

Mathematics Bachelor's of Science

Assessment Report 2018-19

I. SUMMARY OF BS PLO ASSESSMENT

A. Program Learning Outcomes (PLO)

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

B. Program Learning Outcome(S) Assessed

<i>PLO 1</i>	Apply the definitions, techniques and theorems of mathematics.
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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 questions 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 five-year assessment plan. A final exam question was identified as a typical problem for the course that demonstrates the PLO to be assessed. The problem was chosen by the department during one of our monthly department meetings. This discussion was interesting and

useful in that we did not all immediately agree on what is a “typical” final exam question for the course.

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. This selection was done during one of the monthly department meetings.

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

Data Analysis:

Course Assessed:

MATH 320 Abstract Algebra I

Math 320, SLO 1/Mastered (Students)

Problem: Prove H is a subgroup of G

	Missing	Emerging	Developing	Mastering
Readability	0%	11%	26%	63%
Validity	0%	26%	47%	26%
Fluency	0%	26%	26%	47%

These scores indicate 63% of the students have mastered the ability to write a readable proof using a basic definition, 26% mastered and 47% are developing the ability to write a valid proof, and 47% of the students mastered the ability to write a proof with fluency. These scores indicate that most of the students have developed or mastered the ability to write a readable proof about subgroups, most of the students have developed or mastered the ability to write a valid proof and 73% of the students have developed or mastered the ability to write a proof with fluency. The

department should consider strategies to increase the percentage of students mastering writing a valid proof.

D. Summary of Assessment Results

Main Findings: This year students performed well at the readability and fluency level. The departments needs to find ways to increase performance at the validity level. Last year the students performed well at the readability and validity level but needed improvement at the fluency level.

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: The department is creating new 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. Our assessment activity next year will include reassessing more than just one final exam problem to increase the data we use to do our assessment.

Other Reflections: The work described above is a huge project. We have guidelines ready and did a revisit this past summer but we will need to continuously improve our course packets for instructors.

E. Assessment Plans for Next Year

Year 3: 2020-2021	
1. Which PLO(s) to assess	PLO 3
2. Is it aligned to an ILO?	No
3. If yes, list ILO.	
4. Course name and number	MATH 340 Modern Geometry
5. SLO from course	Students who successfully complete MATH 340 Modern Geometry will be able to

	<ol style="list-style-type: none"> 1. Apply the definitions, techniques and theorems of modern geometry. 2. Creatively conjecture and rigorously write, analyze and critique proofs in modern geometry.
6. <i>Assessment activity</i>	Final Exams
7. <i>Assessment Instrument</i>	Re-score final exam questions using the Readability, Validity and Fluency Rubric
8. <i>How data will be reported</i>	Quantitative
9. <i>Responsible person(s)</i>	Kathy Hann, Mathematics EEC representative
10. <i>Time (which semester(s))</i>	Collect exams Fall 2020, rescore and analyze Spring 2021
11. <i>Ways of closing the loop</i>	Data will reported in Mathematics Department Annual Report and discussed in faculty meetings to continuously improve the program.

Appendix A - Rubric

CSU East Bay Mathematics, BS AY 2018_19

PLO 1: Apply the definitions, techniques and theorems of mathematics.

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.