **AY 2022-2023.** This includes data collection, rubric development, data analysis, discussion of findings, development or implementation of closing the loop improvement strategies, update of your assessment plan and/or curriculum matrix, etc.

How many total SLOs does your program assess according to your assessment plan?
- 2

How many SLOs did your program assess this past year in 2022-2023?

- My program assessed SLOs in AY 2022-2023 (e.g., artifact collection, scoring, closing the loop, etc.). May also have engaged in assessment planning activities unrelated to specific SLOs (e.g., modified curriculum matrix, assessment plan, etc.).

Please list the SLOs examined

- SLO #1: Students will progress from developing and applying procedural/computational mathematics to being able to employ axioms, definitions, logical reasoning, generalization, and abstraction to produce written proofs in a variety of mathematical and statistical areas.
- SLO #5: Students will develop knowledge of and an appreciation for the different theories and theoretical topics in the mathematical and statistical sciences.

Student Learning Outcome (SLO): Students will progress from developing and applying procedural/computational mathematics to being able to employ axioms, definitions, logical reasoning, generalization, and abstraction to produce written proofs in a variety of mathematical and statistical areas.

Assessment Activities	Evidence Used	Evaluation and Interpretation of Evidence
• Created/modified/discussed assessment procedures (e.g., SLOs, curriculum matrix, mechanism to collect student work, rubric, survey, etc.)		
• Collected direct evidence (e.g., student work, exam items, etc.) • Scored direct evidence of student learning • Interpreted and made meaning of findings for direct evidence	• Assignment/exam/paper completed as part of regular coursework	• Used rubric or scoring guide • Scored exams/tests/quizzes
• Discussed assessment results to make program decisions to improve SLO achievement (e.g., design new course, modify assignments, etc.)		
• Investigated other pressing issues related to SLO achievement: Discussion of the results for SLO 1 lead to the decision to form a working group for MAT 3100. The group's aim is to produce tasks for multiply quantified statements that students can work through in order to better prepare for MAT 3140.		

Findings			
N of Artifacts	**Criterion Used**	**Goal Met**	**Eye-opening Result**
16 of 50 (8 from each set of 25)	The evaluation was focused on trends in the data rather than average scores.	Not at this time. However, the department as a whole is seeing a lot of learning gaps among students who took most of the mathematics core during the 2019-2023 school years (i.e., during the COVID pandemic).	We are very concerned about some the basic skills which we weak in the data set. Again, we believe this may be linked to pandemic related learning gaps.

Student Learning Outcome (SLO): Students will develop knowledge of and an appreciation for the different theories and theoretical topics in the mathematical and statistical sciences.

Assessment Activities	Evidence Used	Evaluation and Interpretation of Evidence
• Created/modified/discussed assessment procedures (e.g., SLOs, curriculum matrix, mechanism to collect student work, rubric, survey, etc.)		
• Collected direct evidence (e.g., student work, exam items, etc.) • Scored direct evidence of student learning • Interpreted and made meaning of findings for direct evidence	• Assignment/exam/paper completed as part of regular coursework	• Used rubric or scoring guide • Scored exams/tests/quizzes

Findings			
N of Artifacts	**Criterion Used**	**Goal Met**	**Eye-opening Result**
16 of 50 (8 were randomly selected from each set of 25)	This was our first time using the theoretical reasoning scoring rubric. We were unhappy with the rubric, in terms of the information provided. The question of how to assess theoretical reasoning was brought back to the department.	We are not sure. After scoring with the initial rubric, the scoring team decided the result were not meaningful and that there was a need for greater consensus among department members, regarding the meaning of theoretical reasoning.	The thing the scoring team found most meaningful was our recognition of the difficulties of articulating and scoring theoretical reasoning within the discipline of mathematics.

IMPROVING THROUGH ASSESSMENT

Overall, what best describes how the program used the results in 2022-2023? Select all that apply.

- Assessment procedure changes (SLOs, curriculum matrix, rubrics, evidence collected, sampling, communications with faculty, etc.)
- Course-level changes (e.g., syllabus, content, pedagogy)
- Use is pending (typical reasons: insufficient number of students in population, evidence not evaluated or interpreted yet, faculty discussions are ongoing, etc.)
- Other, please explain: We have decided to create a depository with items for students to review the arithmetic of summations.
- Other, please explain: We have decided to create a working group that will produce MAT 3100-level appropriate tasks for instructors to use when teaching proof techniques for multiply-quantified statements involving mixed quantifiers.

Ideas to improve student learning can come from different constituents. With whom did the program discuss assessment planning and/or share results during AY 2021-2022? Select all that apply.

- Program/department faculty as whole
- A committee of program/department faculty
- Program/department assessment committee
- Other, please explain: Each fall, during a September department meeting, the mathematics and statistics department assessment committee presents the assessment results to the department. It is at this time that we discuss not only the findings but also any closing the loop strategies we might take.
- Other, please explain: There will be several Qualtrics surveys in our department in the coming months to determine the ways in which we (as a community) might assess theoretical reasoning.

The past academic year posed both challenges and opportunities. Please share any assessment discoveries (e.g., insights about assessment procedures, great achievements, etc.) regarding program assessment in 2022-2023 so that others may learn from your experiences.

The primary focus of our assessment work during the 2022-2023 AY was on writing mathematical proofs and on theoretical reasoning. We collected whole class data sets from all sections of MAT 3140. Anonymized the data, assigned numbers to each assessment item, randomly selected items to score and scored the data with a scoring team of four faculty (the assessment committee, a MAT 3140 instructor, and our department chair). The scoring team then met of two occasions to discuss the scoring results. We determined we were less concerned about the overall scores and more concerned about the error-trends in the data. This lead us to bring a discussion to the department regarding: (1) the learning trajectory in our core, for the content related to the identified errors; and (2) other content which may be more important to attend to in future assessments of this course. The department level discuss occurred during a department meeting in September. At that meeting, several faculty volunteered to work together on tasks which could be used in courses that are a pre-requisite for the near-graduation course in which data was collected.

Please share how the program triangulates various data sources to determine student success. Consider assessment findings, CPP's GI2025 markers, CSU Dashboard, CPP's Student Success Dashboard on Tableau, course evaluations, etc.

We are not currently engaging in triangulation practices. Results are scored by the assessment committee and course instructors. Results are reported to the department so that faculty can discuss the extent to which the assessment result resonate with faculty observations of our students in other data sets (HW, exams) and settings (in class, in office hours, etc.).

Does the program offer a certificate or credential (e.g., teaching credential)?

* No

The most current assessment plan and curriculum matrix we have on file for your program may be found here. To ensure we have the most updated assessment plan and curriculum matrix for your program, and for posting on our website, please upload the following documents:

Assessment Plan - Yes

Curriculum Matrix - Yes