Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Mathematics BA / BS

Goal

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

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

Objective (L)

Foundation Areas - Differential Calculus

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.

Indicator

Course Assessment - MATH 1430

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.

Criterion

Optimization Using Calculus Techniques

On the final exam, 70% of the students will use appropriate calculus techniques to solve an optimization problem.

Finding

Results From 2015 -- Optimization

Only 50% of respondents to an optimization problem on a set of final exams submitted a correct response. This is not acceptable. One set of exams had an admittedly difficult optimization problem on it.... but a success rate of less than one half is not acceptable to the department. The mathematicians in the department (16 of 30) will meet in Fall 2015 to discuss a plan of action.

Criterion

Differentiation Of Mathematical Functions

On the final exam, 70% of the students will provide the correct derivative for a given mathematical function.

Finding

Results From 2015 -- Differentiation

Students traditionally have less of a problem with computational exercices such as finding derivatives than with conceptual problems such as optimization. It is therefore not surprosing that 77% of our students correctly computed the derivative of a selected function. With more than 2/3 of the course devoted to computing derivatives, most students should be familiar with the various techniques and rules of differentiation.

Criterion

Fundamental Theorem Of Calculus

On the final exam, 70% of the students will correctly use the Fundamental Theorem of Calculus to evaluate a given integral.

Finding

Results From 2015 -- FTC

On the Spring 2015 final exams, 59% of respondents correctly completed the problem on the fundamental theorem of calculus. This is a topic covered at or near the very end of the semester.... so it should be fresh on the mind of students.

However, we have found that many students often have final exams during the last week or even the last two weeks of classes... a problem that is not only a violation of academic policy, but more often than not distracts students from providing their full attention to their other courses at the end of the semester.

We are not as alarmed about the lower than expected performance on this topic, for the simple reason that the material is reviewed during the first week of Calculus II (MATH 1430). But we will discuss the low success rate during Fall 2015.

There are no actions for this objective.

Goal

Improve Communication Between Department And Its Majors

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

Objective (P)

Improve Communication Between Department And Mathematics Majors

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

Action

Improving Communication / marketing

One weakness mathematicans (and most scientists?) have is a lack of willingness or skill in marteting ourselves and our disciplines. We often find it difficult to convince students to study mathematics: if they like it, they will continue studying it; if they don't then they probably shouldn't continue their studies.

But this is a disservice to our particular group of students: those from familes with no or few college graduates, and little career guidance in inaccessible fields such as mathematics.

In Fall 2016 we are beginning to meet with Jana Richie from the university's marketing office. They are going to help us advertise the successes of our program, identify our weaknesses, and recruit area high school and transfer students. While we have the desire and willingness to find and recruit new students, we lack the expertise or the means to do so. Hopefully, this will help us not only attract

more students to our degree program, but also help our existing students find better careers once they earn their degree in mathematics.

Goal

Deliver An Upper-Level Curriculum With Appropriate Discipline Specific Knowledge

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

Objective (L)

Advanced Areas For Majors

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

Indicator

Euclidean Geometry Project - Math3363

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

Criterion

Project Assessment

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.

Finding

Results From 2015 -- 3363

Because of low enrollment in this course, a report of this finding was not conducted in Spring 2015.

There are no actions for this objective.

Previous Cycle's "Plan for Continuous Improvement"

We have plans to apply for 3 different NSF grants: two interdisciplinary STEM-centered projects that will improve our STEM course offerings, and one research grant (PI: J. Wang).

We will hire two new faculty members, in the hopes of increasing our breadth of our graduate and advanced undergraduate course and research offerings. We also hope to find new colleagues that have interests in community outreach and the development of a STEM center on our campus (one of the goals of the NSF grants mentioned above).

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

We hired two new mathematicians, both with considerable experience teaching at the undergraduate level.

One of our new hires (Dr. Daniel Wang) fills a speficic need in our analysis group. In his first two years he will teach both our year-long undergraduate analysis sequence (a pair of courses tradiatially reported by our students as the most difficult of our curriculum) and our year-long graduate sequence. Dr. Wang has been trained in the technique of inquiry-based (student-centered) learning, and we plan on his expertise in this area to be influential in retaining our upper-level mathematics majors.

Dr Candice Price was also hired with several years experience in the classroom. An applied topologist (specifically DNA topology), Dr. Price will surely prove to be transformative to our mathematics program. She has received external funding from the NSF, and is already planning on submitting additional proposals.

In January 2016 we will submit a $2-3 million NSF grant to establish a STEM-center on campus, increasing retention and quality of math, chemistry, biology and engineering technology majors. In addition, the department will support a proposal to the Howard Hughes Medical Institute proposal submitted by a member of the Department of Biological Sciences. Obtaining external funding remains a priority of the department.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

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 undergradute 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.