

# DEPARTMENT of MATHEMATICS

The Department of Mathematics at the North Carolina School of Science and Mathematics offers students the opportunity to build a solid understanding in mathematics through foundation courses that focus on concepts, applications, and the use of technology. Following these courses, students may continue their studies in advanced courses or sponsored research that expand the breadth and depth of their understanding and help them to recognize the many uses of mathematics in other areas of study.

## Graduation Requirement in Mathematics

Each student must be enrolled in a mathematics course for five trimesters of study at NCSSM. Each student must successfully complete five units of core mathematics for graduation credit. Unless a student is placed in a higher level of mathematics upon entry to NCSSM, three units must be in MA305 Precalculus and Modeling or two units must be in MA355 Precalculus and Modeling with Advanced Topics. Courses that fulfill elective graduation requirements but not core requirements in mathematics are designated with an asterisk (\*).

All students are required to purchase a graphing calculator. Specific information concerning the type of calculator is provided at the time of course registration.

Note: All mathematics courses beyond the graduation credit requirement may also be used for core elective credit toward graduation.

## Placement

Junior students are placed in the course best suited for them as determined by the Mathematics Department based on placement tests, previous instruction, and interviews. Placement of senior students is determined by their performance in the mathematics courses they complete as juniors. The department recognizes the individual differences that need to be considered as students are placed in senior level courses.

## MA301a/MA301b/MA301c Algebra 3

*One year (3 units of credit)*

*Meeting pattern: 4 periods per week including lab*

This course builds upon and enriches content typically taught in Algebra 2 and gives students an opportunity to develop algebraic skills for solving real-world problems. Topics covered include data analysis, introduction to functions and their graphs (linear, quadratic, exponential, and logarithmic functions), solutions to equations and inequalities, solutions to systems of equations, recursive equations, matrix algebra, and elementary trigonometry. Emphasis is placed on using mathematics as a tool for problem solving and simple mathematical modeling.

## MA305a/MA305b/MA305c Precalculus and Modeling

*One year (3 units of credit)*

*Prerequisite: MA301 Algebra 3, or Algebra 2 and adequate score on the mathematics placement test.*  
*Meeting pattern: 4 periods per week including lab*

This course is devoted to developing a toolkit of functions that serves as a bridge between mathematics and the world it models. The toolkit includes explicitly defined functions such as exponential, polynomial, logarithmic, and trigonometric functions, as well as functions that are defined recursively and parametrically. Students investigate functions, bivariate data, and models with graphing calculators and computers. Both graphical and analytical approaches to problem solving are emphasized. Students also complete lab activities and present their results in formal written reports.

## MA355a/MA355b Precalculus and Modeling with Advanced Topics

*Two trimesters (2 units of credit)*

*Prerequisite: MA301 Algebra 3 and permission of the Dean of Mathematics, or Algebra 2 and adequate score on the mathematics placement test.*

*Meeting pattern: 5 periods per week including lab*

The topics and ideas of MA305 Precalculus and Modeling are presented in greater depth and at a faster pace. Some topics are explored more extensively, and additional topics are selected to supplement the course materials. Students are expected to work more independently than they would in MA305.

## MA368 Finite Mathematics

*One trimester (1 unit of credit)*

*Prerequisite: At least two trimesters of MA305 Precalculus and Modeling.*

*Meeting pattern: 4 periods per week*

This course offers an overview of many applications of mathematics, especially in the social and management sciences. Topics covered include a selection of the following: fair division of resources and costs, voting methods, apportionment of legislative bodies, power of voting coalitions, finance, probability with Markov chains, linear programming, game theory, and mathematical models using matrices. Students are expected to be involved in formulating problems, applying the appropriate mathematics to find a solution, and evaluating the solution. Computers and calculators are incorporated as computational and modeling aids.

## MA370 Advanced Algebra Applications

*One trimester (1 unit of credit)*

*Prerequisite: MA305 Precalculus and Modeling.*

*Meeting pattern: 4 periods per week*

This course is intended to be an immediate predecessor to a college calculus course. It is designed to reinforce the algebra skills required for success in calculus while applying them to a variety of topics not normally covered in high school precalculus, though still required in many college calculus courses. These topics may include conic sections, complex numbers, polar coordinates, spatial coordinate geometry, parametric equations, linear transformations of points and figures in the plane, or others. This course is intended for students who have not taken calculus.

## MA372 Explorations in Advanced Geometry

*One trimester (1 unit of credit)*

*Meeting pattern: 5 periods per week including lab*

In this course students investigate areas of geometry beyond those included in a one-year high school geometry course. Topics focus on the theory of constructability and proof; periodic and non-periodic tilings; three-dimensional geometry, including investigation of Platonic and Archimedean solids; and modeling through geometry. Students also explore selected topics independently. Emphasis is placed on gaining an intuitive understanding of geometry as well as communicating and applying that understanding through