

# Mathematics

Algebra 1  
Plane Geometry  
Algebra 2 Essentials  
Algebra 2  
Algebra 2/College Algebra & Trigonometry  
College Algebra/Probability & Statistics  
Precalculus/College Algebra & Trigonometry  
Analytic Geometry/Precalculus & Discrete Mathematics  
Introduction to Calculus & Statistics/Mathematics Modeling & Applications  
Senior Mathematics Survey  
Analytic Geometry/Discrete Mathematics

AP Calculus AB  
AP Calculus BC  
Multivariable Calculus/Linear Algebra  
AP Statistics  
Computer Science  
AP Computer Science  
Basic Mathematics 1  
Basic Mathematics 2  
Informal Geometry  
Consumer Mathematics  
ESL Math Resource

## MATHEMATICS FLOW CHART

Mathematics as a discipline is an important and beautiful human endeavor, and mathematics has applications in many areas. All students, to the extent of their abilities, should have the opportunity to take part in the broader aspects of mathematics as a way of thinking, as a cultural heritage, and as an experience in grasping ideas, seeing their interrelations, and communicating them to others.

7th	8th	Freshman	Sophomore	Junior	Senior
<b>LEVEL 2</b>					
		Algebra 1	Plane Geometry	Algebra 2 Essentials	College Alg/Prob & Stats
	Algebra 1	Algebra 1	Plane Geometry	Algebra 2	Placement based on teacher recommendation for one of the following courses: Precalculus/College Alg & Trig, or College Alg/Prob & Stats
		Plane Geometry	Algebra 2	Precalculus/College Alg & Trig	Senior Math Survey
<b>LEVEL 3</b>					
		Algebra 1	Plane Geometry	Algebra 2	Precalculus/College Alg & Trig
	Algebra 1	Plane Geometry	Algebra 2	Precalculus/College Alg & Trig	Placement based on teacher recommendation for one of following courses: AP Calculus AB, AP Statistics, AP Computer Science, Analytic Geometry/Discrete Math, or Intro Calc & Stats/Math Mod & App
<b>LEVEL 4</b>					
Algebra 1	Plane Geometry	Algebra 2/College Alg & Trig	Analytic Geometry, Precalculus & Discrete Math	AP Calculus BC or AP Computer Science	MVCalculus/Linear Algebra, AP Statistics, or AP Computer Science
	Algebra 1	Plane Geometry	Algebra 2/College Alg & Trig	Analytic Geometry/Precalculus & Discrete Math	AP Calculus BC, AP Statistics, or AP Computer Science
<b>NOTES:</b> <ul style="list-style-type: none"> <li>• Two class titles separated by a forward slash denote a full-year sequence.</li> <li>• Computer Science is a full-year enrichment course that can be taken after Geometry. This course does not fulfill the graduation requirement in Mathematics. It is not a prerequisite for AP Computer Science.</li> </ul>					

The goals for students reflect those stated in the Principles and Standards for School Mathematics published by the National Council of Teachers of Mathematics:

- to value mathematics;
- to become confident in one's ability to do mathematics;
- to become a mathematical problem solver;
- to communicate mathematically;
- to reason mathematically; and
- to use technology appropriately.

### ALL COURSES IN THIS DEPARTMENT RECEIVE MAJOR CREDIT. (1.0 CREDIT)

Credit for the first semester is required for enrollment in the second semester of all courses. Mathematics courses taken in junior high school do not receive credit toward graduation from New Trier. *For a visual representation of mathematics courses, please see the departmental flow chart on page 58.*

### HOMEWORK STATEMENT

The primary purpose of homework in mathematics is to enhance classroom learning. Both the student and the teacher use homework to evaluate the learning process. Homework also includes opportunities for students to:

- Refine their skills through practice;
- Check for understanding;
- Develop independent learning skills, including the use of resources such as the textbook and class notes;
- Apply and investigate learned concepts in new contexts; and
- Preview new content.

**Please keep in mind that homework goes beyond the solving of assigned problems. For homework to be an effective part of the learning process, it consists not only of written work but also of reflection by the student on his or her level of understanding.**

While each classroom provides a unique learning experience, the following homework standards exist for all mathematics courses:

- Homework is routinely assigned. In many courses, it is assigned on a daily basis.
- Students should typically expect to invest 30-60 focused minutes per assignment. The required time will vary by student and course.
- The quality of work should provide sufficient detail to convey the problem-solving process to other students and to the teacher.
- Students are expected to check for accuracy.
- Students are expected to follow up on homework difficulties with available resources, including the textbook, class notes, the teacher, math resource centers, and classmates.

Specific homework policies will vary among courses and teachers. Additional information can be found in teachers' Course Expectations documents distributed at the beginning of the school year.

