MATHEMATICS AND COMPUTER SCIENCE DIVISION

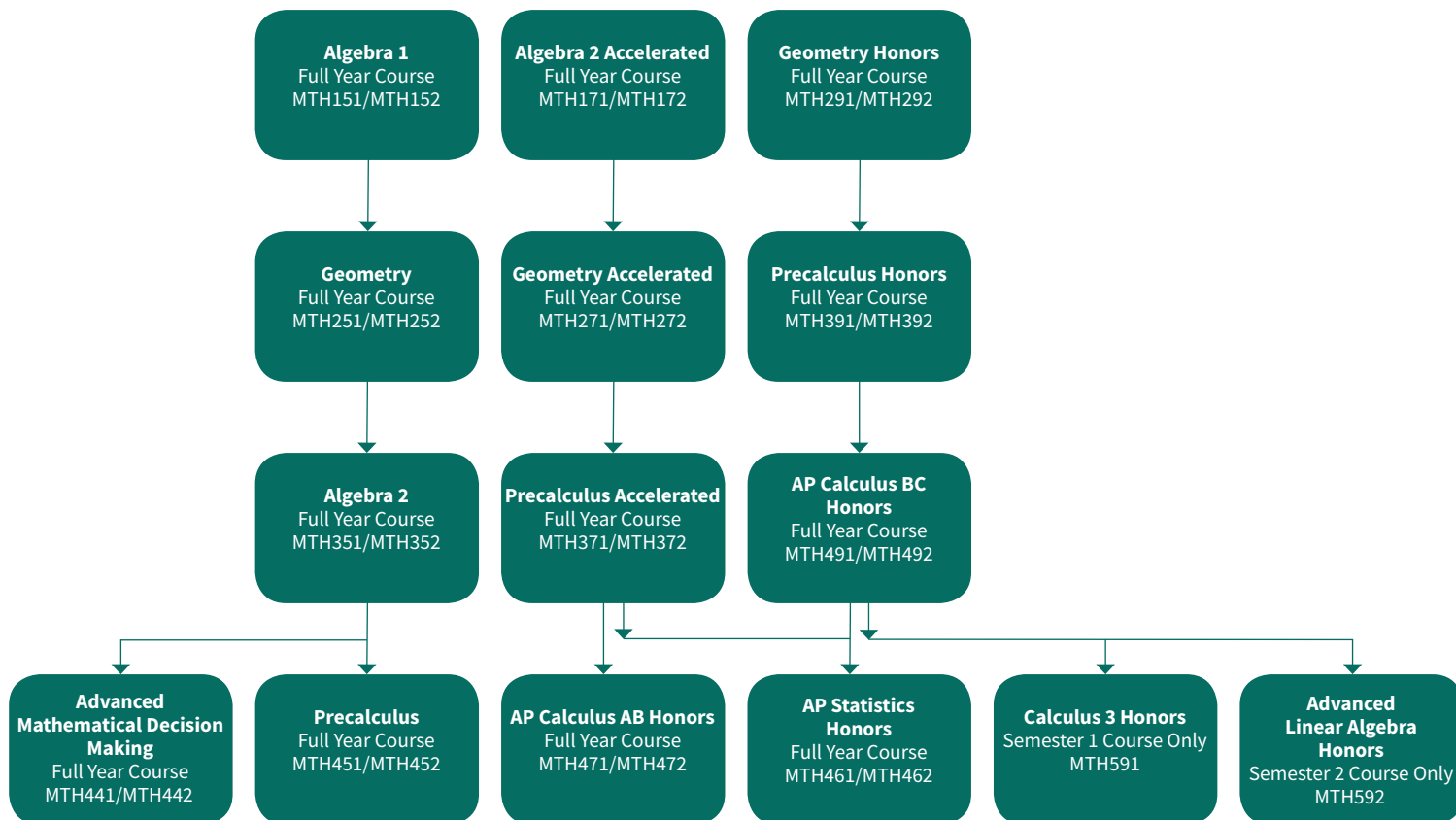**DARSHAN JAIN, DIRECTOR** | DJAIN@D125.ORG | 847-415-4600

The Mathematics and Computer Science Division course offerings provide options and electives for meeting individual needs, experiences, and goals of all students. Course offerings provide opportunities for the development of problem-solving skills and techniques for theoretical and applied settings. Instructional design promotes collaborative, student-engaged learning activities. Graphing calculators are used as an integral part of concept development. These skills and techniques will serve the student in future career and educational undertakings.

