

Mathematics Bachelor's of Science

Assessment Report 2020-21

I. SUMMARY OF ASSESSMENT

BS ASSESSMENT

A. BS Program Learning Outcomes (PLO)

Students graduating with a BS degree in Mathematics will be able to:	
PLO 1	Apply the definitions, techniques and theorems of mathematics. (ILO Thinking and Reasoning: Quantitative Reasoning.)
PLO 2	Use mathematics to understand, explain and/or solve problems beyond a particular course.
PLO 3	Creatively conjecture and rigorously write, analyze and critique proofs.
PLO 4	Communicate mathematics effectively. (ILO Communication: Oral Communication.)

B. Program Learning Outcome(S) Assessed

PLO 3	Creatively conjecture and rigorously write, analyze and critique proofs.
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C. Summary of Assessment Process

Instrument(s): The department used a final exam question and a rubric. The rubric was used to score the exam question in the areas of readability, validity and fluency.

Sampling Procedure: The course for this year's assessment was chosen by the department when we created our long term assessment plan. A final exam question was identified as a typical problem for the course that demonstrates the PLO to be assessed.

Sample Characteristics: The course selected is a course required for all majors. The exam question was selected carefully to ensure it included essential course content.

Data Collection: Final exams were accessed via blackboard by the department assessment coordinator. The problem was scored by the assessment coordinator for readability, validity and fluency using the rubric found in Appendix A.

Data Analysis:

Course Assessed:

MATH 330 Analysis I

Math 330, SLO 3/Mastered (Students)

Problem: 8. Prove the strict monotonicity theorem for the decreasing case.

	Missing	Emerging	Developing	Mastering
Readability	10%	0%	20%	70%
Validity	10%	10%	20%	60%
Fluency	10%	10%	40%	40%

These scores indicate 70% of the students have mastered the ability to write a readable solution, 60% mastered and 30% are emerging towards or developing the ability to write a valid proof, and 40% of the students mastered the ability to write a solution with fluency. These scores indicate that most of the students have developed or mastered the ability to write a readable solution about decreasing functions, most of the students have mastered the ability to write a valid solution and 80% of the students have developed or mastered the ability to write a solution with fluency. The department should consider strategies to increase the percentage of students mastering writing a valid and fluent solution. The department should also explore why there is a high percentage of students who could not write a valid solution.

D. Summary of Assessment Results

Main Findings: This year most students performed well at all three levels, yet there was still a high percentage of students who performed poorly. The department needs to find ways to increase performance at all levels.

Recommendations for Program Improvement: The department needs to work on setting and communicating to instructors and students the essential topics for each course and how to include validity and fluency practice throughout the coursework.

Next Step(s) for Closing the Loop: Since there have been three years of semesters at CSUEB now, the department is updating expanded syllabi for semester courses which will include more details regarding course topics, depth of study, grading guidelines, and assessment expectations at the introductory, developing or mastery level for readability, validity and fluency in student work. Professors will be encouraged to share the assessment rubrics with their students.

Other Reflections: The work described above is a huge project. We have guidelines ready but did not have time to do a revisit this past summer since we needed to prepare for a fall of mixed in person and online teaching. We will need to continuously improve our course packets for instructors.

E. Assessment Plans for Next Year

2021-2022

- 1. Which PLO(s) to assess: PLO 4
- 2. Is it aligned to an ILO? Yes
- 3. If yes, list ILO: Communication: Oral Communication
- 4. Course name and number: Math 493 Senior Seminar
- 5. SLO from course : Upon completion of MATH 493 students will be able to communicate mathematics from a variety of areas effectively.
- 6. Assessment activity: A sampling of videos of student presentations will be viewed by the mathematics assessment committee and scored using a rubric.
- 7. Assessment Instrument: Communicating Mathematics Rubric
- 8. How data will be reported: Quantitative
- 9. Responsible person(s) Math Assessment Committee
- 10. Time (which semester(s)): Spring 2022
- 11. Ways of closing the loop: Data will be reported in the Mathematics Department Annual Report and discussed in faculty meetings to continuously improve the program.

Appendix A - Rubric

Draft 05-04-2017

CSU East Bay Mathematics, BS
AY 2020-21

Creating Proofs RVF Rubric – Readability, Validity, Fluency

	Missing (0)	Emerging (1)	Developing (2)	Mastering (3)
Readability	Informal or non-mathematical language is used. There is misuse of notation/symbols.	Some improper mathematical language or notation is used.	Mostly proper mathematical language and notation is used.	Proper mathematical language and notation is used.
Validity	Significantly inaccurate or irrelevant statements in definitions, techniques and/or theorems are present. Important information is missing.	Mostly accurate statements in definitions, techniques and/or theorems are present. May include some irrelevant or unjustified statements.	Statements in definitions, techniques and/or theorems are accurate and relevant.	Statements in definitions, techniques and/or theorems are accurate and relevant and connected/deduced correctly.
Fluency	No coherent flow of ideas Listing facts without a sense of how to link them to obtain or apply a valid definition, technique or proof of a theorem.	Partially coherent and organized, but inconsistent. Appeals to intuition. Some unjustified or improperly justified statements/conclusions in definitions, techniques or proofs of theorems are present.	A correct and essentially complete definition, solution, or proof given. Logic and flow overall sound. Some small gaps in presentation may require “benefit of the doubt.”	A correct and complete definition, solution, or proof given. Elegance or mathematical maturity present.