# Mathematics Courses

## Algebra 1 (Double Period) level 2

OPEN TO FRESHMEN  
PREREQUISITE: NONE

This course is a complete course in elementary algebra. Because students in this course may not have a solid foundation in the arithmetic and prealgebra skills necessary for success in beginning algebra, this class meets for two periods every day. This course provides extra support to build a solid foundation for future mathematics courses.

## Algebra 1 levels 2 & 3

OPEN TO FRESHMEN  
PREREQUISITE: NONE

Elementary algebra focuses on the structure of the real number system. The solution of equations, inequalities, and systems of equations and inequalities is presented. Graphing, both as a means of displaying data and analyzing data in one and two dimensions, is an integral part of these courses. A sound foundation in arithmetic and prealgebra skills is essential for success in these courses.

## Plane Geometry levels 2, 3, & 4

OPEN TO FRESHMEN AND SOPHOMORES  
PREREQUISITE: ALGEBRA 1

The basic content of this course is plane geometry with integration of transformations and coordinate geometry. This course develops geometric concepts, including the study of formal proofs (including coordinate and indirect methods) and algebraic applications. Algebra is used extensively for areas, volumes, lengths, angle measures, and graphing.

## Algebra 2 Essentials level 2

OPEN TO JUNIORS  
PREREQUISITE: PLANE GEOMETRY, LEVEL 2  
DEPARTMENTAL APPROVAL REQUIRED

This intermediate algebra course is a continuation of Algebra 1. An emphasis is placed upon understanding relations and functions, including quadratic functions, exponential functions, logarithmic functions, and rational functions. The unit circle, probability, series and sequences, and the complex number system are introduced. Additional emphasis is placed on the development of skills necessary to be successful in mathematics. This course covers the majority of content in the Algebra 2, level 2 course, including that content necessary for standardized testing and state standards. Students who complete this course must enroll in College Algebra/Probability & Statistics in the following year.

## Algebra 2 levels 2 & 3

OPEN TO SOPHOMORES AND JUNIORS  
PREREQUISITE: PLANE GEOMETRY

This intermediate algebra course is a continuation of Algebra 1, including the solutions of equations, inequalities, and systems. An emphasis is placed upon understanding relations and functions, including quadratic functions, exponential functions, logarithmic function, rational functions, and polynomial functions. The unit circle, probability and statistics, series and sequences, and the complex number system are introduced.

## Algebra 2/College Algebra & Trigonometry level 4

OPEN TO FRESHMEN AND SOPHOMORES  
PREREQUISITE: PLANE GEOMETRY, LEVEL 4

This course includes topics from intermediate algebra, college algebra, and analytic geometry, including the study of functions, transformations, matrix theory, theory of equations, and an introduction to probability. This course includes the equivalent of a semester study of trigonometry.

## College Algebra/Probability & Statistics level 2

OPEN TO SENIORS  
PREREQUISITE: ALGEBRA 2 OR ALGEBRA 2 ESSENTIALS  
DEPARTMENTAL APPROVAL REQUIRED

This course provides a fourth year of mathematics for students who want an alternative to the traditional senior mathematics course which includes a semester of trigonometry. The content of this course includes functions and their graphs, matrices, linear programming, probability, introductory statistics, and right triangle trigonometry.

## Precalculus/College Algebra & Trigonometry level 2

OPEN TO JUNIORS AND SENIORS  
PREREQUISITE: ALGEBRA 2  
DEPARTMENTAL APPROVAL REQUIRED

This course includes the study of linear functions, equations, and inequalities, analysis of graphs of functions, trigonometry, exponential and logarithmic functions, and rational functions. Emphasis is placed on problem solving techniques and aims to build upon and extend skills gained in previous math courses. Students who register for this course should have earned at least a C- grade in Algebra 2, level 2, or received a recommendation from the Algebra 2 teacher to take this course.

## Precalculus/College Algebra & Trigonometry level 3

OPEN TO JUNIORS AND SENIORS  
PREREQUISITE: ALGEBRA 2

This course builds on the topics studied in Algebra 2 and includes the equivalent of a semester study of trigonometry. A rigorous study of rational, exponential, logarithmic, and trigonometric functions and their behavior is completed in this course, along with an in-depth study of additional topics in trigonometry, analytic geometry, including conic sections, vectors, and an introduction to parametric equations, polar equations, limits, matrices, and select calculus concepts.

## Analytic Geometry/ Precalculus & Discrete Mathematics level 4

OPEN TO SOPHOMORES, JUNIORS, AND SENIORS  
PREREQUISITE: ALGEBRA 2/COLLEGE ALG & TRIG

This course builds upon the topics studied in Algebra 2, College Algebra/Trigonometry. The content includes two and three dimensional vectors, transformations (including matrix definitions), and topics of discrete mathematics (including algorithms, graphs and trees, and probability). Introductory calculus topics are discussed.