Students must pass at least six semesters including Algebra and at least one course with geometry content.
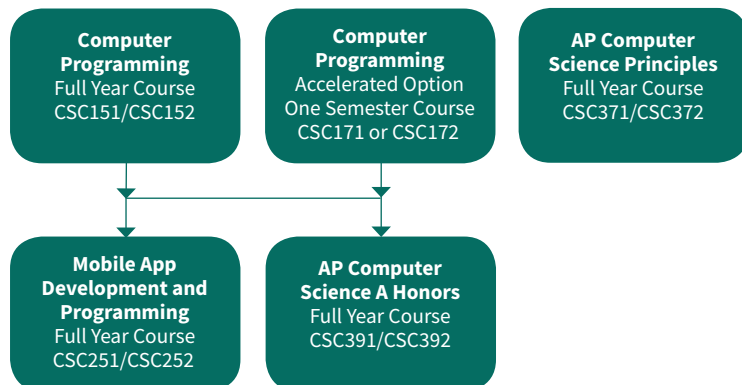
MATHEMATICS AND COMPUTER SCIENCE COURSE OFFERINGS

MATHEMATICS COURSE PATHWAY

Algebra 1 Full Year Course MTH151/MTH152	**Algebra 2 Accelerated** Full Year Course MTH171/MTH172	**Geometry Honors** Full Year Course MTH291/MTH292

Geometry Full Year Course MTH251/MTH252	**Geometry Accelerated** Full Year Course MTH271/MTH272	**Precalculus Honors** Full Year Course MTH391/MTH392

Algebra 2 Full Year Course MTH351/MTH352	**Precalculus Accelerated** Full Year Course MTH371/MTH372	**AP Calculus BC Honors** Full Year Course MTH491/MTH492

Advanced Mathematical Decision Making Full Year Course MTH441/MTH442	**Precalculus** Full Year Course MTH451/MTH452	**AP Calculus AB Honors** Full Year Course MTH471/MTH472	**AP Statistics Honors** Full Year Course MTH461/MTH462	**Calculus 3 Honors** Semester 1 Course Only MTH591	**Advanced Linear Algebra Honors** Semester 2 Course Only MTH592

CALCULATOR RECOMMENDATION:
A TI-84 Plus CE calculator is recommended for all mathematics courses. TI-Nspire CX and TI-Nspire CX CAS calculators are also acceptable.

COMPUTER SCIENCE COURSE PATHWAY

Computer Programming Full Year Course CSC151/CSC152	**Computer Programming** Accelerated Option One Semester Course CSC171 or CSC172	**AP Computer Science Principles** Full Year Course CSC371/CSC372

Mobile App Development and Programming Full Year Course CSC251/CSC252	**AP Computer Science A Honors** Full Year Course CSC391/CSC392

MATHEMATICS DIVISION

ALGEBRA 1 (COLLEGE PREP)

MTH151—SEMESTER 1   MTH152—SEMESTER 2
OPEN TO 9-10   FULL YEAR
PREREQUISITE: COMPLETION AND DEMONSTRATED PROFICIENCY IN COMMON CORE STATE STANDARDS MATHEMATICS GRADE 8 (CCSSM8).

This course is designed to engage students in the practice of mathematics by developing an understanding of mathematical relationships, functions, and models, both in and out of context, with an emphasis on problem solving. Algebraic topics will be developed and valued conceptually leading to procedural fluency. Students will utilize concepts, skills, representations, and techniques that address linear functions, exponential functions, quadratic functions, and systems of equations. This course also uses statistical models to analyze relationships represented by data. Successful completion of this course will prepare students for entry into Geometry.

