

**Courses**

# Mathematics

Mathematics Graduation Requirement (3 Credits)

**Recommended Mathematics Course Sequence**

Numerous research studies support students taking specific mathematics courses to ensure a strong foundation of mathematical understanding. College placement tests, such as the ACT, test mathematical knowledge from specific courses. For these reasons one of the following mathematical sequences is to be followed in MNPS:

Grade Level	Community College	Four-year College or University	Rigorous University Path	Rigorous University Path with Algebra I credit earned in 8th grade	Rigorous University Path with Algebra I and Geometry credits earned in middle school	IB Sequence with Algebra I credit earned in 8th grade	IB Sequence with Algebra I and Geometry credits earned in middle school	
9th Grade	Foundations II	Algebra I	Algebra I - Honors	Geometry - Honors	Algebra II - Honors	Geometry I - Honors	Algebra II - Honors	
10th Grade	Algebra I	Geometry	Geometry - Honors	Algebra II - Honors	Pre-Calculus – Honors	Algebra II - Honors	Pre-Calculus – IB/AP	
11th Grade	Geometry	Algebra II	Algebra II - Honors	Pre-Calculus Honors	Calculus – BC AP	Pre-Calculus – IB/AP	Mathematics SL - IB	Mathematics HL-IB
12th Grade	Algebra II	Pre-Calculus-Honors	Pre-Calculus-Honors	Calculus - AB AP and/or Statistics -AP	Statistics – AP	Math Studies SL - IB or Calculus - AB AP	Calculus-AB or BC AP or Statistics - AP	Mathematics HL-IB

**Algebra I**

**Recommended Prerequisite:**

**None**

**Grades Offered: 9 - 12**

**Credit: ½, 1**

**SDE Course Code: 3102**

**MNPS Course Code: MTH4111**

Algebra I develops mathematical concepts through the following strands: number sense and number theory; estimation, measurement and computation; patterns, functions and algebraic thinking; statistics and probability; and spatial sense and geometric concepts.

This course incorporates the process standards of representation, communication, problem solving, reasoning and proof, and connections to address the Gateway Mathematics indicators. Appropriate technology and manipulatives are used to develop and extend algebraic thinking and to engage student reasoning. Other concepts include analysis of “families of functions (linear and quadratic),” solving systems of equations, graphing and data analysis. Algebra I provides the fundamentals necessary for the further study of mathematics. Stu-

dents must pass the Gateway Algebra I exam to receive a regular or honors diploma.

**Algebra I - Honors**

**Recommended Prerequisite:**

**None**

**Grades Offered: 9 - 12**

**Credit: ½, 1**

**SDE Course Code: 3102**

**MNPS Course Code: MTH4112**

The content of this course is the same as Algebra I with an accelerated pace and more in-depth study.

Extended reading assignments, group activities, projects, exploration of the history and culture of the subject, in-depth problem solving experiences, critical analyses, applications, and student presentations are incorporated to enrich basic standards. Student collaboration is expected.

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**Algebra I - Sheltered**

**Recommended Prerequisite:**

**None**

**Grades Offered: 9 - 12**

**Credit: ½, 1**

**SDE Course Code: 3102**

**MNPS Course Code: MTH 4113**

In this sheltered ELL course, the students will develop their understanding of mathematical concepts through the following strands: number sense and number theory; estimation, measurement and computation; patterns, functions and algebraic thinking; statistics and probability; and spatial sense and geometric concepts. This course incorporates the process standards of representation, communication, problem solving, reasoning and proof, and connections to address the Gateway Mathematics indicators. Appropriate technology and manipulatives are used to develop and extend algebraic thinking and to engage student reasoning. Other concepts include analysis of "families of functions" (linear and quadratic), solving systems of equations, graphing and data analysis. Algebra I provides the fundamentals necessary for the further study of mathematics. Students will take the Gateway Mathematics test upon completion of this course. Students must pass the Gateway Algebra I exam to receive a regular or honors diploma.

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**Algebra II**

**Recommended Prerequisites:**

**Algebra I and Geometry**

**Grades Offered: 9 - 12**

**Credit: ½, 1**

**SDE Course Code: 3103**

**MNPS Course Code: MTH4311**

Algebra II extends the concepts of Algebra I. Linear, absolute value, quadratic, exponential, logarithmic, rational and periodic functions are studied in-depth along with finite

and infinite arithmetic and geometric sequences and series. Topics in Statistics and Probability such as the Law of Large Numbers, permutations, combinations, normal distribution and standard deviation are studied as well. The course introduces elementary concepts of Analytic Geometry. Graphing calculators should be used as a tool in this course.