## Senior Mathematics Survey level 2

OPEN TO SENIORS  
PREREQUISITE: PRECALCULUS/COLLEGE ALGEBRA & TRIGONOMETRY  
DEPARTMENTAL APPROVAL REQUIRED

This two-semester course is designed for the college-bound senior who has taken Precalculus, College Algebra/Trigonometry at level 2. Topics studied include discrete mathematics, logic, combinatorics, statistics, probability, number theory, graph theory, voting methods, and non-Euclidean geometry. The course will include a review of trigonometry, functions, and other pre-calculus topics as well as a preview of calculus.

## Introduction to Calculus and Statistics/ Mathematics Modeling & Applications level 3

OPEN TO SENIORS  
PREREQUISITE: PRECALCULUS/COLLEGE ALG & TRIG, LEVEL 3  
DEPARTMENTAL APPROVAL REQUIRED

The first semester of this course studies applied topics in calculus and statistics. Calculus topics include a basic study of derivatives and their applications in physical science, business, and optimization problems. Statistics topics extend students' prior learning beyond measures of central tendency, dispersion, and basic regression to include investigations and projects involving experimental design, probability and sampling distributions, confidence intervals, and some hypothesis testing. In the second semester, topics include, but are not limited to, voting and apportionment, integer representation, and matrix algebra.

## Analytic Geometry/Discrete Mathematics level 3

OPEN TO JUNIORS AND SENIORS  
 PREREQUISITE: ALGEBRA 2/COLLEGE ALG & TRIG, LEVEL 4 OR  
 PRECALCULUS/COLLEGE ALGEBRA/TRIGONOMETRY, LEVEL 3  
 DEPARTMENTAL APPROVAL REQUIRED

This course is a precalculus course with an emphasis on proofs. It serves as a precalculus course for students who have completed level 4 Algebra 2, College Algebra/Trig and is an option for students who have completed level 3 precalculus but do not take calculus or statistics. Topics studied include two and three-dimensional vectors, the logic of proofs and problem solving, analyzing functions, complex numbers and number systems, and a preview of calculus.

## AP Calculus AB level 4

OPEN TO SENIORS  
 PREREQUISITE: PRECALCULUS/COLLEGE ALG & TRIG, LEVEL 3 OR ANALYTIC GEOM/  
 DISCRETE MATHEMATICS  
 DEPARTMENTAL APPROVAL REQUIRED

This course provides the equivalent of one semester of college calculus. Topics studied include limits, continuity, derivatives and their applications, slope fields, and integrals and their applications. Students enrolled in this course are required to take the Advanced Placement examination in AB Calculus. On the basis of this examination, the student's college will determine how much advanced placement and/or credit in college mathematics the student will receive.

## AP Calculus BC level 4

OPEN TO JUNIORS AND SENIORS  
 PREREQUISITE: ANALYTIC GEOM/PRECAL & DISCRETE MATH  
 DEPARTMENTAL APPROVAL REQUIRED

This course is the equivalent of a full-year of college calculus. All the topics in AP calculus AB are studied in this course. Other topics include motion in the plane, Euler's method, parametric and polar functions, improper integrals, and sequences and series. Students enrolled in this course are required to take the Advanced Placement examination in BC Calculus. On the basis of this examination, the student's college will determine how much advanced placement and/or credit in college mathematics the student will receive.

## AP Statistics level 4

OPEN TO SENIORS  
 PREREQUISITE: PRECALCULUS/COLLEGE ALG & TRIG, LEVEL 3 OR ANALYTIC GEOM/  
 PRECAL & DISCRETE MATH AND CONCURRENT ENROLLMENT IN SENIOR ENGLISH  
 DEPARTMENTAL APPROVAL REQUIRED

This course provides college-level work in statistics, data analysis, and probability. The course is built around 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: introducing probability and simulation; and 4) Statistical Inference: confirming models. Students enrolled in this course are required to take the Advanced Placement examination in Statistics. On the basis of the student's performance on this examination, the student's college will determine how much advanced placement and/or credit in college statistics the student will receive.

## Multivariable Calculus/Linear Algebra level 4

OPEN TO SENIORS  
 PREREQUISITE: AP CALCULUS BC

This course is a two-semester post calculus course. The first semester covers topics in multivariable calculus. Included are vectors in two and three-dimensions, solid analytic geometry, differential calculus of several variables (including directional derivatives and gradients), and line and surface integrals. The second semester of the course is linear algebra. The course includes general vector spaces in n-dimensional Euclidean space and over the complex numbers, inner product spaces, eigenvalues and eigenvectors, linear transformations, applications of vector spaces, and numerical methods.