GEOMETRY (COLLEGE PREP)

MTH251—SEMESTER 1   MTH252—SEMESTER 2
OPEN TO 10-11   FULL YEAR
PREREQUISITE: ALGEBRA 1

This course deals with sets of points and related properties. Sets studied include lines, angles, polygons, with emphasis on circles, planes, and surfaces of geometric solids such as pyramids, cones, cylinders and spheres. This course emphasizes systematic approaches to and processes for proving and applying theorems. Algebra is utilized extensively during the course. Successful completion of this course prepares the students for further work in Algebra 2.

ALGEBRA 2 (COLLEGE PREP)

MTH351—SEMESTER 1   MTH352—SEMESTER 2
OPEN TO 11-12   FULL YEAR
PREREQUISITE: GEOMETRY

This course is designed to provide students with a thorough background in advanced algebraic topics in preparation for continued coursework in Precalculus (MTH451/452) and Advanced Mathematical Decision Making (MTH441/442). Central to classroom experience is extending prior coursework and improving mathematical reasoning skills. Topics include inverses and transformations of functions, the study of the polynomial, rational, exponential, logarithmic, and trigonometric function families with an increased emphasis on modeling, and systems of equations, probability, and statistics.

PRECALCULUS (COLLEGE PREP)

MTH451—SEMESTER 1   MTH452—SEMESTER 2
OPEN TO 11-12   FULL YEAR
PREREQUISITE: ALGEBRA 2

This course includes the topics of polynomial, rational and algebraic functions, complex numbers, trigonometric equations, identities, inverse trigonometric functions, statistics, logarithms, permutations, combinations, and probability. Students completing this course will be prepared for a college-level calculus course.

ADVANCED MATHEMATICAL DECISION MAKING (COLLEGE PREP)

MTH441—SEMESTER 1   MTH442—SEMESTER 2
OPEN TO 12   FULL YEAR
PREREQUISITE: ALGEBRA 2

This course is designed for students who are college bound non-mathematics majors. Specific emphasis will be on problem solving using ratio, rate and proportions, probability, combinatorics, graph theory, finance, statistical analysis, mathematical modeling using logistic growth, exponential, periodic functions, and finance.

ALGEBRA 2 (ACCELERATED)

MTH171—SEMESTER 1   MTH172—SEMESTER 2
OPEN TO 9-10-11   FULL YEAR
PREREQUISITE: COMPLETION AND DEMONSTRATED PROFICIENCY IN
ALGEBRA 1

This course is designed to provide students with an extensive background in advanced algebraic topics. Students will investigate a wide array of topics including inverses and transformations of functions, the study of the polynomial, exponential, rational, exponential, logarithmic, and trigonometric function families with an increased emphasis on modeling, systems of equations, probability, and statistics. Within these topics, some are studied at greater depth in order to prepare students to take advanced mathematics courses such as calculus, advanced statistics, or discrete mathematics. Successful completion of this course prepares the student for Geometry Accelerated.

GEOMETRY (ACCELERATED)

MTH271—SEMESTER 1   MTH272—SEMESTER 2
OPEN TO 9-10-11   FULL YEAR
PREREQUISITE: ALGEBRA 2 ACCELERATED

This course requires students to complete an in-depth study of Euclidean Geometry. Topics include coordinate geometry, proof, congruent triangles, similar triangles, polygons, circles, area, and volume. The course teaches and extends problem solving skills and the development of logical reasoning to communicate mathematics. Successful completion of this course prepares a student for Precalculus Accelerated.

PRECALCULUS (ACCELERATED)

MTH371—SEMESTER 1   MTH372—SEMESTER 2
OPEN TO 10-11-12   FULL YEAR
PREREQUISITE: GEOMETRY ACCELERATED

This course provides an in-depth study of precalculus mathematics. Topics include polynomial, rational, algebraic, exponential, logarithmic and trigonometric functions and relations, conics and their properties, the complex number system, inequalities, probability, and statistics. Successful completion of this course provides the student with the necessary prerequisites for AP Calculus AB.