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**Algebra II - Honors**

**Recommended Prerequisite:**

**Algebra I and Geometry**

**Grades Offered: 9 - 12**

**Credit: ½, 1**

**SDE Course Code: 3103**

**MNPS Course Code: MTH4312**

The content of this course is the same as Algebra II with an accelerated pace and more in-depth study. Extended group activities, individual projects and portfolios are incorporated to provide additional measures of student progress. Extended reading assignments, group activities, projects, exploration of the history and culture of the subject, in-depth problem solving experiences, critical analyses, applications, and student presentations are incorporated to enrich basic standards. Student collaboration is expected.

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**Calculus- Advanced**

**Recommended Prerequisites:**

**Algebra I, Geometry, Algebra II and Pre-Calculus with Trigonometry and AP Calculus AB and/or BC**

**Grades Offered: 12**

**Credit: ½, 1**

**SDE Course Code: 3197**

**MNPS Course Code: MTH4512**

This course is designed for students who have completed an Advanced Placement Calculus course. It is an extension of the beginning calculus in the AB and BC courses. This course is a survey of Intermediate Calculus topics including hyperbolic functions, parametric equations and polar coordinates, vectors and 3-space geometry, partial derivatives, vector calculus, double and triple integrals and differential equations. The TI-89 graphing calculator will be used exclusively.

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**Calculus AP - AB**

**Recommended Prerequisites: Algebra I, Geometry, Algebra II and Pre-Calculus with Trigonometry**

**Grades Offered: 9 – 12**

**Credit: ½, 1**

**SDE Course Code: 3127**

**MNPS Course Code: MTH4514**

Calculus is the mathematics of change and motion. It is a branch of mathematics that enables solution of two large classes of problems. The first involves finding the rate at which a variable quantity is changing and the second is that of finding a function when its rate of change is given. Emphasis is placed both on the theory of Calculus and on problem solving. The curriculum is based on the course outline recommended by the College Board. Only those schools with College Board Approved syllabi will be allowed to award Advanced Placement credit on transcripts. This course is designed to prepare students for the AP examination. The examination contains questions for which a graphing calculator is necessary.

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**Calculus AP - BC**

**Recommended Prerequisites: Algebra I, Geometry, Algebra II and Pre-Calculus with Trigonometry and AP Calculus AB**

**Grades Offered: 9 - 12**

**Credit: ½, 1**

**SDE Course Code: 3128**

**MNPS Course Code: MTH4516**

This course extends Calculus AB and is designed to prepare students for the AP examination. The Calculus BC examination contains all the topics in Calculus AB, as well as advanced topics in integral calculus, and sequences and series. The curriculum is based on the course outline recommended by the College Board. Only those schools with College Board Approved syllabi will be allowed to award five additional points per report card grade and Advanced Placement credit on transcripts. This course is designed to prepare students for the AP examination. The examination contains questions for which a graphing calculator is necessary.

**Computer Science – AP**

**Recommended Prerequisites:**  
**Algebra I, Geometry, & Algebra II**  
**Grades Offered:** 9-12  
**Credit:** ½, 1  
**SDE Course Code:** 3635  
**MNPS Course Code:** MTH4540

This course takes an object-oriented approach to the study of computer programming using Java. Students are expected to solve problems that may involve designing or coding a program in Java, manipulating well-known data structures or algorithms, and understanding or implementing large programs written by others. An in-depth study of procedural programming is covered through the analysis of case studies so that students may see practical applications that make use of the programming concepts learned. Another focus of this programming course involves objects that communicate with each other in the form of messages. Data structures like linked lists, queues, stacks, and trees are covered. The curriculum is based on the course outline recommended by the College Board. Only those schools with College Board Approved syllabi will be allowed to award Advanced Placement credit on transcripts. This course is designed to prepare students for the AP examination.

**Discrete Mathematics with Probability and Statistics**

**Recommended Prerequisites:**  
**Algebra I, Geometry and Algebra II**  
**Grades Offered:** 10 - 12  
**Credit:** ½, 1  
**SDE Course Code:** 3135  
**MNPS Course Code:** MTH4515

Discrete Mathematics involves the study of objects and ideas that can be divided into separate or discontinuous parts. Problems to be studied can be classified into three broad categories. The first category, existence problems, deals with whether a given problem has a solution or not. The second category, counting problems, investigates how many solutions may exist for problems with known solutions. A third category, optimization problems, focuses on finding the

best solution to a particular problem. This course will acquaint the student with the theory of probability - the mathematics of uncertainty. It will illustrate some applications of probability to statistical theory, and how these applications are applied to practical and scientific problems.

