

# DEPARTMENTAL PLAN FOR ASSESSMENT OF STUDENT LEARNING

**Department: Mathematics**

**Programs: BS, MS, MEd**

## Mission Statement

The Mathematics Department provides training of graduate and undergraduate students, conducts research, and provides academic support to the University. The primary mission of the undergraduate mathematics program is to insure that mathematics majors receive:

- a solid introduction to the wide diversity of topics that make up the field of mathematics,
- preparation for mathematically oriented careers in industry, government, and education,
- preparation for entrance into graduate programs in mathematics and related areas.

In addition to serving mathematics majors, a large proportion of departmental resources is allocated to providing academic support to the University and its Colleges. This support primarily takes the form of offering service and interdisciplinary courses designed to meet the needs of students in aviation, business, education, engineering, the humanities, the arts, and the sciences. The Mathematics Department also provides mathematical and statistical consulting to faculty and students across UND as well as to others in the state and region.

## Introductory Statement

The Mathematics Department assesses each of our student learning goals for majors at least once every three years. The departmental Assessment Committee is charged with the task of interpreting the data and reporting to the Chair of the Department. When these reports indicate problems, the Chair may recommend either that changes be made or that a deeper assessment be performed. The department will not collect new data on a particular program during program review years. Instead, the department will carefully consider the results of the last two assessment cycles as part of their program review and consequent strategic planning. For general education goals, this pause for reflection occurs at the time of general education revalidation.

## BS in Mathematics

**Student Learning Goal 1:** *Every mathematics major will be proficient in the elementary computational techniques usually taught in Precalculus and Calculus.*

**Assessment:** Calculus I provides students with an opportunity to synthesize the material they have learned in precalculus courses and to apply precalculus techniques in a new setting. Questions will be embedded into final exams in Calculus I to specifically test mastery of precalculus techniques. Similarly, Differential Equations provides an opportunity for students to synthesize the material they encountered in three semesters of calculus and to apply that material to new kinds of problems. We will embed questions into Differential Equations final exams to specifically test mastery of calculus techniques. In addition, the department will keep track of the success rates of our majors in Calculus I and Differential Equations as an indirect check on their mastery of these computational techniques.

**Responsibility:** The Assessment Committee is responsible for designing and scoring embedded questions. It will make a recommendation to the Chair regarding the need for any deeper assessment. The Chair is responsible for acting on the report as well as for reporting the results to the Dean, Provost, and other interested parties outside the department.

**Timing:** Data will be collected every third year.

**Student Learning Goal 2:** *Every mathematics major will develop an appreciation for the importance of proof in mathematics, knowledge of what constitutes a mathematical proof, and the ability to understand and construct elementary proofs.*

Objective 2.1: Students will be able to read and understand elementary proofs.

Objective 2.2: Students will be able to write elementary proofs.

Objective 2.3: Students will realize when a proof is called for.

**Assessment:** Instructors will provide samples of student solutions to relevant exam problems or other work in Set Theory and Logic as well as courses in any of the pure mathematics sequences.

**Responsibility:** The Assessment Committee will score these solutions according to a rubric developed by the department and report its findings to the Chair. The Chair is responsible for acting on the report as well as for reporting the results to the Dean, Provost, and other interested parties outside the department.

**Timing:** Data will be collected every third year.

**Student Learning Goal 3:** *Every mathematics major will develop an appreciation for the central role that examples play in mathematics.*

Objective 3.1: Students will develop a repertoire of useful examples.

Objective 3.2: Students will realize when an example is called for.

**Assessment:** Instructors in our upper division sequences will provide samples of student solutions to exam problems or other work calling for students to develop or explain examples.

**Responsibility:** The Assessment Committee will score these solutions according to a rubric developed by the department and report their findings to the Chair. The Chair is responsible for acting on the report as well as for reporting the results to the Dean, Provost, and other interested parties outside the department.

