Mathematical Sciences Graduate Course Descriptions

COURSE DESCRIPTIONS

MTSC-500. FOUNDATIONS OF MATHEMATICS 3:3:0
This course is specifically designed to bridge undergraduate and graduate study in mathematics. It is an introduction to abstract ideas, proofs, set theory, relations, and number systems and their connections.

Prerequisites: MTSC-252.

Credit, three hours.

MTSC-503. MATHEMATICS TEACHING METHODS I 3:3:0
This course is the first of a two (2) part sequence designed to provide weighty consideration of some of the major topics in middle and secondary school mathematics education. Emphasis will be on epistemological, pedagogical, social, psychological, effective teaching, classroom management, and cultural concerns as well as the teaching profession. This course is also a study of methods and materials used in teaching mathematics and will expose students to current educational theory and reform organizations. Through research, practice, and presentations, students will take an active role in the instruction and development of materials for this course.

Prerequisites: MTSC-252, MTSC-313, MTSC-341, MTSC-241 and MTSC-203.

Credit, three hours.

MTSC-504. MODERN GEOMETRY 3:3:0
The course covers Menelaus and Ceva's Theorem, Cross Ratio, Elementary Transformations, Euclidean Constructions, and Non-Euclidean Geometry. The course illustrates to the students the strength of deductive reasoning in proofs involving Euclidean axioms and transformation theory. The student will also be familiar with Non-Euclidean Geometry.

Prerequisites: MTSC-303 with minimum grade of .C..

Credit, three hours.

MTSC-505. MATHEMATICAL LOGIC 3:3:0
The course is designed to examine the logical foundations of mathematics. Formal systems are shown to model real life relationships, and these formal systems are studied and analyzed using mathematical methods and rigor. The results of the study show both the inherent limitation of reasoning and at the same time the richness of what can be expressed and proven.

Prerequisites: MTSC-251, MTSC-313.

Credit, three hours.

MTSC-511. INTRODUCTION TO ABSTRACT ALGEBRA 3:3:0
The course is concerned with the basic theory of some of the important algebraic systems such as groups, rings and fields with emphasis on homomorphism, isomorphism, integral domain, extension fields, and Galois groups.

Credit, three hours.

MTSC-521. GENERAL TOPOLOGY 3:3:0
The purpose of the course is to give the students the basic concepts of topology and lead them to algebraic topology.

The course also presents as a related discipline to the proper understanding of various branches of analysis and geometry. The students should become familiar with topological spaces, point-set topology and homotopy theory.

Prerequisites: MTSC-451, MTSC-452.

Credit, three hours.

MTSC-531. NUMBER THEORY 3:3:0
The course, Number Theory, is an introduction to the study of basic properties of integers which allows one to demonstrate how various areas of mathematics play a role in the study of properties of natural numbers. The course is flexible and fundamental enough to be taken by Math and Math Ed Majors.

Credit, three hours.

MTSC-541. ADVANCED PROBABILITY THEORY 3:3:0
The course covers the mathematical structure of probability theory with applications of the theory from a wide variety of experimental situations.

Prerequisites: MTSC-253 with a minimum grade of .C..

Credit, three hours.

MTSC-551. ORDINARY DIFFERENTIAL EQUATIONS 3:3:0
The purpose of the course is to present techniques of solving ordinary differential equations. The students should become familiar with Boundary Value Problems, Systems of Ordinary Differential Equations, Phase Diagrams, and Stability.

Prerequisites: MTSC-351.

Credit, three hours.

MTSC-561. REAL ANALYSIS I 3:3:0
The purpose of the course is to cover the basic material that every graduate should know in the classical theory of functions of a real variable and in measure and integration theory. To provide the students with the background in those parts of modern mathematics which have their roots in the classical theory of functions of a real variable. These include the classical theory of functions of a real variable itself, measure and integration, point-set topology, and the theory of normed linear space.

Prerequisites: MTSC-402 with a minimum grade of .C., or its equivalent.

Credit, three hours.

MTSC-562. REAL ANALYSIS II 3:3:0
This course is the extension of real analysis I. The purpose of the course is to further provide students the background of modern mathematics. The course is to cover the theories of (improper) Riemann integrals and a brief introduction of Lebesgue integrals, the theories of pointwise and uniform convergence of sequences of functions, and the theories of infinite series of functions.

Prerequisites: MTSC-561 with minimum grade of .C., or its equivalent.

Credit, three hours.

MTSC-571. COMPLEX ANALYSIS 3:3:0
This is a first-semester course at the graduate level, in the field of Functions of one (1) Complex Variable. The rigorous approach adopted herein will set a firm foundation for leading the students to the next level of Complex

Analysis. To prepare the student for further studies in the field of Complex Analysis. To provide the students with sufficient background for various applications of Complex Analysis physical and engineering disciplines.

Prerequisites: MTSC-471.

Credit, three hours.

MTSC-621. FUNCTIONAL ANALYSIS 3:3:0
The course gives students an introduction to Metric Spaces, Hilbert Spaces, and Banach Spaces with emphasis on Hilbert Spaces.

Prerequisites: MTSC-561.

Credit, three hours.

MTSC-631. OPERATIONS RESEARCH 3:3:0
The course is designed to expose students in computer science to linear, nonlinear, and integer programming, simplex method, duality theorem, transport and other application problems, and different optimization methods and techniques. The topics to be covered include: Optimization problems; the subject of Operations Research; Linear programming; Simplex method and duality theorem; Integer programming; Nonlinear programming; Optimization techniques; Applications; and MATLAB Optimization Toolbox.

Credit, three hours.

MTSC-641. COMBINATORICS 3:3:0
The student will be introduced to the theory involved in combinatorial reasoning. The two (2) combinatorial theories of enumeration and graph theory will be developed. Students will apply combinatorial reasoning to problems in the analysis of computer systems, in discrete operations research and in finite probability.

Credit, three hours.

MTSC-643. STATISTICS 3:3:0
The course provides students with the fundamental theory of statistics. The students will be familiar with descriptive and inferential statistical methods, theory, and applications.

Prerequisites: MTSC-541 with minimum grade of .C..

Credit, three hours.

MTSC-651. PARTIAL DIFFERENTIAL EQUATIONS 3:3:0
The course is designed to acquaint students to Classifications of Partial Differential Equations, Methods of Solution for the Wave Equation, Laplace’s Equation, and the Heat Equation.

Prerequisites: A second course in Ordinary Differential Equations.

Credit, three hours.

MTSC-661. NUMERICAL ANALYSIS 3:3:0
The student should become familiar with advanced techniques for solving numerically large problems in Linear Algebra. In particular, students should become familiar with the effects of ill conditioning, and of ways in which special information about matrices, such as sparsity can be used. An important part of all of this is the consideration of error from various sources and ways of controlling its accumulation.

Prerequisites: MTSC-313.

Credit, three hours.

MTSC-699. THESIS OR DIRECTED PROJECT 6 3:3:0
A student may register three (3) or six (6) hours thesis with the approval of his/her thesis advisor.

Credit, three to six hours.

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