End of Year Assessment Report for Programs

Program: Mathematics	Semester/year: 2020-2021
Program Director: George Peters	Submission date: 05/20/2021
Year in Operational Plan: 2nd (we adjusted to PO2 because we had to cancel Applied Mathematics)	

Assessment Methods and Benchmarks

Program Objective	Introducing	Developing	Mastering
PO 2: Construct and communicate creative work, including proofs, using the language and symbolism of mathematics.	Course Activity: Sequences and Series Lectures and Homework	Course Activity: Proof writing all semester long in lectures, on homework, and on tests.	Course Activity: Analysis proof writing in Advanced Calc. Geometry proof writing in MATH302
	Benchmark: >= 60% on the Seq. and Series Exam	Benchmark: >= 60% on the proof problems on the final.	Benchmark: >= 60% on the Advanced Calc. final and >= 60% average on the Geometry exams in MATH302.
	Evidence: 100% (2/2)	Evidence: 67% (4/6)	Evidence: 85% (4/4 and 7/9)

*The chart above is merely an example template. Please make sure to edit the chart to reflect your operational plan for the current year

Analysis of Assessment Findings

Overall, 81% (13/16) of our majors met all or all but one of the program objectives for the year. Our target percentage is 75% so we feel pretty good about that. Of the three students who didn't, one was a pretty weak student that just managed to graduate with some retakes, one student with some significant health and family issues for the year, and one student who did well in Advanced Calc but then had a motivation meltdown in Non-Euclidean. I don't feel that we failed as faculty with any of these students in a big way. However, holding them to tighter standards and reaching out more quickly to them when they are not turning things in could help.

Let's write about Calc. II, Linear, Geometry, and Advanced Calc. and proof writing across the curriculum.

(1) What strengths and weaknesses do the findings reveal about the program? Advanced Calc. proofs were a little weak probably due to previous weakness from Linear that we are trying to address. (All passed the Adv. Calc. Objective but we may need to adjust that, see below). This is fortified some by weak proofs at the start of Non-Euclidean Geometry. The communication in the proofs was some of the weakness, even when thinking was stronger. We believe the more intentional writing focus in Linear should help with this. Overall the students are learning to write proofs and communicate them. The rewritten formal proofs in Linear came out well.

(2) What strengths and weaknesses do the findings reveal about the assessment process? We need to look at our thresholds for Objectives in different classes. The threshold in Linear seems possibly a little high (or mis-assessed) and maybe it is a little low in some others like Advanced Calc. The writing for the History paper needs an adjustment through a first draft. We believe that examining each student's yearly objectives met is helpful to us. Looking at our senior data set could be more helpful if we could easily see the proceeding years' senior data.

(3) What impact have program changes in recent years had on student learning (indicate those program changes that resulted from previous assessment findings)? We added some writing to Linear for Writing Intensive requirements and due to weaknesses seen in classwork and shown in FCARs. These changes should be helpful. This was the first year. We will try and track writing as these students move forward.

(4) What impact have recent changes in the assessment process had on the quality and usefulness of the findings? Of particular importance to note are recent changes and improvements in the program that resulted from previous assessment efforts. We moved from trying to assess all departmental objectives every year to focusing on one per year. We are still trying to see how this plays out.

Sharing and Discussion of Assessment Findings

Describe how assessment findings are typically shared and discussed among program faculty and other stakeholders. In particular, make clear the process for analyzing assessment findings and using them to make improvements in the program and/or the assessment process.

Use of Assessment Findings for Program Improvement (Action Plan)

(A) Describe any changes in
(1) the program: We have decided to do drafts on the History paper in MATH302 to improve the writing product and experience. We have decided in MATH312 to have the first drafts come in earlier of the formal written proof.
(2) the assessment process: We will start putting the senior evaluations from previous years into the assessment worksheet for the year. That will give us a sense of performance over time. We will also make the MATH312 assessment include the formal proof.

(B) Briefly summarize the status of the previous years' or semester's action plans. Are they complete, still being implemented, on hold, or some other status?
Changes to Numerical Analysis have to wait until the spring of 2022 since it is taught every 2 years.
The changes to the computational assessment of MATH218 did not happen this year as I would have liked COVID made it a bit harder to do (meeting with students about their spreadsheet work) but other work that could have happened just didn't. I hope to make some changes this upcoming fall.
The changes to the MATH115 : Andy reduced the group sizes to groups of three but thinks pairs would still be better. Group work was awkward through COVID. In 2 years when he teaches again he will do pairs. He did make an excel tutorial video and uploaded it to D2L. Over half the class watched it. The results were better this time then last. The first time was a difficult situation with the birth of Andy's first child happening at the time of the project. So we will continue to track to see if improvement is due to changes.
The writing of problems for Differential Equations, Multivariable Calculus, and Calculus II for when I (George) teach them is basically complete. It has made grading so much better and forced student engagement with the material. Andy's continued use of quizzes is working well for him and students. We believe the combination is showing students the importance of understanding the material in preparation for the tests and not just copying things to get them done. It has improved our personal morale.
(C) At next end of year we will be able to look at our changes to MATH312 and see if the assessment is more reasonable when including the paper. We will also have the MATH218 numerical assignments to consider how that went. We will have to wait an extra year for the History papers in draft form. Those should see significant improvement in the grades due to having a draft (helping with performance but also instruction following).
(D) We are not making any programmatic changes this year. ½ the department was on sabbatical this year.
(E) Indicate your plans to make your program more experiential in the coming year? We will provide an increased emphasis on finding good summer research experiences both here and at other institutions. We will try and get students thinking about and applying for summer research experiences starting in the fall rather than the winter. I have an offer from some grads that work at U.S. national laboratory to come talk to students in the fall. We continue to look for ways to increase computer programming exposure for our students, which is experiential and practical. We will try a more experiential project in MATH301 in the spring.

Supporting Documents

FCARS for MATH116, MATH302, MATH312, & MATH317. The 2021 assessment spreadsheet for the Mathematics Department.