

# MATHEMATICS (MA)

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## **MA 521. Algebraic Reasoning. 2 Credits.**

Students apply proof-based reasoning in the context of different algebraic systems, including groups, rings and fields. Specific examples include finite fields and matrix rings, as well as the real and complex numbers. Emphasis is placed on the interplay between axiomatic algebra and the existence and solution of algebraic equations.

**Offered:** Every year, Summer

## **MA 522. Analytic Reasoning. 2 Credits.**

Students explore properties of the real numbers and functions of real numbers based on the completeness axiom, including continuity in the context of powers and roots, exponentials and logarithms, and the trigonometric functions. Definitions and properties of these functions are developed and proved, with an emphasis on their reliance on continuity.

**Offered:** Every year, Fall

## **MA 541. Complex Variables. 2 Credits.**

This course extends the concepts of calculus to deal with functions whose variables and values are complex numbers. Topics include the geometry of complex numbers, differentiation and integration, representation of functions by integrals and power series, and the calculus of residues.

**Prerequisites:** Take MA 242 or MA 251 and MA 301; Minimum grade C- or better.

**Offered:** Every year, Fall

## **MA 565. Famous Mathematical Constants. 3 Credits.**

This course is a tour of mathematics from the viewpoint of the well known constants  $e$ ,  $\pi$  and  $i$ . Topics are chosen from geometry, number theory, calculus and algebra.

**Offered:** Every Third Year

## **MA 580. Euclidean and Non-Euclidean Geometry. 4 Credits.**

Students study concepts in Absolute, Euclidean and non-Euclidean geometries, including planar geometry, hyperbolic geometry, and spherical geometry. In particular, students explore topics which may include finite geometries, axiom systems, transformations and symmetries, analytic geometry, circles, triangles, quadrilaterals, the parallel postulate, Pythagorean Theorem, area and similarity.

**Offered:** Every year, Spring

## **MA 583. Mathematics: Historical Insights. 2 Credits.**

Students explore mathematics from historical perspectives. In particular, students investigate contributions of ancient Babylonian, Egyptian, and Persian cultures, historical methods of solving quadratic and cubic equations, development of the calculus.

**Offered:** Every year, Summer

## **MA 585. Mathematical Problem Solving. 3 Credits.**

This course presents an introduction to the spirit of mathematical inquiry through a problem-based approach; heuristics; problem-solving techniques; Polya's stages of problem solving; specific strategies.

**Offered:** As needed, All

## **MA 586. Discrete Structures. 3 Credits.**

This course considers induction, set theory, relations, functions, graphs, trees, logic and boolean algebra, counting techniques, applications to probability, computer science and algorithm development.

**Offered:** As needed, All