GEOMETRY (HONORS)

MTH291—SEMESTER 1   MTH292—SEMESTER 2
OPEN TO 9-10   FULL YEAR
PREREQUISITE: COMPLETION AND DEMONSTRATED PROFICIENCY IN
ALGEBRA 2 ACCELERATED

This course is an in-depth study of Euclidean geometry including extension topics of coordinate geometry, geometric probability and transformations. The course stresses problem solving skills and the development of logical reasoning and communication of mathematics. Algebra 2 topics are integrated extensively throughout the course. Successful completion will prepare the student for Precalculus Honors.

PRECALCULUS (HONORS)

MTH391—SEMESTER 1   MTH392—SEMESTER 2
OPEN TO 10-11   FULL YEAR
PREREQUISITE: GEOMETRY HONORS

This course is a continuation of the mathematics studied in Algebra 2 Accelerated and Geometry Honors. The content includes that of Precalculus Accelerated as well as topics related to limits, vector theory, matrix algebra, discrete mathematics, polar coordinates, proof by induction, and conic sections. Successful completion of this sequence prepares the student for entry into AP Calculus BC.

AP CALCULUS AB (HONORS)

MTH471—SEMESTER 1   MTH472—SEMESTER 2
OPEN TO 11-12   FULL YEAR
PREREQUISITE: PRECALCULUS ACCELERATED

AP Calculus AB is primarily concerned with developing students' understanding of the concepts of calculus and providing experience with its methods and applications. The course emphasizes a multi-representational approach to calculus with concepts, results, and problems expressed graphically, numerically, analytically, and verbally. The connections among these representations are also important. Topics covered in this course include limits, differentiation, integration, continuity, indeterminate forms, and improper integrals. Students who enroll in this course will be prepared to take the AP Calculus AB exam in May.

AP CALCULUS BC (HONORS)

MTH491—SEMESTER 1
OPEN TO 11-12
MTH492—SEMESTER 2
FULL YEAR
PREREQUISITE: PRECALCULUS HONORS

This course deals with the BC content of the AP curriculum beyond that of the Calculus AB sequence. Additional topics include sequences, infinite series, solutions of differential equations, advanced techniques of integration, as well as parametric and polar equations. Students who enroll in this course will be prepared to take the AP Calculus BC exam in May.

AP STATISTICS (HONORS)

MTH461—SEMESTER 1
OPEN TO 11-12
MTH462—SEMESTER 2
FULL YEAR
PREREQUISITE: PRECALCULUS (ANY LEVEL)

The purpose of the AP course in statistics 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—Exploring Data: describing patterns and departures from patterns; Sampling and Experimentation: planning and conducting a study; Anticipating Patterns: exploring random phenomena using probability and simulation, and Statistical Inference: estimating population parameters and testing hypotheses. Students who enroll in this course will be prepared to take the AP Statistics exam in May.

CALCULUS 3 (HONORS)

MTH591—SEMESTER 1 ONLY
OPEN TO 11-12
ONE SEMESTER
PREREQUISITE: AP CALCULUS BC

This course is the last of a three course sequence in calculus and analytic geometry and includes the essential elements of multi-variable calculus as well as the analytic geometry of space. Content focus is on vectors, functions of several variables, curves and surfaces, differentiation, partial derivatives, multiple integrals and surface integrals.

ADVANCED LINEAR ALGEBRA (HONORS)

MTH592—SEMESTER 2 ONLY
OPEN TO 11-12
ONE SEMESTER
PREREQUISITE: AP CALCULUS BC

The course covers matrices and the algebra of linear systems. Content includes equations, vector spaces, real inner product spaces, linear transformations, determinants, eigenvalues, eigenvectors, diagonability, quadratic forms, and symmetric matrices. This course is equivalent to a one semester college linear algebra course.

