INTRODUCTION:
The Master of Arts Program in Mathematics was established in 2002. Classes in this program were first offered in fall 2003.

The primary purpose of the program is to prepare students to teach mathematics at the secondary school and junior/community college levels. The program also provides advanced degree credentials for teachers who wish to take on supervisory positions in mathematics or in mathematics administration.

GENERAL REQUIREMENTS:
All pertinent regulations set forth in the Graduate Studies Bulletin and the Bulletin of the College of Natural Sciences and Mathematics must be observed. The student must consult the departmental Director of Graduate Studies prior to beginning his/her graduate program so that proper records may be established within the department.

It is the student's responsibility to be informed about current degree requirements. It is the joint responsibility of the student and the student’s advisor to maintain communications and to track the student’s progress toward meeting those requirements.

FORMAT:
All of the courses in the program are offered online, and the entire program can be completed in that format. It is also be possible to take approved on-campus courses as alternatives to online courses.

There is a regular schedule of online classes each semester, including the summer sessions. As a result, there is little difficulty in combining a full-time teaching position with the program’s course work.

PREREQUISITES FOR ADMISSION:
To be admitted to the program, a student must have completed a bachelor’s degree with a 3.0 GPA over the last 60 hours of all course work and should have a good background in mathematics. A student need not have majored in mathematics to be admitted. However, it is expected that the student has completed a standard 3-semester calculus sequence and has had at least 9 semester hours of mathematics at the junior or senior level, preferably in courses such as abstract algebra, linear algebra, advanced calculus, differential equations, or geometry.

The Graduate Record Examination (GRE) is required for admission.

BASIC PROGRAM DESCRIPTION:
The program requires 33 semester hours of course work with at least 24 semester hours at the 5000 level or above, and including:
- A minimum of 21 semester hours in mathematics with at least 15 semester hours at the 5000 level or above.
- A 3-semester hour Master’s tutorial.
- A maximum of 9 semester hours of approved elective course work.
COURSES:

MATH 5310: HISTORY OF MATHEMATICS. Prerequisites: Three semesters of calculus, or consent of instructor. Mathematics of the ancient world, classical Greek mathematics, the development of calculus, notable mathematicians and their accomplishments.

MATH 5330: ABSTRACT ALGEBRA. Prerequisites: Three semesters of calculus, or consent of instructor. The theory of groups is used to discuss the most important concepts and constructions in abstract algebra.

MATH 5331: LINEAR ALGEBRA WITH APPLICATIONS. Prerequisites: Three semesters of calculus, or consent of instructor. Systems of linear equations, matrices, vector spaces, linear independence and linear dependence, determinants, eigenvalues; applications of the linear algebra concepts will be illustrated by a variety of projects.

MATH 5332: DIFFERENTIAL EQUATIONS. Prerequisites: MATH 5331 or consent of instructor. Linear and nonlinear systems of ordinary differential equations; existence, uniqueness and stability of solutions; initial value problems; higher dimensional systems; Laplace transforms. Theory and applications illustrated by computer assignments and by projects.

MATH 5333: ANALYSIS. Prerequisites: Three semesters of calculus, or consent of instructor. A survey of the concepts of limit, continuity, differentiation and integration for functions of one variable and functions of several variables; selected applications are used to motivate and to illustrate the concepts.

MATH 5334: COMPLEX ANALYSIS. Prerequisites: MATH 5333 or consent of instructor. Complex numbers, holomorphic functions, the Cauchy theorem and the Cauchy integral formula, the calculus of residues.


MATH 5337: MODELS OF COMPUTATION. Prerequisites: Three semesters of calculus, or consent of instructor. The algebra of Boolean functions, logic gates, languages and grammars, finite state machines, the Kleene algebra of regular sets, Turing machines and the halting problem.

MATH 5341: MATHEMATICAL MODELING. Prerequisites: Three semesters of calculus or consent of instructor. Proportionality and geometric similarity, empirical modeling with multiple regression, discrete dynamical systems, differential equations, simulation and optimization. Computing assignments require only common spreadsheet software and VBA programming.
MATH 5344: SCIENTIFIC COMPUTING WITH EXCEL. Prerequisites: Three semesters of calculus or consent of instructor. Scientific computing includes numerical integration and numerical solution of systems of equations. The computational aspect of the course will require the use of Excel and VBA programming.

