BA/BSMathematics

Annual Program Report Template

Year:	2022-2023
Program:	BA/BSin Mathematics
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Summary of Continuous Improvement Efforts since Last Report

Provide a brief description of how assessment results have been used for program improvement. Point to a specific example of how an assessment provided the program with data it could use for improvement and what that improvement was, if possible, also show evidence of the improvement. You may look at data from the two previous academic years to support this case.

Respond here:

We realized based on 2021-2022 information that we were missing substantial amounts of data due to lack of submission. We revisited efforts at department meetings in Fall 2022 to increase faculty participation and submission of work samples. Getting the correct data is the first step in our continuous improvement process so that can have enough data to analyze and create an action plan. Submissions of work samples from Fall 2022 were significantly higher than in past years, and we have implemented a data storage method to make sure that we can find that information easily for future reporting.

Starting in Fall 2022, samples collected from the examined courses (Math 4325, Math 3322, Math 3350/3351) were graded by the assessment committee instead of the individual instructors. We took the average of two scores for each paper based on the same rubric to better examine the samples gathered. Return rates were higher than in previous years, and so we have a more robust sample to use for comparisons and improvements going forward.

Program Highlights Since Last Report

Identify and briefly discuss any programmatic curriculum changes made since the last report (e.g. new courses, course changes, SLO changes, course deletions).

Respond here:

In Summer 2021 and Fall 2022, all courses were examined and student learning outcomes and course objectives were updated for all courses in response to SACSOOC feedback. These changes are through the college curriculum council and waiting for final approval from the university curriculum council.

During Fall 2022, we reexamined the curriculum being taken by students seeking certification to teach mathematics and have re

Table 1. Assessment Results and Analyses for Current Cycle.

STAGE 1: PLAN				STAGE 2: DO		STAGE 3: STUDY
Departmental Student Learning Goal	Program Student Learning Outcome	Assessment	Assessment Method/Locati on	Benchmark Expectations	Data Results	Actions/ Goals Based on Data Results* What do the data tell you? How will you use this data? How were data from the last cycle used to make changes during this cycle, and What were the results of those changes?
Written Communication	Students should demonstrate growth and self-sufficiency in the proof-writing process.	Two work samples from each of Math 3322, Math 3350/3351, and Math 4325 will be gathered and scored on a rubric measuring to restate the problem, the correctness of the proof, and growth between first and second submissions.	Updated: these samples are graded by the assessment committee, with at least two scores per problem collected. We have also increased outreach to faculty teaching these courses to ensure samples are submitted. The rubric used in Fall 2022 is attached in Appendix A.	At least 80% of mathematics majors should be deemed successful, have at least 50% of mathematics majors be deemed successful with an average score of 7.25 or higher		

the LU QPT free materials developed in the exam. previous year by our department.	and pass the o		students taking this assessment and their scores on the LU Content Proficiency Test.	students seeking teacher certification must take and pass the LU Content Proficiency Test with a score of at least 75%	these exams in AY 2022-2023, there are 5 students who are working on remediation plans during Summer 2023 with Dr. Couch. In 2020, 66% of students passed the LU CPT. In 2021, 0% of students passed the LU CPT exam.	1.
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Table 2. Continuous Improvement Results Since Last Report

Stage 4: ACT

Actions/ Goals Based on Data Results

*Copy last cycle's actions/goals and report on progress toward continuous improvement on those here.

Status

C=Complete P=Progressing N=No Action Taken

Discussion of Status

If C, describe efforts that led to accomplishment of actions/goals.

If P, provide update on progress made toward

	An updated remediation plan has been
	established, with students meeting in a study
	group with Dr. Couch during summer 2023 before
	their next attempt at the exam.
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APPENDIX A: Fall 2022 Rubric

1: Written Communications

Means of Assessment for Outcome 1: Each mathematics major will have a portfolio that will contain, from <u>each</u> of the core courses MATH 3322, MATH 3350, and MATH 4325, a minimum of two graded work samples with written feedback and one proof of reasonable difficulty from the final exam. The department chair will assist in the maintenance of student portfolios. After the graduating senior's portfolio is complete, the department chair will ask the appropriate faculty members to review the student portfolio, using standard rubrics, to ascertain whether growth in this area has been sufficient.

Rationale: A student completing an undergraduate degree in mathematics should demonstrate growth over time in mathematical maturity and self-sufficiency in the proof process.

