Mathematics Department  
Southeastern Oklahoma State University

Assessment Plan  
Updated September, 2011

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Mathematics Program
Southeastern Oklahoma State University

Assessment Plan
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A. Departmental Mission Statement

The mission of the Mathematics Department at Southeastern Oklahoma State University is to prepare students to become teachers of mathematics, to enter graduate programs in the field of mathematics, to secure positions in business and government that require preparation in mathematics, and to satisfy the individual’s curiosity concerning the patterns of thought found within the body of mathematics. The programs in the Mathematics Department are based upon the philosophy that the study and application of mathematics requires the cultivating of thought processes and intellectual attitudes that are important and useful to all students in all academic disciplines. In keeping with this philosophy, the Mathematics Department provides courses for other academic programs and courses designed to fulfill general education requirements.

B. Departmental Vision Statement

The Mathematics Department at Southeastern Oklahoma State University will be the leading mathematics department for quality mathematics education among regional universities in Oklahoma and northern Texas.

C. Statement for Assessment and Student Learning

The Mathematics Department at Southeastern Oklahoma State University believes that assessment fundamentally contributes to student learning and that it is useful in all academic disciplines and extracurricular activities. The Mathematics Department will make appropriate changes to the Mathematics program as needed to ensure optimal student learning based on assessment results. In addition to curricular matters, assessment will also be used for program review, budgeting and planning and it will provide useful information to guide continuous program improvement.

D. Program Goals and Objectives

The goals or objectives of the Mathematics Program are to prepare mathematics majors at Southeastern Oklahoma State University (1) to enter graduate programs in the mathematical sciences; (2) to secure positions in business and government that require preparation in mathematics; and (3) to advance intellectual development concerning the patterns of thought found within the body of mathematics. These goals are realized through specific program outcomes as listed below.
E. Major Program Outcomes

A student completing a B.S. degree in Mathematics shall be able to:

1. Demonstrate a comprehension of calculus techniques and concepts.

2. Use mathematical reasoning to write valid, complete, well-expressed proofs.

3. Demonstrate a comprehension of concepts in linear and abstract algebra.

4. Connect different areas in mathematics, use several steps of reasoning, or absorb and apply new concepts readily.

5. Apply mathematical concepts to other disciplines.

6. Evaluate and utilize appropriate technology in solving mathematical problems.

7. Manifest oral and written communication skills in the presentation of mathematical topics.

8. Obtain a job utilizing their degree or be admitted to graduate school.

F. New to This Year's Report

New assessment instruments or anything different from the outlines of previous reports will be listed here.

G. List of Assessment Tools

Below is a list of the assessment tools used in this report, followed by the section in this report in which the analysis occurs.

1. ETS Exam Calculus Indicator: H.1a.
2. GRE or ETS Practice Exam: H.1b and H.3b.
5. ETS Exam Nonroutine Indicator: H.4a.
H. Assessment of Each Objective and Outcome

1. Comprehension of calculus

Objective #1 is *Demonstrate a comprehension of calculus techniques and concepts*. This objective is assessed via the following instruments.

a) ETS Exam Calculus Indicator

Each student majoring in Mathematics is required to take the ETS Major Field Achievement Examination in Mathematics. It is administered to all seniors in the Senior Seminar course. Scores are compared to national averages.

b) GRE or ETS Practice Exam

Students majoring in Mathematics are required to take a Graduate Record Examination (GRE) or Educational Testing Service (ETS) practice exam, which contains specific questions to test students’ comprehension of calculus techniques and concepts. The exam is given in the Senior Seminar course.

Questions on the version of the practice exam given in the course are representative of material covered in the standard 10 hour calculus sequence taken by Mathematics majors at Southeastern.

2. Proof-writing

Objective #2 is *Use mathematical reasoning to write valid, complete, well-expressed proofs*. This objective is assessed via the following instruments.

a) Proof Analyses

Students who take and pass Math 3283 – Foundations of Mathematics are expected to be able to construct and express mathematical proofs. The three fundamental areas of focus for proofs are logical correctness, mathematical completeness and verbal expression.

Proofs are evaluated and graded on a 5 point scale for each of these three fundamental areas. Each student who has passed Foundations of Mathematics will have proofs analyzed from this course. A student will be determined to be competent in their ability to construct and express proofs if at least one of the randomly chosen proofs receives, at minimum, a score of 12 out of 15, with the requirement that no one area (logical correctness, mathematical completeness, and
Verbal expression) receive a score less than 3. Thus, there will be no averaging of results used in the assessment. If a particular student does not meet the criteria for competency in the Foundations Course, they will be evaluated in each course for which Foundations is a requirement until one of the following two outcomes has occurred: The first outcome is that the student meets the criteria for competency in the proof making process. In this case, the student will be classified as competent in the overall analysis. The second outcome is that the student graduates without receiving a passing evaluation on any of the proofs examined in the subsequent courses. In this case, the student will be classified as not competent in the overall analysis. This method of determination of competency, together with the choice of using all students who have passed Foundations, will give an accurate assessment of our ability as a department to teach students the concepts required for them to construct and express mathematical proofs.

