MA - MATHEMATICS (MA)

MA 525. Methods and Materials for Teaching Secondary Mathematics. (3 Credits)
Practical aspects of teaching and learning mathematics at the secondary level. Topics covered include secondary mathematics curricula, preparation and presentation of lesson material, classroom management, and professional behaviors. Does not satisfy requirements for major field courses in mathematics. Prerequisite/corequisite: MA 421, College Geometry, or equivalent.

MA 548. Mathematical Statistics II. (3 Credits)
Sampling distributions; confidence intervals; tests of hypothesis; regression analysis; analysis of variance; appropriate applications. Prerequisite: MA 447 or 547.

MA 552. Advanced Calculus. (3 Credits)
Functions of several variables; mapping; partial derivatives; power series; uniform convergence; line and surface integrals; vector analysis. Prerequisite: MA 451 or 551.

MA 555. Complex Analysis. (3 Credits)
Algebra and geometry of complex numbers; elementary functions and their mappings; analytic functions; integration in the complex plane; Cauchy's integral theorem; Taylor and Laurent expansions; calculus of residues. Prerequisite: MA 451 or 551.

MA 561. Numerical Analysis. (3 Credits)
Error analysis for iterative methods, approximation theory; numerical differentiation and quadrature; initial-value problems for ordinary differential equations; iterative techniques in matrix algebra. Also listed as CS 561 but creditable only in the field for which registered. Prerequisites: CS 155 or 210; MA 227.

MA 571. Applied Mathematics. (3 Credits)
Mathematical model and modeling techniques in the field of engineering, ecology, economics, medicine, chemistry, traffic engineering, and simulation of experiments. Prerequisite: MA 227.

MA 575. Intro to Operations Research. (3 Credits)
The nature of operations research; modeling problems using operations research techniques; linear programming; the Simplex Method, theory and practice, special problems; network analysis; dynamic programming; theory of games. Prerequisites: MA 126 and one of CS 110, 155, 210. Corequisite: MA 431.

MA 591. Graduate Seminar. (3 Credits)
Mathematics topics selected according to the interest and needs of the individual student, with study at the graduate level. Prerequisites: graduate classification and approval of the chair of the department.

MA 600. Applied Engineering Programming. (3 Credits)
Use of high level programming language (Matlab) and associated application programming interfaces (API) to design and create models for manufacturing processes. Programming methods for designing, implementing and using machines used in manufacture. The approach will be practical where students will learn to develop, debug and execute scripts to achieve specific objectives. (Fall)

MA 601. Fundamental Concepts in Mathematics for the Elementary School Teacher. (3 Credits)
Mathematics as a language and a tool for thinking. Emphasis is placed on teaching with meaning and on seeing arithmetic as a unified system of correlated ideas, facts, and principles. Includes fundamental notions of number, measure, logic, proof, and function.

MA 602. Advanced Applied Engineering Mathematics. (3 Credits)
Advanced Applied Engineering Mathematics: Mathematics remains the language which engineers design, modify and use machines. Topics covered will include: linear algebra, differential equations, numerical methods and approximations, use of computer algebra systems like MATLAB. (Fall)

MA 605. Applied Statistics I. (3 Credits)
An advanced course in statistical methods and applications including statistical computing utilizing the Statistical Analysis System. Prerequisite: MA 345.

MA 611. Applied Mathematics for the Teacher. (3 Credits)
Process approach to problem solving. Emphasis placed on fundamental steps in the solution of problems.

MA 612. Selected Topics in Mathematics for the Teacher. (3 Credits)
Selected topics suitable for laboratory mathematics; mathematics modeling; secondary school mathematics from an advanced point of view.

MA 617. Symbolic Logic. (3 Credits)
Concept of a logistic system and the propositional calculus. Truth tables and their applications to problems. Syllogistic inference and rules. Class membership and inclusion, the algebra of classes.

MA 621. Foundations in Algebra for the Teacher. (3 Credits)

MA 623. Foundations in Analysis for the Teacher. (3 Credits)
Development of the real number system, limits and continuity, and basic point set theory.

MA 625. Foundations in Geometry for the Teacher. (3 Credits)
Development of Euclidean geometry in two and three dimensions using the axiomatic methods. Introduction to non-Euclidean geometries.