**Geometry**

**Recommended Prerequisite:**  
**Algebra I**  
**Grades Offered:** 9 - 12  
**Credit:** ½, 1  
**SDE Course Code:** 3108  
**MNPS Course Code:** MTH4211

This course develops the concepts of plane, solid and coordinate geometry. Proofs, both deductive and inductive, and problem solving strategies are used to develop these concepts. Inquiry, hands-on activities, and technology are employed to assist students in developing logical thought and reasoning processes. The curriculum centers on the integration of skills listed in the MNPS Academic Standards for Geometry. Students in Geometry will be administered a District Geometry Assessment as part of the final exam for the course.

**Geometry - Honors**

**Recommended Prerequisite:**  
**Algebra I**  
**Grades Offered:** 9 - 12  
**Credit:** ½, 1  
**SDE Course Code:** 3108  
**MNPS Course Code:** MTH4212

The content of this course is the same as Geometry with an accelerated pace and more in-depth study. Extended reading assignments, research based writing assignments, projects, exploration of the history and culture of the subject, in-depth problem solving experiences, critical analyses, applications, and student presentations are incorporated to enrich basic standards. Student collaboration is expected. Students will be administered a District Geometry Assessment as part of the final exam for the course.

**Geometry - Sheltered**

**Recommended Prerequisite:**  
**Algebra I**

**Grades Offered:** 9 - 12  
**Credit:** ½, 1  
**SDE Course Code:** 3108  
**MNPS Course Code:** MTH4213

In a sheltered ELL environment this course develops the concepts of plane, solid and coordinate geometry. Proofs, both deductive and inductive, and problem solving strategies are used to develop these concepts. Inquiry, hands-on activities, and technology are employed to assist students in developing logical thought and reasoning processes. The curriculum centers on the integration of skills listed in the MNPS Academic Standards for Geometry. Students in Sheltered Geometry will be administered a District Geometry Assessment as part of the final exam for the course. The teacher of this course must hold either 013 or 413 teaching endorsement code.

**Math Foundations I - Sheltered**

**Recommended Prerequisite:**  
**None**  
**Grades Offered:** 9 - 12  
**Credit:** ½, 1  
**SDE Course Code:** 3130  
**MNPS Course Code:** MTH4106

A fundamental course in mathematics that develops the topics of number sense, number theory, estimation, measurement, computation, patterns, functions, algebraic thinking, statistics and probability, spatial sense and geometric concepts. Unless the student is in the freshman class of 2005-2006, and this is the only math credit below Algebra I, Sheltered Math Foundations I may not count as one of the three required math courses for graduation.

**Math Foundations II**

**Recommended Prerequisite:**  
**None**  
**Grades Offered:** 9 - 12  
**Credit:** ½, 1  
**SDE Course Code:** 3131  
**MNPS Course Code:** MTH4108

Foundations II develops the topics of rational numbers, number properties, order of operations, inverse operations, operations with integers, functions, graphs, measurement and computation, patterns,

algebraic expressions and solving equations, statistics and probability, geometric properties and relationships and problem-solving strategies with a theme of Thinking Algebraically. Concrete strategies and geometric models of mathematical concepts will be emphasized. Students may not earn credit in both Sheltered Math Foundations II and Foundations II. Upon completion of the course, students must take the State-mandated End-of-Course test. (For the freshman class of 2005-2006, only one math credit below Algebra I may count towards the 3 math credits required.)

**Math Foundations II - Sheltered**

**Recommended Prerequisite:**

**None**

**Grades Offered: 9 - 12**

**Credit: ½, 1**

**SDE Course Code: 3131**

**MNPS Course Code: MTH4107**

Through this course students will study the topics introduced in Sheltered Foundations I in more depth. Sheltered Math Foundations II may count as one of the three required math courses for graduation. Upon completion of the course, students must take the State-mandated End-of-Course test. (For the freshman

class of 2005-2006, only one math credit below Algebra I may count towards the 3 math credits required.)

**Pre-Calculus with Trigonometry-Honors**

**Recommended Prerequisites:**

**Algebra I, Geometry and Algebra II**

**Grades Offered: 10 - 12**

**Credit: ½, 1**

**SDE Course Code: 3126**

**MNPS Course Code: MTH4413**

Pre-Calculus with Trigonometry deals with the topics of vectors, analytic geometry, theory of equations, logic and limits. Included in the course is an in-depth study of the conic sections, higher degree equations, sequences and series, and the fundamental theorem of algebra. This course also includes the study of the properties of the trigonometric functions, their graphs and their applications to various mathematical situations including the solution of triangles. Trigonometry has applications in surveying, navigation, construction work and is particularly essential for higher level courses in mathematics and physics.

