Program Assessment Report (PAR)

Mathematics, BA (MTH) Baccalaureate Degree

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ACADEMIC YEAR COVERED BY THIS REPORT: 2020-2021

I. PROGRAM LEARNING OUTCOMES

1. Graduates will be able to solve problems in a broad range of significant Mathematics and Statistics. 2. Graduates will be able to produce and judge the validity of rigorous theoretical arguments. 3. Graduates will be able to communicate mathematical/theoretical ideas and arguments.

II. PROCEDURES USED FOR ASSESSMENT

A. Direct Assessment

An assessment plan containing learning outcomes was designed in the spring of 2019. The 2020-2021 assessment focused on the second learning outcome. The data were collected in December 2021 and was analyzed during the spring 2022 semester. The course selected was MTH 4310. A special assessment was designed to address the learning outcome 2. Graduates will be able to produce and judge the validity of rigorous theoretical arguments. For math majors this is clarified to state At a minimum, each graduating Math major should demonstrate an ability to write clear and correct simple proofs The following criteria was used in the evaluation of students' solutions 1. Correctness Is the solution correct and is the method of solution appropriate? 2. Clarity Are the steps in the solution clearly presented and relevant to the solution? We will expect a 75% success rate for the evaluation based on the above criteria. There are two kinds of basic proofs in the course used for assessing the LO. (a) One is to verify a typical analysis statement, e.g., the definition of convergence of a sequence or continuity of a function. (b) The other is to assume a typical analysis statement and use it to prove another analysis statement. One question was used to assess students proficiency in producing an argument of type (a) and another an argument of type (b). A third question asked students to use a grading rubric to assess the correctness of three proof attempts produced by students in the course. The proof attempts provided were a model solution, one with a good start, and one that was completely incorrect. The assessment was given to

students as a "Quiz" for the course, counting towards their course grade. The assessment is attached to this report. All students' submissions were assessed by the instructor for the course, who shared the grading scheme and the papers with the Undergraduate Committee members.

B. Scoring of Student Work

The instructor used a rubric (attached) for grading and the analysis provided. The rubric and analysis was shared with, and approved by, the Undergraduate Committee.

C. Indirect Assessment

We have started conducting exit interviews during which we have asked students what we could have done differently. Starting with the Spring 2022 graduating class we will add questions asking students to rate their learning of the learning outcome being assessed in that year's cycle.

III. ASSESSMENT RESULTS/INFORMATION:

17 students completed the course. 15 (88%) students produced a correct proof of type (a), 14 (82%) produced a correct proof of type (b), and 13 (76%) students demonstrated proficiency in judging the validity of all three proof attempts.

According to the assessment plan we expect 75% of our graduates to meet the learning outcome. We have met and exceeded this goal.

The difference in how well students' met the benchmark may be due to differences in the pre-requisites for the courses assessed. MTH 4460 students take a sequence of courses designed for future elementary and middle school teachers where the focus is to explain their reasoning. The pre-requisite courses for MTH 3320 and STT 3600 have been identified by program faculty as focusing exclusively on computational skills at the expense of developing mathematical reasoning and communcation skills.

IV. ACTIONS TO IMPROVE STUDENT LEARNING

The Undergraduate Committee conducted and analyzed these results. In the Fall 2022 semester the department will focus a meeting on undergraduate program

assessment. 1. We will discuss using this year's assessment as a model of how to design a special assessment to target a learning objective vs using standard course assessments. 2. We will discuss outcomes of exit interviews from Spring 2022. 3. We will discuss the difficulties of using many of our listed classes for program learning outcome measurement when we have so few students in some of our programs.

V. SUPPORTING DOCUMENTS

Additional documentation, when provided, is stored in the internal Academic Program Assessment of Student Learning SharePoint site.