

Mathematics Department Assessment Plan
College of Liberal Arts and Sciences
Park University

Mission Statement

The mission of the Mathematics Department of Park University is to challenge our students by setting high academic standards, providing excellence in teaching to enable them to meet those standards, and preparing them for careers in science, business, and teaching.

This mission statement is consistent with and supportive of the mission and vision statements of the School for Natural and Applied Sciences, the College of Liberal Arts and Sciences, and the University.

Academic Goals

The Department sets five goals for students who major in mathematics. These are as follows:

- Students will have sufficient mathematical knowledge to pursue their personal and professional life goals.
- Students will be prepared to study mathematics or mathematics-based disciplines at the graduate level.
- Students will be able to see, appreciate, and utilize mathematical constructs in other fields such as chemistry, biology, and computer science.
- Students will have the capacity to apply rational and creative thought to other disciplines.
- Students will have the ability to recognize patterns and other abstract relationships.

Program Competencies

The Department sets six program competencies to be achieved by every student who graduates from Park University with a B.A. degree/major in mathematics. These six competencies and how they are to be achieved and assessed are discussed below. In general, each competency is achieved by passing the indicated mathematics courses, including the capstone course, MA 450, Seminar in Mathematics. Assessment of the specific competencies is tested through the Department Exit Exam.

1. **The student will demonstrate the ability to read, present, utilize, and explain orally or in writing, fundamental concepts of mathematics.** The courses that provide the background for this ability are the calculus sequence, MA 210, MA 211, MA 212, and MA 213, as well

as four upper level courses: MA 301, MA 311, MA 312, and the capstone course, MA 450. Specifically, the student will know the definitions of a limit, of a derivative, of an antiderivative, and the Riemann sum of a definite integral, and explain the quadratic formula. The student will also be able to state and briefly explain (but not necessarily prove) the Fundamental Theorems of Arithmetic, of Algebra, and of Calculus.

2. **The student will analyze and model given abstract mathematical structures.** The courses that support this competency are MA 301, MA 311, MA 312, and MA 450. Specifically, students will demonstrate knowledge of logic, of groups, rings, and fields, of vector spaces, and of set theory.
3. **The student will demonstrate the ability to abstract, generalize, and apply specific mathematical concepts.** The courses that support this competency are the calculus sequence, MA 210 through MA 213, MA 305, MA 301, MA 311, MA 312, and MA 450. MA 302 is optional. Specific kinds of problems that the student should be able to solve are ones of optimization, related rates, classical probability, systems of linear equations, lengths, areas, and volumes by integration, and problems of graphing functions.
4. **The student will exhibit an awareness of the beauty, diversity, and rich interconnectedness of the various branches of mathematics.** Courses supporting this competency are MA 360 and MA 450. Specifically, MA 450 will contain a unit on the three classic construction problems of ancient Greece.
5. **The student will construct clear, logical, coherent, and correct proofs using various strategies and techniques and evaluate proofs of others by the same criteria.** The courses that support this competency are MA 301, MA 311, MA 312, and MA 450. MA 401 is optional. The student will demonstrate skills of proving through direct proof, through induction, by the use of contradiction, by the use of the contrapositive, by cases, by the “pigeonhole” method, by logical tautology, and by using the definition of set equality.
6. **The student will be aware of appropriate technology (including paper and pencil) to solve mathematical problems and to present, display, communicate, or create mathematical ideas.** MA 450 will devote time to the introduction of appropriate software and hardware.

Assessment of Program Competencies.

The language of mathematics is a sophisticated system of written symbols. As such, the most direct way to assess a student's understanding of a mathematical concept or skill is to provide him the opportunity to express what he or she knows using the symbol system and written and/or spoken English. Virtually every mathematics course offered at Park University requires the student to complete one or more tests, an assessment where there are known correct answers or solutions to exercises and problems. Such a simple instrument, the paper-and-pencil test, is the most direct, efficient, and accurate means to determine just what a student knows. MA 350, History of Mathematics, or similar courses, may more properly assess a student's understanding by a student's written paper about historical events or ideas.

The courses are the building blocks of the competencies described above. Passing the required courses is the first step along the path toward demonstrating a competency in mathematics. MA 450, Seminar in Mathematics, is the culminating course for the mathematics major. MA 450 provides the opportunity for the student to display a deeper and more sophisticated understanding of concepts presented in earlier courses. The final exam of 450 is designed to explicitly test for the achievement of the six program competencies described above.