MATH S054 – Prealgebra

Upon successful completion of this course, students will be able to:

1. Understand and manipulate integers, decimals and fractions
2. Understand and apply graphical and proportional data
3. Calculate perimeters, areas and volumes of basic geometric shapes
4. Simplify and evaluate basic algebraic expressions and equations

MATH S055 – Elementary Algebra

Upon successful completion of this course, students will be able to:

1. Evaluate, factor and simplify algebraic, rational and absolute value expressions
2. Solve, graph and interpret linear equations and inequalities
3. Solve and interpret quadratic and rational equations
4. Solve applications of linear, quadratic and rational equations

MATH S105 – Intermediate Algebra

Upon successful completion of this course, students will be able to:

1. Combine, compose, evaluate and graph functions and inverse functions
2. Demonstrate graphical competency for linear, quadratic, absolute value and square root functions
3. Graph and interpret exponential and logarithmic functions
4. Solve applied problems using appropriate algebraic techniques

MATH S113 – Concepts and Contemporary Applications of Mathematics:

Upon successful completion of this course, students will be able to:

1. Describe, use and compare a variety of voting methods, including analysis of weighted voting systems
2. Describe and use a variety of methods for fair division and apportionment
3. Use algorithms to solve scheduling and travelling salesman problems; applications of Euler circuits, Hamilton circuits and minimum spanning trees
4. Identify and describe a variety of basic sampling methods and sampling concepts
5. Calculate and interpret descriptive statistics and basic probabilities

MATH S151 – College Algebra for Calculus

Upon successful completion of this course, students will be able to:

1. Apply rules and properties of real numbers to the evaluation and/or simplification of polynomial and rational expressions and expressions involving rational exponents, radicals, and absolute values.
2. Solve equations and inequalities in one variable involving polynomial and rational expressions and expressions involving radicals, exponential functions, logarithmic functions, and absolute values.
3. Write mathematics using proper notation and terminology.
4. Solve problems by modeling with equations and functions.

MATH S152 – Trigonometry

Upon successful completion of this course, students will be able to:

1. Describe the properties and graphs of trigonometric functions.
2. Simplify trigonometric expressions to solve equations and verify identities.
3. Apply trigonometry to solve problems.

MATH S211 – Mathematics for Elementary School Teachers I

Upon successful completion of this course, students will be able to:

1. Solve open-ended elementary problems involving patterns, sets, rational numbers and basic number theory.
2. Justify the use of our numeration system by comparing it to historical alternatives and other bases.
3. Describe the development of our numeration system and its properties as it expands from the set of natural numbers to the set of rational numbers.
4. Demonstrate and justify standard and alternative algorithms for addition, subtraction, multiplication and division of whole numbers, integers, fractions, and decimals.

MATH S212 – Mathematics for Elementary School Teachers II

Upon successful completion of this course, students will be able to:

1. Solve open-ended elementary problems involving geometry, measurement, real numbers, probability and statistics.
2. Analyze characteristics, measurements and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
3. Explain and apply basic concepts of probability.
4. Formulate questions that can be addressed with data as well as collect, organize, and display relevant data to answer them.

MATH S251 – Calculus I

Upon successful completion of this course, students will be able to:

1. Understand and apply the concept of a limit
2. Understand and apply the concepts of differentiation and integration, and their relationship as expressed by the Fundamental Theorem of Calculus
3. Proficiently calculate derivatives, and definite and indefinite integrals by means of substitution
4. Apply the derivative in modeling settings, such as for graphing, optimization, and related rates problems

MATH S252 – Calculus II

Upon successful completion of this course, students will be able to:

1. Compute definite and indefinite integrals using a variety of techniques
2. Apply integration in modeling settings, drawn from mathematics and the natural and social sciences
3. Understand and determine convergence of infinite series, including Taylor series
4. Understand and use parameterizations of curves, including in polar coordinates

MATH S253 – Calculus III

Upon successful completion of this course, students will be able to:

1. Calculate and apply multidimensional notions of derivatives, such as partial and directional derivatives, gradients, curl, and divergence
2. Formulate and solve optimization problems in multidimensional settings, including constrained optimization
3. Calculate iterated integrals and apply them in modeling settings
4. Understand and apply integration theorems of vector analysis

MATH S265 – Introduction to Mathematical Proofs

Upon successful completion of this course, students will be able to:

1. Apply the logical structure of proofs and work symbolically with connectives and quantifiers to produce logically valid, correct and clear arguments,
2. Perform set operations on finite and infinite collections of sets and appropriately use properties of set operations in problems,
3. Determine equivalence relations on sets and describe the associated equivalence classes,
4. Apply definitions to solve problems and prove conjectures about functions, direct and inverse images and inverse functions,
5. Construct direct and indirect proofs and proofs by induction and determine the appropriateness of each type in a particular setting,
6. Analyze and critique proofs with respect to logic and correctness, and
7. Unravel abstract definitions, create intuition-forming examples or counterexamples, and prove conjectures.