MATH 5347: TECHNOLOGY ON MATHEMATICAL INSTRUCTION. Prerequisites: Three semesters of calculus or consent of instructor. Technology and software for symbolic, graphical, and numerical computation in the mathematics classroom.

MATH 5350: INTRODUCTION TO DIFFERENTIAL GEOMETRY. Prerequisites: Three semesters of calculus, or consent of instructor. Multi-variable calculus, linear algebra, and ordinary differential equations are used to study the geometry of curves and surfaces in 3-space. Topics include: Curves in the plane and in 3-space, curvature, Frenet frame, surfaces in 3-space, the first and second fundamental form, curvature of surfaces, Gauss’s theorem egregium, and minimal surfaces.

MATH 5379: AXIOMATIC GEOMETRY. Prerequisites: Three semesters of calculus, or consent of instructor. A review of the axiomatic approach to Euclidean Geometry and an introduction to non-Euclidean Geometries. Some finite geometries, Hyperbolic Geometry and Spherical Geometry are introduced. A student version of The Geometer’s Sketchpad is required for the homework assignments.

MATH 5382: PROBABILITY. Prerequisites: Three semesters of calculus and one semester of linear algebra, or consent of instructor. Sample spaces, events and axioms of probability; basic discrete and continuous distributions and their relationships; Markov chains, Poisson processes and renewal processes; applications.

MATH 5383: NUMBER THEORY. Prerequisite: Three semesters of calculus, or consent of instructor. Divisibility and factorization, linear Diophantine equations, congruences and applications, solving linear congruences, primes of special forms, the Chinese remainder theorem, multiplicative orders, the Euler function, primitive roots, quadratic congruences, representation problems and continued fractions.

MATH 5385: STATISTICS. Prerequisites: Three semesters of calculus, or consent of instructor. Data collection and types of data, descriptive statistics, probability, estimation, model assessment, regression, analysis of categorical data, analysis of variance. Computing assignments using a prescribed software package (e.g., EXCEL, Minitab) will be given.

MATH 5386: REGRESSION AND LINEAR MODELS. Prerequisites: Three semesters of calculus, one semester of linear algebra, and MATH 5385, or consent of instructor. Simple and multiple linear regression, linear models, inferences from the normal error model, regression diagnostics and robust regression, computing assignments with Matlab, R, Minitab, or SAS.

MATH 5389: SURVEY OF UNDERGRADUATE MATHEMATICS: Prerequisites: Three semesters of calculus, or consent of instructor. A review and consolidation of
undergraduate courses in linear algebra, differential equations, analysis, probability, and abstract algebra. Students may not receive credit for both MATH 4389 and MATH 5389.

Course Groups:

I. Algebra Courses

MATH 5330: Abstract Algebra
MATH 5331: Linear Algebra
MATH 5336: Discrete Mathematics
MATH 5383: Number Theory

II. Analysis Courses

MATH 5333: Analysis
MATH 5350: Introduction to Differential Geometry
MATH 5334: Complex Analysis

III. Probability & Statistics

MATH 5382: Probability
MATH 5385: Statistics
MATH 5386: Regression Analysis

IV. Applied Mathematics

MATH 5332: Differential Equations
MATH 5337: Models of Computation
MATH 5341: Mathematical Modeling
MATH 5347: Technology in Mathematics Classes
MATH 5344: Scientific Computing with Excel

V. Other Courses

MATH 5310: History of Mathematics
MATH 5379: Axiomatic Geometry
MATH 5389: Survey of Mathematics

SPECIFIC REQUIREMENTS FOR THE DEGREE:
The program requires 33 semester hours of course work with at least 24 semester hours at the 5000 level or above, and including:

- A minimum of 21 semester hours in mathematics with at least 15 semester hours at the 5000 level or above.
- Completion of at least one course in each of the groups: Algebra, Analysis, Probability & Statistics, and Applied Mathematics.
• A 3-semester hour Master’s tutorial.
• A maximum of 9 semester hours of approved elective course work.

COMPLETION OF THE PROGRAM:
The Department of Mathematics typically offers four or five of these courses each semester during the academic year, and at least four courses during the summer sessions. It is possible to complete the program in two years by taking two courses each semester for two academic years and one course in the corresponding summer session.