COMPUTER SCIENCE DEPARTMENT

COMPUTER PROGRAMMING (COLLEGE PREP)

CSC151—SEMESTER 1
OPEN TO 9-10-11-12
CSC152—SEMESTER 2
FULL YEAR
PREREQUISITE: CONCURRENT ENROLLMENT OR DEMONSTRATED PROFICIENCY IN ALGEBRA 1

This full year course introduces students to computer programming and computational thinking with an emphasis on problem solving. Students will learn how to read and program code in Python and Java programming languages. The course introduces students to writing programs that make decisions using conditional statements and iteration through the use of looping structures. By the end of the year, students will be able to produce their own unique and creative game(s), which may include animation, importing pictures, and sound. Projects include interactive programs with keyboard and/or mouse inputs that display text and/or graphics. Students cannot earn credit in CSC151/152 and Computer Programming Accelerated (CSC171/172).

COMPUTER PROGRAMMING (ACCELERATED)

CSC171—SEMESTER 1
OPEN TO 9-10-11-12
CSC172—SEMESTER 2
ONE SEMESTER
PREREQUISITE: CONCURRENT ENROLLMENT OR DEMONSTRATED PROFICIENCY IN ALGEBRA 1

This semester course introduces students to computer programming and computational thinking at an accelerated pace with an emphasis on problem solving. Students will learn how to read and program code in the Python and Java programming languages. Projects include interactive programs that display text and/or graphics. The course introduces how to write programs that make decisions using conditional statements and iteration through the use of looping structures. Students may enroll in either CSC171 (semester 1 only) or CSC172 (semester 2 only). Students cannot earn credit in CSC151/152 and Computer Programming Accelerated (CSC171 or 172).

AP COMPUTER SCIENCE A (HONORS)

CSC391—SEMESTER 1
OPEN TO 10-11-12
PREREQUISITE: COMPUTER PROGRAMMING OR COMPUTER PROGRAMMING ACCELERATED AND CONCURRENT ENROLLMENT OR CREDIT IN ALGEBRA 2 ACCELERATED

CSC392—SEMESTER 2
FULL YEAR

This course introduces students to object-oriented programming methodology with an emphasis on problem solving and algorithm development. It is meant to be the equivalent of a first-semester college course in Computer Science. Students will learn how to code more sophisticated concepts in Java. The course emphasizes the design issues that make programs understandable, adaptable and reusable. It also includes the study of fundamental data structures, abstraction, and recursion. Students who enroll in this course will be prepared to take the AP Computer Science A exam in May.

AP COMPUTER SCIENCE PRINCIPLES (HONORS)

CSC371—SEMESTER 1
OPEN TO 10-11-12
PREREQUISITE: ALGEBRA 1

CSC372—SEMESTER 2
FULL YEAR

This course provides students with an understanding of the fundamental concepts of computing, its breadth of application, and its potential for transforming the world we live in. Students enrolled in this course will discover that computing is a creative activity; abstraction reduces information and detail to facilitate focus on relevant concepts; data and information facilitate the creation of knowledge; algorithms are used to develop and express solutions to computational problems; programming enables problem solving, human expression, and creation of knowledge; the internet pervades modern computing; and computing has a global impact. Student discovery and creativity are central to the delivery of course curriculum. Students will find opportunities to be challenged and to discover the creativity within computing, regardless of their programming or computing background. Students who enroll in this course will be prepared to take the AP Computer Science Principles exam in May.

MOBILE APP DEVELOPMENT AND PROGRAMMING (COLLEGE PREP)

CSC251—SEMESTER 1
OPEN TO 9-10-11-12
PREREQUISITE: COMPUTER PROGRAMMING OR COMPUTER PROGRAMMING ACCELERATED

CSC252—SEMESTER 2
FULL YEAR

This full year course introduces students to the world of app development for mobile devices (such as smartphones and tablets). Students will work in a collaborative, lab-based environment that utilizes industry-standard processes and development strategies similar to those a professional app development company might employ. Each unit begins by introducing students to specific skills and ideas that will be used to modify and redesign existing mobile apps. Each unit concludes with students applying the concepts learned to create an application on their own. Topics include: event-driven programming strategies, app structure, algorithm design, and user-interface design. Successful completion of this course provides students with a strong command of the fundamental strategies necessary to develop high quality apps.