

**Core Assessment Matrix (CAM)
TEMPLATE**

UNIVERSITY OF SAN FRANCISCO

Core Area: Math

Spring 2007

(1) Student Learning Outcomes	(2) Measurement of Evidence	(3) Summary Results	(4) Assessment Informed Improvements
Determine whether a problem lends itself to a mathematical* solution, and, if so, design a mathematical solution.	In-class examinations (2), quizzes (4), and statistical worksheets (2) require students to analyze and apply necessary computations.	Students who completed homework and studied for the exams and quizzes earned passing grades on both exams and quizzes. Students who did not complete homework or study for tests did not earn passing grades.	I provided students with more opportunity to complete problems and apply statistical solutions with my guidance.
Implement the design or identify and correct problems with the design.	In-class examinations (2), quizzes (4), and statistical worksheets (2) require students to analyze and apply necessary computations.	Students who completed homework and studied for the exams and quizzes earned passing grades on both exams and quizzes. Students who did not complete homework or study for tests did not earn passing grades	I provided students with more opportunity to complete problems and apply statistical solutions with my guidance.
Evaluate the validity of a solution and its relevance to the original problem using reasoned discourse as the norm for decision-making.	n-class examinations (2), quizzes (4), and statistical worksheets (2) require students to analyze and apply necessary computations.	Students who completed homework and studied for the exams and quizzes earned passing grades on both exams and quizzes. Students who did not complete homework or study for tests did not earn passing grades	I provided students with more opportunity to complete problems and apply statistical solutions with my guidance.

Additional evidence that the general core learning outcomes are being met:

(1) Student Learning Outcomes	(2) Measurement of Evidence	(3) Summary Results	Action Plans	(4) Assessment Informed Improvements
<p>Determine whether a problem lends itself to a mathematical* solution, and, if so, design a mathematical solution.</p>	<p>This learning outcome was satisfied throughout the course on two levels: students examined both theoretical and applied mathematics problems. Theoretical mathematics problems may be ill-posed, or require refinement. Applied mathematics problems require critical study of why certain techniques have efficacy in some contexts, but not in others. Through exploration of theoretical and applied mathematics problems students learned to determine whether a problem lends itself to a mathematical solution, and, if so, design a mathematical solution. (It was assessed by written examination.)</p>	<p>Almost all of the students performed adequately.</p>	<p>The instructor will continue coverage of both theoretical and applied mathematics problems.</p>	<p>To date, the instructor has not attempted group (or seminar style) discussion—brainstorming—in this course. Such may be of aid in fulfilling this learning outcome.</p>
<p>Implement the design or identify and correct problems with the design.</p>	<p>This course covered a range of procedures from precalculus. Given the variety of techniques under review, selecting the right technique for a particular problem was itself a challenge. While some assigned problems were simple drills, others were extensive exercises. The latter often required use of several methods concurrently. By being asked to identify correct approaches to a variety of problems, students learned how to implement the design or identify and correct problems with the design. (It was assessed by written examination.)</p>	<p>About 95% of the students performed adequately on the given exams.</p>	<p>The instructor will continue coverage of elaborate applied mathematics problems that can only be solved through application of several theoretical techniques.</p>	<p>To date, the instructor has not attempted group (or seminar style) problem solving in this course. Such may be of aid in fulfilling this learning outcome.</p>

(1) Student Learning Outcomes	(2) Measurement of Evidence	(3) Summary Results	Action Plans	(4) Assessment Informed Improvements
Evaluate the validity of a solution and its relevance to the original problem using reasoned discourse as the norm for decision-making.	Students were asked to solve problems of applied mathematics. Inherent in the solution of such is the relevance of "mathematical models" to the real world. By solving problems of this type, students learned to critically examine the practical utility of theoretical techniques. In doing so, students learned to evaluate the validity of solutions and their relevance to original problems. (It was assessed by written examination.)	Almost all of the students performed adequately.	The instructor will continue coverage of mathematical modeling.	To date, the instructor has not required students to make class presentations of their work. Such may be useful in fulfilling this learning outcome. By being required to defend a mathematical model, students may come to have a better understanding of the mathematical modeling process.

* In the outcomes "mathematical" can mean one or more of "algebraic," "algorithmic," "statistical," "numerical," or "computational."