**Timing:** Data will be collected every third year.

**Student Learning Goal 4:** *Every mathematics major will develop an awareness of the broad applicability of mathematics and be exposed to some areas of mathematics that are obviously applicable.*

**Assessment:** The primary purpose of this goal is to ensure that all mathematics majors are exposed to applicable mathematics. This occurs in Calculus and Differential Equations. To be sure that this is happening, instructors of these courses will be surveyed about the applications they talked about in their sections. We are continuing to search for a relatively unobtrusive way to collect meaningful student input regarding this goal. Possibilities include developing questions to be added to the Student Assessment of Teaching form or beginning to interview graduating seniors before they leave.

**Responsibility:** The Assessment Committee will collect the data and report its findings to the Chair. The Chair is responsible for acting on the report as well as for reporting the results to the Dean, Provost, and other interested parties outside the department.

**Timing:** Data will be collected every third year.

**Student Learning Goal 5:** *Every mathematics major will develop an appreciation for the beauty of mathematics as an independent discipline and be exposed to some areas of mathematics that are not obviously applicable.*

**Assessment:** This is a requirement that every mathematics major be exposed to abstract mathematics. We offer a wide variety of courses that satisfy this requirement. The primary assessment will be to determine whether or not all of our majors complete a core of such courses. We are continuing to search for a relatively unobtrusive way to collect meaningful student input regarding this goal. Possibilities include developing questions to be added to the Student Assessment of Teaching form or beginning to interview graduating seniors before they leave.

**Responsibility:** The Assessment Committee will collect the data and report its findings to the Chair. The Chair is responsible for acting on the report as well as for reporting the results to the Dean, Provost, and other interested parties outside the department.

**Timing:** Data will be collected every third year.

Student Learning Goal 6: *Every mathematics major will develop an appreciation for the complexity and subtlety of mathematics.*

Assessment: We are continuing to search for a relatively unobtrusive way to collect meaningful student input regarding this goal. Possibilities include developing questions to be added to the Student Assessment of Teaching form or beginning to interview graduating seniors before they leave.

## General Education

The Mathematics Department offers six courses that students may use to satisfy part of their General Education requirements: College Algebra, Trigonometry, Intro to Mathematical Thought, Applied Calculus I, Calculus I, and Calculus II. All of these courses help students to think critically and to make informed choices, which are among UND's General Education Goals.

Assessment: We use embedded questions on final exams as a major portion of our assessment in each of these courses. The questions are specifically designed to determine whether or not students are meeting our general education goals. We also use the appropriate general education questions on the Student Evaluation of Teaching form to measure student impressions of the success of our general education courses.

Responsibility: The Assessment Committee will use a rubric developed by the department to score the embedded questions. They will use the results, together with indirect data from student evaluations, to make a recommendation as to whether or not the course is satisfying our general education goals. The Chair is responsible for acting on the report as well as for reporting the results to the Dean, Provost, and other interested parties outside the department.

Timing: Data will be collected every third semester.

## MS/MEd

Student Learning Goal 1(a): *Every student in the MS program in mathematics will develop an understanding of at least two areas of modern mathematics.*

Student Learning Goal 1(b): *Every student in the MEd program in mathematics will develop an understanding of at least one area of modern mathematics as well as an understanding of the teaching and learning of mathematics.*

Assessment: Each student is required to pass a comprehensive examination over two major area(s) of mathematics.

Responsibility: The Chair is responsible for acting on the report as well as for reporting the results to the Dean, Provost, and other interested parties outside the department.

Timing: Data will be collected annually.

Student Learning Goal 2: *Every graduate student in mathematics will develop the ability to independently learn significant mathematics, and to communicate what they learn to others.*

Assessment: An independent study project or thesis is required of every student.

Responsibility: The Chair is responsible for acting on the report as well as for reporting the results to the Dean, Provost, and other interested parties outside the department.

Timing: Data will be collected annually.