Assessment Reporting
Spring 2009 – Spring 2010

PROGRAM INFORMATION

Degree Program(s):	BA/BS Mathematics	**Department:**	Mathematics
Department Chair:	Brad Jackson	**Phone:**	924-5173
Report Prepared by:	Brad Jackson/Julie Sliva	**Phone:**	924-5120
Next Self-Study due :	Next external review Fall 2013	**E-mail:**	Jackson@math.sjsu.edu

Schedule of Planned Assessment Activities

In 2008-2009, an external review of the Math Department was performed by Dr. Sheldon Axler, Dean of the College of Science at San Francisco State University.
In 2009-2010, the math department has been discussing Dr. Axler's suggestions and trying to figure out what we want to do about them. We plan to have our next external review in Fall 2013.
In Fall 2010, data will be collected to analyze student performance regarding Goals 2 relating the effective communication skills of students in our BA/BS programs. This data will be discussed in Spring 2011. Any necessary changes will be implemented as soon as possible after that.
In Fall 2011, data will be collected to analyze student performance regarding Goals 1,3 relating the effective proof-writing skills and computational skills of the students in our BA/BS programs. This data will be discussed in Spring 2012. Any necessary changes will be implemented as soon as possible after that.
In Fall 2012, data will be collected to analyze student performance regarding Goals 4,5 relating the effective modeling skills and technology skills of the students in our BA/BS programs. This data will be discussed in Spring 2013. Any necessary changes will be implemented as soon as possible after that.

The Math Department has the following baccalaureate degrees, a BA Math, and a BA Math Preparation for Teaching. Our BS Applied and Computational Mathematics with three different emphases has been changed to a BS Applied Mathematics with three different concentrations, a Concentration in Economics and Actuarial Science, a Concentration in Statistics, and a Concentration in Applied and Computational Mathematics, effective Fall 2011. This year we are discussing what changes, if any, should made in the assessment plan for the BS degree because of this change.

Several changes have been made to the math curriculum this year to improve its effectiveness in helping math majors achieve the various learning objectives we have set for our BA/BS programs. Workshops were added to Math 31 Calculus II this fall. Last year workshops were added to Math 19 Precalculus and Math 30/30P Calculus I. These workshops have greatly increased the passing rates for students who are required to take calculus, which in addition to math majors, includes engineering majors and other science majors. Before workshops were implemented the passing rate in Math 19 Precalculus was about 60%, the passing rate in Math 30/30P Calculus I was about 65%, and the passing rate in Math 31 Calculus II was about 60%. In Fall 2009 the workshops have increased the passing rates to about 75% in Precalculus, about 80% in Calculus I, and about 70% in Calculus II. In the calculus sequence students are first introduced to some of the standard mathematical computations, which they are expected to learn in **Goal 3 The Ability to Perform Standard Mathematical Computations.**

Also several new courses have been added to the math curriculum to help both Biology majors and Math majors understand the interaction between mathematics and biology. These courses are Math 60 Calculus for Biological Sciences (to be first taught in Fall 2010), Math 160 Statistics for Biological Sciences (to be first taught in Spring 2011), a new variant of Math 178 Mathematical Modeling which will concentrate on mathematical models related to Biology (to be first taught in Spring 2011), as well as an experimental course for Math/Biology majors which will explain techniques for analyzing data obtained from microarrays. The effective use of mathematical modeling is something that students are expected to learn in **Goal 4 The Ability to Use Mathematical Models to Solve Practical Problems.**

Program Information

Degree Program(s):	BA/BS Mathematics	**Department:**	Mathematics
Department Chair:	Bradley Jackson	**Phone:**	408-924-5173
Report Prepared by:	Bradley Jackson	**Phone:**	408-924-5173

Student Learning Outcome (SLO)

Implementation of workshops is most closely related to Goal 3 The Ability to Perform Standard Mathematical Computations.
Implementation of new Math/Bio courses is most closely related to Goal 4 The Ability to Use Mathematical Models to Solve Practical Problems.