MATH S302 Differential Equations

Upon successful completion of this course, students will be able to:

1. Apply exact and asymptotic methods in solving first and higher order linear and nonlinear differential equations.
2. Analyze the qualitative behavior of solutions for autonomous differential equations using phase portraits; identify equilibrium points and limit cycles.
3. Apply numerical methods to obtain approximate solutions to differential equations.
4. Derive and solve initial value problems that relate to real-world applications.

MATH S305 Geometry

Upon successful completion of this course, students will be able to:

1. Identify critical elements of a geometric object and describe the relationships between these elements.
2. Utilize spatial visualization and geometric modeling to explore and analyze geometric shapes, structures, and their properties.
3. Use computer technology to explore geometric concepts and verify results.
4. Apply sound mathematical writing and appropriate use of numerical, graphical, and symbolic representations to present solutions of mathematical exercises and applications.

MATH S311 Modern Algebra

Upon successful completion of this course, students will be able to:

1. Define, recognize, and give examples of different types of algebraic structures.
2. State basic properties of various algebraic structures.
3. Explicitly identify similarities and differences among various algebraic structures and illustrate these similarities and differences with examples.
4. Demonstrate enhanced mathematical maturity by writing coherent proofs of basic properties of various algebraic structures.
5. Articulate the need for an axiomatic treatment of mathematics.

MATH S314 Linear Algebra

Upon successful completion of this course, students will be able to:

1. Demonstrate proficiency at matrix algebra.
2. Solve systems of linear equations using various techniques.
3. Recognize the concepts of span, linear independence, basis, and dimension, and apply these concepts to various vector spaces and subspaces.
4. Explore linear algebra concepts and applications using technology.
5. Apply sound mathematical writing and appropriate use of numerical, graphical, and symbolic representations to present solutions of mathematical exercises and applications.

MATH S324 Advanced Calculus

Upon successful completion of this course, students will be able to:

1. Recognize various properties of the real number line.
2. Calculate limits of sequences, functions and sequences of functions.
3. Calculate derivatives and integrals of functions and sequences of functions.
4. Describe the differences and relationships between various types of continuity and convergence.
5. Demonstrate enhanced mathematical maturity by writing coherent proofs of fundamental concepts in mathematical analysis.

MATH S392 Junior Seminar

Upon successful completion of this course, students will be able to:

1. Apply sound mathematical writing and appropriate use of numerical, graphical, and/or symbolic representations to present solutions of mathematical exercises and applications.
2. Demonstrate an awareness and appreciation of the wide range of fields in mathematics through discussions with peers and instructors inside and outside of the classroom.

MATH S410 Complex Variables

Upon successful completion of this course, students will be able to:

1. Calculate with complex numbers written in rectangular and exponential form.
2. Evaluate, take limits of, differentiate, integrate, and find Laurent series representations of elementary complex-valued functions of a complex variable.
3. Display mappings of regions in the complex plane by elementary functions.
4. Calculate residues of a function at its isolated singular points and use these residues in applications, such as the evaluation of real definite integrals.

MATH S411 History of Mathematics and Science

Upon successful completion of this course, students will be able to:

1. Explain and apply methods from antiquity to the nineteenth century.
2. Compare and contrast methods from antiquity to the nineteenth century with current methods used for the same purpose.
3. Research a focused topic/method from the history of mathematics or science and effectively communicate their findings.

MATH S460 Mathematical Modeling

Upon successful completion of this course, students will be able to:

1. Design and/or develop mathematical models applicable to problems from fundamental principles using existing concepts, theory and methods.
2. Perform qualitative analyses of models using appropriate techniques, and classify solution behaviors resulting from varying assumptions and/or model parameters.
3. Solve models using appropriate exact, asymptotic, or numerical methods, interpret solutions and assess the approximate accuracy of short- and long-term solutions in relation to expected behavior and/or real data.
4. Determine and/or implement modifications to models based on findings from qualitative analyses and/or quantitative solutions.

MATH S492 – Senior Seminar

Upon successful completion of this course, students will be able to:

1. Demonstrate appropriate competence in speaking and writing mathematics.
2. Research a focused topic from new or advanced material not covered in courses at UAS.
3. Write a formal paper and give a formal presentation of the paper.