3. Linear and abstract algebra

Objective #3 is *Demonstrate a comprehension of concepts in linear and abstract algebra*. This objective is assessed via the following instruments.

a) ETS Exam Algebra Indicator

Each student majoring in Mathematics is required to take the ETS Major Field Achievement Examination in Mathematics. It is administered to all seniors in Senior Seminar course. Scores are compared to national averages.

b) GRE/ETS Practice Exam

This was the fourth year in which each student majoring in Mathematics was required to take a Graduate Record Examination (GRE) or Educational Testing Service (ETS) practice exam, which contains specific questions to test students’ comprehension of abstract and linear algebra. The exam is given in the Senior Seminar course.

4. Connect areas, use several steps, or apply new concepts

Objective #4 is *Connect different areas in mathematics, use several steps of reasoning, or absorb and apply new concepts readily*. This objective is assessed via the following instruments.

a) ETS Exam Nonroutine Indicator

Each student majoring in Mathematics is required to take the ETS Major Field Achievement Examination in Mathematics. It is administered to all seniors in Senior Seminar course. Scores are compared to national averages. Group assessment for forming connections, using several steps of reasoning, or applying new definitions or concepts is reported by the ETS.

Approximately 25 percent of the ETS Major Field Test in Mathematics has to do with questions based on the Nonroutine Assessment Indicator, which “includes all items that are
considered insightful”. (ETS website) It also “includes items that require several steps of reasoning and items that require either the use of several definitions or a ‘new’ definition which the student would not be expected to know. Some questions may require bringing techniques from two or more areas to bear on one problem, e.g., treating functions from calculus as elements of an algebraic system.” (ETS Website)

5. Apply mathematical concepts

Objective #5 is Apply mathematical concepts to other disciplines. This objective is assessed via the following instruments.

a) ETS Exam Applied Indicator

Each student majoring in Mathematics is required to take the ETS Major Field Achievement Examination in Mathematics. It is administered to all seniors in Senior Seminar course. Scores are compared to national averages.

Approximately 20% of the ETS Field Test in Mathematics has to do with questions based on the Applied Assessment Indicator, which includes all “real world” problems but not those that use one area of mathematics to solve a problem in another area of mathematics.

b) National Competitions

Participation and performance in national contests such as the Mathematical Contest in Modeling (COMAP) or the Putnam exam are examined and evaluated.

6. Technology

Objective #6 is Evaluate and utilize appropriate technology in solving mathematical problems. This objective is assessed via the following instrument.

a) Senior Seminar Presentations

We realize that class grades cannot provide a complete assessment of any outcome, and so in Spring 2009 we implemented a new assessment instrument to assess students’ abilities to evaluate and utilize appropriate technology in solving math problems. We decided to analyze the projects assigned in Senior Seminar. These projects are not required to utilize technology in any way. Rather, we ask the following questions about each of the projects: (1) Could technology have been used to enhance the solution to a math problem in the research project? (2) Did the student use appropriate technology in the solution to a math problem in their research?
7. Communication in presentation of mathematics

Objective #7 is *Manifest oral and written communication skills in the presentation of mathematical topics.* This objective is assessed via the following instruments.

**a) Senior Seminar Project**

Each student in Senior Seminar is assigned a research project with a written component and an oral presentation component. A mathematics faculty member *not teaching the course* evaluates the project for this assessment report.

8. Obtain a job

Objective #8 is *Obtain a job utilizing their degree or be admitted to graduate school.* This objective is assessed via the following instruments.

**a) Alumni Data**

Records are kept for graduates of the Mathematics program. These records are used to evaluate whether our graduates obtain a job utilizing their degree or are admitted to graduate school.

I. Program Faculty

Program faculty will be listed here.

J. Faculty Level of Involvement in Assessment Process

All faculty members in the Mathematics Department will be involved in the collecting and analyzing of data and in the writing and proofreading of the assessment report. In addition to the editing and proofreading of the entire document, specific responsibilities will be listed in the report. Responsibilities change annually depending on who is teaching Senior Seminar.

K. Constituents and Stakeholders

The constituents and stakeholders relevant to the Mathematics Program will be listed, and how the program communicates with those will be demonstrated.
L. Assessing IETV and/or Web-Based Instruction

There are no IETV or web-based or hybrid courses offered in the Mathematics Program. Some mathematics courses are offered online, but these are not in the Mathematics Program. Most of these courses are assessed in the Mathematics Department's General Education Assessment Report.

M. Strengths and Weaknesses of the Program

Strengths and weaknesses of the program will be noted and backed up by assessment results.

N. How Modifications are to be Made

When assessment results indicate a need for a change in the Mathematics Program, the Mathematics Department as a whole will meet and discuss what changes are needed. Appropriate changes will be made and forwarded to the necessary entities for final approval (e.g. the Curriculum Committee, Board of Regents, etc.). These changes will allow the department to improve the Mathematics Program, plan for the future, and request budget modifications as necessary based on assessment results. Additionally, assessment will sometimes occur in other ways. For example, an individual instructor may make changes in their course based on their own personal experience. Also, modifications in the assessment plan will occur annually, as assessment reports are reviewed by faculty and the Institutional Assessment Committee (IAC). Modifications in the assessment plan will be the direct result of assessment reports from the previous years, or suggestions from the IAC or the Director of Assessment.

O. Effectiveness of Previous Modifications

Effectiveness of previous modifications will be analyzed and backed up by assessment results.

P. Modifications to be Made to the Program or the Assessment Plan

Future modifications will be listed in the annual report.

Q. Signatures

The report will be signed by the Chair of Mathematics and the Dean of Arts & Sciences.