Evidence for Need:

Based on anecdotal information and course grades (Table # 1) from fall 2006 and 2007 the pass rates in the pre-calculus course (Math 19) was lower than the department desired. Additionally, increasing the passing rates in pre-calculus was mentioned as desirable goal in our last external review.

Table 1. Percentage of Students Passing the Pre-calculus Course

Grade	Fall 2006	Fall 2007	Fall 2008
A or B/	33%	36%	43%
Passing	60%	63%	70%

What actions were taken to improve student learning related to this outcome (e.g., program changes, changes in pedagogy, process changes, resources requests, etc)?

To improve student performance in pre-calculus, the math department added a supplemental instruction workshop for the course. The workshop (Math 19W) has students work in small groups on pre-calculus and calculus problems in order to build skill and confidence in problem solving. Workshops are facilitated by upper division and graduate students, who are chosen, trained, and supervised by the workshop coordinator Dr. Mohammed Saleem.

Evidence for Impact:

The student pass rates and grades improved in fall of 2008 from the previous semesters in which data was collected. (Table #1) In fall 2008 students who took and passed the workshop had a pass rate of 75%. (Table #2) Students who did not take or did not pass Math 19W had a pass rate of only 35%.

Table 2. Percentage of Workshop (Math 19W) Students Passing Pre-calculus Fall 2008

Grade	Cr Math 19W	No Cr Math 19W
A or B/ Math 19	47%	17%
Passing Math 19	75%	35%

This year (2009-2010), in addition to the pre-calculus workshop, the Math Department is adding workshops to Calculus courses in order to increase student performance in these important gateway courses for mathematicians, scientists, and engineers. Workshops for Calculus I were added in spring 2009 and workshops for Calculus II will be added in fall 2009.

In Fall 2009 the workshops increased the passing rates to about 75% in Precalculus, about 80% in Calculus I, and about 70% in Calculus II. In the calculus sequence students are first introduced to some of the standard mathematical computations, which they are expected to learn in Goal 3 The Ability to Perform Standard Mathematical Computations.

Learning Objectives

Outcomes - BA Mathematics & BA Mathematics - Preparation for Teaching
Goals 1-4

Outcomes - BS Applied and Computational Mathematics
Goals 2-5

Goal 1 The Ability to Use and Construct Logical Arguments
The ability to reason logically to conclusions, including the ability to use precise definitions and to use various forms of logical argument.

Specific Learning Objectives to be assessed:

1. Ability to give direct proofs
2. Ability to give proofs by contradiction
3. Ability to give proofs by mathematical induction
4. Ability to apply definitions to give proofs
5. Ability to give proofs and disproofs involving quantified statements

Goal 2 The Ability to Communicate Mathematics Effectively
The ability to read mathematics with understanding and to communicate mathematical ideas with clarity and coherence.

Specific Learning Objectives to be assessed:

1. Ability to state a problem accurately, articulate assumptions, and describe a method of solution
2. Ability to conduct independent investigation of mathematical concepts at the undergraduate level
3. Ability to give written reports and oral presentations that include mathematical context which is mathematically accurate, yet accessible to classmates

Goal 3 The Ability to Perform Standard Mathematical Computations

Specific Learning Objectives to be assessed:

1. Ability to evaluate limits
2. Ability to calculate derivatives and integrals
3. Ability to apply properties of algebraic and transcendental functions

Goal 4 The Ability to Use Technology to Solve Mathematical Problems

Specific Learning Objectives to be assessed:

1. Ability to write programs to solve mathematical problems
2. Ability to use a mathematical programming environment such as MATLAB or Maple
3. Ability to interpret numerical results 4. Ability to understand that there are limits to numerical accuracy

Goal 5 The Ability to Use Mathematical Models to Solve Practical Problems

Specific Learning Objectives to be assessed:

1. Ability to extract relevant information from a practical problem and give a mathematical formulation of the problem
2. Ability to use numerical results to validate (or modify) a model and to understand the limitation of a model
3. Ability to clearly describe models, including an analysis of the strengths and weaknesses of models and their relationship to the underlying problem