**Statistics - AP**

**Recommended Prerequisites: Algebra I, Geometry, Algebra II and Pre-Calculus**

**Grades Offered: 10 - 12**

**Credit: ½, 1**

**SDE Course Code: 3129**

**MNPS course Code: MTH4538**

The purpose of the Statistics AP course is to introduce students to the major concepts and tools for collecting, analyzing and drawing conclusions from data. Students are exposed to four broad conceptual themes: (1) Exploring Data: Observing patterns and departures from patterns, (2) Planning a Study: Deciding what and how to measure, (3) Anticipating Patterns in Advance: Producing models using probability and simulation and (4) Statistical Inference: Confirming models. The curriculum is based on the course outline recommended by the College Board. Only those schools with College Board Approved syllabi will be allowed to award Advanced Placement credit on transcripts. This course is designed to prepare students for the AP examination. The examination contains questions for which a graphing calculator is necessary.

**INTERVENTIONS: These courses cannot substitute for a required Mathematics course, but may be counted as an elective credit.**

**Algebra Gateway Intervention I**

**Recommended Prerequisite:**

**Algebra I**

**Grades Offered: 9 - 12**

**Credit: ½, 1**

**SDE Course Code: 3180**

**MNPS Course Code: MTH4116**

Algebra Gateway Intervention I is an elective credit for students who have not succeeded in passing the Gateway Mathematics exam. It is the first Algebra intervention course in a series of four. The curriculum is focused around the Gateway Mathematics assessment indicators. Students may re-take the Gateway Mathematics test upon competition of this course. Students must pass the Gateway Algebra I exam to receive a regular diploma.

**Algebra Gateway Intervention II**

**Recommended Prerequisite:**

**Algebra Gateway Intervention I**

**Grades Offered: 9 - 12**

**Credit: ½, 1**

**SDE Course Code: 3180**

**MNPS Course Code: MTH4117**

Algebra Gateway Intervention II is an elective credit for students who have not succeeded in passing the Gateway Mathematics exam and have already passed Algebra Gateway Intervention I. It is the second Algebra intervention course in a series of four. The curriculum is focused around the Gateway Mathematics assessment indicators. Students may re-take the Gateway Mathematics test upon competition of this course. Stu-

dents must pass the Gateway Algebra I exam to receive a regular diploma.

**Algebra Gateway Intervention III**

**Recommended Prerequisite:**

**Algebra Gateway Intervention I and II**

**Grades Offered: 9 - 12**

**Credit: ½, 1**

**SDE Course Code: 3180**

**MNPS Course Code: MTH4118**

Algebra Gateway Intervention III is an elective credit for students who have not succeeded in passing the Gateway Mathematics exam and have already passed Algebra Gateway Intervention II. It is the third Algebra intervention course in a series of four. The curriculum is

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focused around the Gateway Mathematics assessment indicators. Students may re-take the Gateway Mathematics test upon completion of this course. Students must pass the Gateway Algebra I exam to receive a regular diploma.

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***Algebra Gateway Intervention IV***  
**Recommended Prerequisites:**  
**Algebra Gateway Intervention I, II and III**

**Grades Offered: 9 - 12**

**Credit:  $\frac{1}{2}$ , 1**

**SDE Course Code: 3180**

**MNPS Course Code: MTH4119**

Algebra Gateway Intervention IV is an elective credit for students who have not succeeded in passing the Gateway Mathematics exam and have already passed Algebra Gateway Intervention III. It is the final Algebra intervention course in a series of four. The curriculum is focused around the Gateway Mathematics assessment indicators. Students may re-take the Gateway Mathematics test upon completion of this course. Students must pass the Gateway Algebra I exam to receive a regular diploma.

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***Mathematics- Content Area***  
***Reading (CAR)***

**Recommended Prerequisite:**

**None**

**Grades Offered: 9 - 12**

**Credit:  $\frac{1}{2}$ , 1**

**SDE Course Code: 3081**

**MNPS Course Code: MTH1107**

Students will learn, practice and internalize strategies that are essential life-long learning skills for reading, writing, understanding and interpreting content specific texts. The strategies will be applied in the content area of mathematics and will enable students to interpret the language of mathematical problem solving. This course may be used as a Gateway intervention if the identified skill weakness is reading comprehension.