MA 627. Mathematical Thinking for the Teacher I. (3 Credits)
Theoretical framework for mathematical learning, transitioning from action to process to object level thinking. Explicit method for teaching mathematical thinking using computer programming to push the learner to recognize and use connections, relationships and patterns among mathematical ideas, write general expressions, conjecture and write convincing arguments or proof. Project based applications reinforce abstract thinking about the mathematical concepts as representations are used to model and interpret physical and technical phenomena.

MA 630. Foundations of Advanced Mathematics. (3 Credits)
Proof-writing techniques; logic; sets and functions; fundamental topics in analysis, abstract and linear algebra, number theory, and combinatorics. Prerequisite: Admission to MS in Mathematics Program or permission of instructor.

MA 634. History of Philosophy of Mathematics. (3 Credits)
Development of mathematics in algebra, geometry, an analysis Impact of science and philosophy made by Euclid, Descartes, Newton, Euler, Gauss, Wierstrass, Cantor, Hamilton, Boole, and Galois.

MA 637. Group Theory. (3 Credits)
Introduction to groups; subgroups; group homomorphisms; quotient groups; direct products; semidirect products; group actions; and the Sylow theorems. Prerequisites: A grade of C or higher in MA 630 or permission of instructor.

MA 638. Rings and Fields. (3 Credits)
Theory of rings; integral domains; fields; Galois theory. Prerequisite: MA 637 with a grade of C or higher.
MA 640. General Topology. (3 Credits)
This course is an introduction to point-set topology. Topics include compactness, connectedness, quotient spaces, separation properties, Tychonoff’s theorem, the Urysohn lemma, Tietze’s theorem, and the characterization of separable metric spaces. Prerequisites: MA 630.

MA 641. Elementary Number Theory. (3 Credits)
This course serves as an introduction to elementary number theory and its applications. Topics include integers and divisibility, prime numbers, the fundamental theorem of arithmetic, multiplicative and arithmetic functions, modular arithmetic and congruences, the Chinese remainder theorem, quadratic reciprocity, primitive roots, and applications to cryptography. An auxiliary goal of this course is further refinement of students’ mathematical writing skills. Additional topics may include diophantine equations, elliptic curves, continued fractions, arithmetic geometry, or an introduction to analytic, algebraic, or computational methods in number theory. Prerequisites: MA 630 with a grade of C or higher, or permission of instructor.

MA 647. Mathematical Statistics I. (3 Credits)
Probability and combinatorial methods, discrete probability functions; probability density functions for continuous variates; mathematical expectation; moment generating functions; appropriate applications. Prerequisite: MA 227.

MA 651. Advanced Calculus. (3 Credits)
Logic; basic set theory and topology; real number system; limits; functions; continuity; sequences and series. Prerequisites: MA 630 with a grade of C or higher or permission of instructor.

MA 652. Advanced Calculus II. (3 Credits)
Derivatives; sequences and series of functions; convergence; power series; Riemann-Stieltjes integral; Fourier series. Prerequisite: MA 651 with a grade of C or higher.

MA 653. Real Analysis I. (3 Credits)
Real number system, Lebesque measure, Lebesque integral, convergence theorems, differentiation of monotone functions, absolute continuity and the fundamental theorem of calculus, L^p spaces, Holder and Minkowski inequalities, and bounded linear functions on the L^p spaces. Prerequisite: MA 652 with a grade of C or higher.

MA 654. Real Analysis II. (3 Credits)
Measure and integration on abstract measure spaces, signed measures, Hahn decomposition, Radon-Nikodoym theorem, Lebesque decomposition, measures on algebras and their extensions, product measures, and Fubini’s theorem. Prerequisites: MA 653.

MA 661. Numerical Analysis. (3 Credits)
Error analysis for iterative methods, approximation theory; numerical differentiation and quadrature; initial-value problems for ordinary differential equations; iterative techniques in matrix algebra. Also listed as CS 561 but creditable only in the field for which registered. Prerequisites: CS 155 or 210; MA 227.

MA 691. Graduate Seminar. (3 Credits)
Mathematics topics selected according to the interest and needs of the individual student, with study at the graduate level. Prerequisites: graduate classification and approval of the chair of the department.

MA 698. Algebra Comprehensive Exam. (0 Credits)
Analysis Comprehensive Exam. Prerequisites: MA 637 and MA 638, both with a grade of C or higher.

MA 699. Analysis Comprehensive Exam. (0 Credits)
Analysis comprehensive exam. Prerequisites: MA 651 and MA 652, both with a grade of C or higher.