## Computer Science level 9

OPEN TO SOPHOMORES, JUNIORS, AND SENIORS  
 PREREQUISITE: PLANE GEOMETRY

This enrichment course is an introduction to computer science with an emphasis on computer programming. Students will study the logical structures of computer programming, algorithms, and computational thinking in multiple programming environments.

## AP Computer Science level 4

OPEN TO JUNIORS AND SENIORS  
 PREREQUISITE: PRECALCULUS/COLLEGE ALG & TRIG, LEVEL 3,  
 ANALYTIC GEOM/DISCRETE MATH, LEVEL 3, OR  
 ANALYTIC GEOM/PRECAL & DISCRETE MATH, LEVEL 4  
 DEPARTMENTAL APPROVAL REQUIRED

This course provides the equivalent of one semester of college computer science. The major emphases of the course are programming methodology, algorithms, and real world applications. Students will learn the programming language required in the Advanced Placement course description in Computer Science A. Students enrolled in this course are required to take the Advanced Placement examination in Computer Science A. On the basis of the student's performance on this examination, the student's college will determine how much advanced placement and/or credit in computer science the student will receive.

## Basic Mathematics 1 level 2

OPEN TO FRESHMEN  
 PREREQUISITE: NONE

Enrollment in this course must be approved by the department chair. This course and Basic Math 2 provide a two-year sequence in mathematics for students who have not demonstrated readiness for college preparatory mathematics. The emphasis is on basic skills and problem solving. The content includes a review of arithmetic, prealgebra, informal geometry, measurement, and introductory statistics. A special effort is made to give the students the help they need to develop good study habits, to improve their organizational skills, and to enhance their understanding and appreciation of mathematics.

## Basic Mathematics 2 level 2

OPEN TO SOPHOMORES  
 PREREQUISITE: BASIC MATH 1

Basic Math 2 builds on the foundation begun in the Basic Math 1 course. Emphasis is on problem solving and calculator use. Other areas of study include introductory geometry and informal algebra.

## Informal Geometry level 2

OPEN TO SOPHOMORES, JUNIORS, AND SENIORS  
 PREREQUISITE: ALGEBRA 1 OR DEPARTMENTAL APPROVAL

This course is for students who are not yet ready for the college preparatory level of work in geometry. Some students from Algebra 1 may be advised to take this course instead of Plane Geometry. The content is geometry without formal proof.

## Consumer Mathematics level 2

PREREQUISITE: ONE YEAR OF HIGH SCHOOL MATHEMATICS

This course seeks to develop mathematical skills and problem solving strategies. Topics relate to consumerism and include probability and statistics, transportation, housing and other basic living expenses and personal finance. A year of this course fulfills the state requirement in consumer education.

## ESL Math Resource level 8

This course serves English Language Learners as they transition into mainstream math classes. The course primarily helps students identify new vocabulary in advance of each chapter and provides strategies for learning and properly applying the terms. Additionally, there is support for understanding math concepts as they relate to the difficulties faced by an English Language Learner. The teacher will be in contact with the classroom math teacher, but students will be expected to develop their own self-advocacy skills. This course is taken in addition to a mainstream math class. Enrollment is based on placement by the ESL Coordinator.

# MATHEMATICS

## Course Classifications

Each course has a six-digit number. For example, the course number for Algebra 1 at level 3 is “400133.” The first three digits, “400,” identify the department. The fourth digit, “1,” indicates the year the course is usually taken. The fifth digit, “3,” identifies the semester the course is offered; full-year courses are assigned a “3” to represent both semesters. The sixth digit, “3,” indicates the level.

ESL Math Resource.....	400138
Basic Math 1 .....	401132
Basic Math 2.....	401232
Algebra 1 (Double Period).....	405132
Algebra 1.....	400132
Algebra 1 .....	400133
Plane Geometry .....	400134
Plane Geometry.....	400232
Plane Geometry.....	400233
Alg2/College Alg & Trig.....	400234
Algebra 2 Essen .....	402332
Algebra 2 .....	400332
Algebra 2 .....	400333
Analytic Geom/Precalc & Discrete Math.....	400334
Precalc/College Alg & Trig.....	400432
Precalc/College Alg & Trig.....	400433
AP Calculus AB .....	400434
AP Calculus BC .....	401434
Sr Math Survey.....	400532
Analytic Geom/Discrete Math.....	400533
MV Calc/Linear Algebra .....	400534
Intro Calc & Stats/Math Mod & App.....	401433
Informal Geometry.....	405232
Consumer Math .....	405332
Computer Science.....	405339
College Alg/Prob & Stats .....	405432
AP Statistics .....	405434
AP Comp Sci .....	406434