<u>Decision rule to be used to determine successful performance for Outcome 1</u>: The appropriate faculty members will determine if the candidate has passed or failed. If the candidate achieves an average of 70% on the assessment rubrics, the candidate passes.

Rationale: The experts most able to assess student achievement are those who teach the courses involved.

Proof Rubric

Statement of the problem (5 points is the maximum - 0-2 Unacceptable, 2-

Goals

MATHEMATICS SCORING RUBRIC: A GUIDE TO SCORING EXTENDED-RESPONSE ITEMS

Mimimum passing score is 10 points, including at least 3 points for each column

MATHEMATICAL KNOWLEDGEKnowledge of mathematical principles and concepts which result in a correct solution of a problem. STRATEGIC KNOWLEDGEIdentification and use of important

Score

terminology and notationsØ may contain major algorithmic or computational errors

evidence of a strategy for solving the problem

Means of Assessment for Outcome 3: No less than one-third of the questions of the final examination for the course, MATH 3370 - Introduction to the Theory of Statistical Inference, will include applications of the Central Limit Theorem. At least half of the problems involved will be common problems, developed by the faculty who teach the course.

<u>Decision rule to be used to determine successful performance for Outcome 3</u>: The instructor of record will score the problems for correctness of the final answers.

<u>Target</u>: To be considered proficient in the use of the Central Limit Theorem, each mathematics major who completes this course with a grade of "C" or better, must earn at least 70% of the points available for CLT problems on the final exam for MATH 3370.

<u>Rationale</u>: The Central Limit Theorem is fundamental in both the study of and the applications of statistics. A student completing an undergraduate degree in mathematics she should be able to demonstrate proficiency in solving problems involving this theorem.

APPENDIXB Updated Rubric

Largest changes are highlighted in yellow.

Outcome 1 Written Communications

Means of Assessment for Outcome 1

Each mathematics major will have a portfolio that will contain from <u>each</u> of the core courses (MATH 3322, MATH 3350, MATH 3351, and MATH 4325) a minimum of two graded proofs of reasonable difficulty from exams. There should be a minimum of one month between when the submitted proofs were collected in order to access if the student has shown growth during the semester in their written communications skills and mathematical knowledge.

If a problem submitted has multiple parts please indicate which part is to be scored.

The proofs collected for the portfolio need to be the same proofs for each student in a particular class (they can vary from semester to semester of course) in order for the scoring to be consistent for all students in the class.

The WEAVE committee chair will oversee the collection of the proofs for the student portfolios. In the semester following the collection of the proofs the WEAVE committee chair will call together a working group consisting of instructors who have recent taught the course or recently taught courses with complementary topics to score each proof using the Correctness of Proof rubric (see next page). It is assumed that, in general, there will be a working group for each course in which proofs were collected.

In addition, once proofs from each of the three courses have been collected and scored using the Correctness of Proof rubric the working groups will convene a joint meeting to score each student using the Indication of Growth rubric (see next page).

Rule to be used to determine successful performance for Outcome 1

In order for a student to be deemed have successful performance for Outcome 1 a student should meet the following criteria.

- 1. An average of 6.5 or higher on all the Correctness of Proof scores with no more than two scores at 4 or below.
- 2. A minimum score of 2 on the Indication of Growth rubric.

Goal

At least

9	A correct and complete proof is given.
Excellent	Some irrelevant information may be included since the time limit precludes polishing up the presentation.
7 8	A correct approach to proving the theorem is attempted.
Acceptable	Some statements may be unjustified or improperly justified, but errors are minor and could be fixed given time to polish the proof.
5 6	Statements linked into a reasonable (though perhaps misguided) attempt to prove the theorem.
Marginally Acceptable	The proof may be left incomplete or may depend upon a major unjustified leap.
	Unconnected, mostly true statements properly deduced from the given.
le	Listing facts without sense of how to link them to get a correct proof.
	May just jump to the conclusion without justification.

• A correct approach to proving the theorem is attempted.

7 8 Acceptable

rtfolio. Included should be cover sheet giving the scores

for each of the problems that include applications of the Central Limit Theorem as well as the percentage of the total possible points from the Central Limit Theorem problems that the student achieved.

Rule to be used to determine successful performance for Outcome 3

The instructor of record will score the problems for correctness of the final answers.

Goal

At least 80%

70% of the total possible points

from the Central Limit problems on the Math 3370 final exam.

Rationale

The Central Limit Theorem is fundamental in both the study of and the applications of statistics. A student completing an undergraduate degree in mathematics
should be able to demonstrate
proficiency in solving problems involving this theorem.