ADDITIONAL EVIDENCE THAT THE GENERAL CORE LEARNING OUTCOMES ARE BEING MET:

Students reported a general increase in their mastery of mathematical theory as well as the ability to formulate solutions to practical problems.

EVIDENCE THAT COURSE SUPPORTED THE MISSION OF THE UNIVERSITY (Offer the “*...knowledge and skills needed to succeed as persons and professionals, and the values and sensitivity necessary to be men and women for others*”):

This course specifically filled math prerequisites for two undergraduate programs:

- Architecture and Community Design
- Dual Degree in Teacher Preparation (Multiple Subject).

To this extent, the course was essential for adequate preparation towards students’ professional goals.

Student Learning Outcomes Included in My Syllabus:

Upon completion of the course, the student will be able to:

- Compute the appropriate descriptive statistics, measures of central tendency and dispersion, for a given data set
- Calculate and correctly interpret probabilities, especially those related to hypothesis testing
- Graph frequency distributions using the spreadsheet program Excel
- Compute the appropriate data analysis using SPSS
- Use parametric statistics to test hypotheses based on group differences
- Use nonparametric statistics to test hypotheses about distribution differences
- Compute correlations and linear regression analyses

Student Learning Outcomes:

1. Determine whether a problem lends itself to a mathematical solution, and, if so, design a mathematical solution.

Measure of Evidence:

Rigorous problems on three in-class exams and one in-class final exam that require: analysis of the problem, computation necessary to complete the problem and appropriate statistical conclusions (i.e., NOT multiple choice). Extensive homework problems also were required. Students also completed a tutorial on using a software statistical program.

Summary Results:

Students who studied for the exams and complete the required homework earned passing grades on the rigorous exams. Those who did not, did not earn passing grades. Additionally, students successfully analyzed data presented in novel problems, using SPSS (software package).

Assessment Informed Improvements:

I provided more in-class problems and demonstrations relative to the lectures; this allowed students to practice new concepts and apply conceptual learning concepts to novel problems.

2. Implement the design or identify and correct problems with the design.

Measure of Evidence:

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Determine whether a problem lends itself to a mathematical* solution, and, if so, design a mathematical solution.	students write programs in several different environments, including Python, Flash, and the LEGO Mindstorms environment	Students are given a specific set of tasks to accomplish. Their programs are graded and critiqued by the professor or TA. Robot programs are also iteratively demonstrated in class.	
Implement the design or identify and correct problems with the design.	Students write and improve programs using the tools described above.	see above.	above: discussion of design before coding is critical. Iterative refinement and step-by-step concept introduction is critical.
Evaluate the validity of a solution and its relevance to the original problem using reasoned discourse as the norm for decision-making.	Programs are tested, refined, and improved.	Students are asked to test their programs and determine reasons why it might not work correctly.	More detailed discussion of debugging would be helpful.

Additional evidence that the general core learning outcomes are being met:

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Implement the design or identify and correct problems with the design.	-On weekly homework assignments, students must implement methods of solving problems that were learned in class -Students must follow through with their chosen solution on the midterms and exams	- 94% of students received an average homework grade of C or higher - See exam results above	The students who tended to speak up were mostly those who had stronger mathematical skills; they can be utilized to help the others in group work
Evaluate the validity of a solution and its relevance to the original problem using reasoned discourse as the norm for decision-making.	-Students are asked in class and on assignments to interpret a solution within the context of the proposed problem -Students must explain verbally in class as well as in writing how the results of a statistical test may be used to support or discredit a statistical claim	Again, often the same few students respond in class, but homework and exam results demonstrate general class understanding. - See homework and exam results above	More group work and class activities

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Additional evidence that the general core learning outcomes are being met: Students are presented with and must solve statistical problems that deal with many varied applications, such as in politics (polling, elections), the medical field (experimentation), and psychology/sociology (opinion surveys). In that way, students learned how to interpret statistical findings that they will likely encounter in a number of professions and daily activities.

Technology is utilized in the form of Excel spreadsheets to better organize and display data.

Students are trained throughout the semester to present written mathematical solutions in a clear, organized manner. Definite improvement was observed in my students' abilities to present clear written explanations of statistical processes and results.

The assistance of an assigned class tutor from the Learning and Writing Center, and my continuous support of the tutor and of her efforts to help the class, has motivated a couple of my top students to want to be tutors in order to help other students in statistics courses.

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