UNIT REPORT Mathematics BA/BS Assessment Plan Summary

Mathematics BA/BS

Deliver A Lower-Level Curriculum With Appropriate Discipline Specific Skill Sets

Goal Description:

The curriculum will provide freshman and sophomore students with opportunities to develop the skills typically required of professionals in the area of study.

RELATED ITEMS/ELEMENTS- - - -

RELATED ITEM LEVEL 1

Foundation Areas - Differential Calculus Learning Objective Description:

MATH 1420 (Calculus I): Students will demonstrate the following knowledge and skills: differentiation of standard mathematical functions, application of the Fundamental Theorem of Calculus to the evaluation of integrals, and using calculus techniques to solve optimization problems.

RELATED ITEM LEVEL 2

Course Assessment - Mth142

Indicator Description:

All students enrolled in the program are required to complete Mth 142. Students will be administered a final exam developed and approved by the department faculty. The exam will require them to demonstrate the knowledge and skills mentioned in the objective.

Findings Description:

This course assessment requires updating. (The course has not been called MTH 142 in several years.... it was updated to MATH 1420 in Fall 2011.)

In the past the instructors of each section of MATH 1420 (Calculus I), in order to assess student learning outcomes, would place three common questions on each final exam. The pass/fail rates for each problem were compiled and recorded.

These pass/fail rates provided little data in regards to the student learning outcomes in calculus. Some instructors did not require the final exam of all students (rather, it was optional in order to replace a lower exam grade). This consequently resulted in the "better" students -- those who had earned higher grades on exams during the semester -- not taking the final exam, resulting in lower than actual performance on the common final exam problems.

The student performance on the common problems was rather static.... we were essentially reporting the same scores each year; while these scores weren't awfully low, they were typical for a 1000-level calculus class at a comprehensive state institution such as SHSU. In short, the data we collected each semester didn't help us do a better job in the classroom. It is for these reasons we have decided to no longer use this particular course assessment.

Deliver An Upper-Level Curriculum With Appropriate Discipline Specific Knowledge Goal Description:

The curriculum will address the discipline specific knowledge dictated by professional societies and/or professionals in the workforce for upperlevel instruction in mathematics.

RELATED ITEMS/ELEMENTS -----

RELATED ITEM LEVEL 1

Advanced Areas For Majors Learning Objective Description:

Students preparing to graduate will demonstrate advanced mathematics knowledge and skills.

RELATED ITEM LEVEL 2

Euclidean Geometry Project - Math3363

Indicator Description:

Students will complete a project on the role of proof and technology in communicating mathematics.

Criterion Description:

At the end of the semester, 70% of the students submitting their project will receive a rating of 8 out of 10 or better according to the attached rubric.

Findings Description:

Because of the small size of the section of MATH 3363 in Spring 2016, data was not collected in support of this criterion.

RELATED ITEM LEVEL 3

MATH 3363

Action Description:

Because of the small class size, no data was collected from the project in MATH 3363. Next year we anticipate a larger class size, so we will collect data in Spring 2017.

Improve Communication Between Department And Its Majors

Goal Description:

Communicate to our mathematics majors more and better information pertaining to internships, research opportunities, scholarships. etc.

RELATED ITEMS/ELEMENTS -----

RELATED ITEM LEVEL 1

Improve Communication Between Department And Mathematics Majors

Performance Objective Description:

Communicate to our mathematics majors more and better information pertaining to internships, research opportunities, scholarships. etc.

RELATED ITEM LEVEL 2

Improving Communication

KPI Description:

A meeting was held, hosted by the Chair, in early Spring. All math majors were invited. News from the department was announced, and invitations to apply to REUs the following summer were extended.

Results Description:

One success we saw from this year's meeting was two students accepted to summer REU programs. These are very competitive summer research programs (similar to a paid internship) into which our students rarely are accepted. So any summer one student is accepted is considered successful.

RELATED ITEM LEVEL 3

Improving Communication Action Description:

We will continue to hold annual (or at least every other year) meetings of all majors and minors.

Update to Previous Cycle's Plan for Continuous Improvement

Previous Cycle's Plan For Continuous Improvement (Do Not Modify):

The undergraduate mathematics program has several ideas for improvement. These include, but are not limited to, the following:

1. Continue to apply for external (usually federal) funding to improve the quality of our undergraduate offerings. In particular, summer bridge programs have been shown to increase the preparation of math and chemistry students. We are very interested in adapting existing, successful programs to our curriculum. Another example is encouraging the further use of Inquiry-Based Learning (IBL) in our upper-level classrooms, as well as in other disciplines on campus. IBL has been shown to be successful with particular groups of mathematics students (women, minority students, and relatively underprepared students).

2. Designing a 5-year combined BS/MS program in mathematics for motivated, talented first year students. This will not only help us graduate more students with a higher earnings potential and less student debt, it will force us to market our program more effectively (or at all).

3. Continuing to encourage and foster research with undergraduate students. We will offer for the first time in Spring 2016 a course (MATH 4395) in which students perform a semester-long research project (along with discipline-specific professional development activities) with a faculty mentor. Students have regularly in the past done research at this level, but for the first time we have in place a system for them to receive credit towards their degree.

Update of Progress to the Previous Cycle's PCI:

Progress on last cycle's plan:

1. Three grant proposals to the NSF were submitted in 2016.

-- a \$3 million proposal was submitted in January which would (1.) improve student preparation for first- and second-year math and chemistry courses, (2.) encourage the use of innovative teaching methods in STEM courses, and (3.) incorporate research at the undergraduate level in all STEM disciplines, particularly with transfer students. This proposal is pending as of September 2016.

-- a \$1 million scholarship and mentoring grant was submitted in May (and declined by NSF later that summer).

-- a \$400,000 REU proposal was submitted in August and is pending as of September 2016.

2. A committee was formed to propose a 5-year BS/MS degree plan. This committee met with representatives from Lamar University, whose math department has a similar program. We will submit a proposal for a degree plan in February.

3. Spring 2017 will be the first offering of MATH 4395.

Plan for Continuous Improvement

Closing Summary:

The first course any student takes in the BS/BA degree plans is differential calculus (MATH 1420). It is the first encounter we have with our math majors and minors.

There are several ways for a student to satisfy prerequisites for this course: MATH 1410 (here), MATH 1314+1316 (here), MATH 1314+1316+2314 (at 2-yr school), high school calculus... we don't have a firm understanding of how well students are prepared for calculus, and which pathways are or are not effective.

We hired a Lecturer (in a 2-year probationary role) to assess these calculus prerequisite pathways. Spring and Summer 2017 will be spent collecting and analyzing data on performance in 1420 based on type of prerequisite obtained. This will be very useful in assessing our precalculus courses.