

MATHEMATICS

Mathematics is offered in three college preparatory sequences. Generally, students take a four-year sequence that leads to readiness for the first calculus course in college. For those beginning this sequence in the 9th grade, the courses taken are Algebra I, Geometry, Algebra 2 and Pre-Calculus.

Highly motivated students take a sequence that prepares them for the AB Calculus Advanced Placement depending on teacher recommendation. Some students take Algebra IA, Geometry A, Algebra 2/Trig Honors and Intro to Analysis Calculus or AB Calculus with teacher approval. Others might take Alg IA/Geom A, Alg 2/Trig H, IA-C and AB Calculus as seniors.

The most advanced students take a four-year sequence that culminates with the BC Calculus Advanced Placement exam as a senior. Those who do well on this test receive a year of credit at most colleges. For those beginning this sequence in the 9th grade, the courses taken are Geometry/Algebra 2A, Trigonometry/Analytic Geometry Honors, Analysis Honors and BC Calculus AP.

Elective courses are offered in Computer Science and Advanced Placement Statistics.

ALGEBRA / GEOMETRY

ALGEBRA 1.1

2313 Alg I.1 Year 9-10

Suggested Course Preparation: Satisfactory achievement in arithmetic.

The objective of this course is to prepare students for Algebra I. Course content includes work in basic skills, problem solving, patterns, number properties, equations and inequalities, exponents, negative numbers, simple linear equations, formulas, basic statistics, basic geometry, and measurement.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class Work: 1.5 hours per week

ALGEBRA 1

2347 ALG I Year 9-10

Suggested Course Preparation: Completion of 8th grade math with a C or better.

The objectives of this course include the solving and graphing of linear and quadratic functions and inequalities. The course content includes the following: work with sets of rational and irrational numbers and their properties; solution of linear equations and inequalities and graphs of both linear and quadratic functions; solving systems of equations both graphically and with linear combinations; products and factoring of polynomial, rational expressions, exponents, elementary statistics and probability, and problem solving.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class Work: 2 hours per week

ALGEBRA 1A

2348 ALG 1A Year 9

In addition to the objectives of the ALGEBRA I course described above, this course extends mathematical problem solving techniques needed for the applications of Algebra I concepts. Students are evaluated on a deeper understanding of Algebra. Emphasis is placed on solving non-linear equations, solutions of quadratic equations and inequalities, and simplifying rational and radical expressions. Operations with matrices are also included.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class Work: 2 hours per week

ALGEBRA 1A/GEOMETRY A

2355 ALGIAGEOMA Year 9

Suggested Course Preparation: Grade of B or better in 8th grade Algebra I course.

The objectives of this course are to review major Algebra concepts in the first quarter and to complete a full-year study of propositional Euclidean Geometry in the remaining three quarters of the year. Algebra content emphasizes radical equations, systems of equations, and quadratic equations. The Geometry content includes Euclidean topics such as pts, lines, planes, triangles, circles, polygons, solids and constructions. Emphasis is placed on deductive reasoning (and Algebra is integrated with the geometry). The course also includes an introduction to analytic geometry and trigonometry.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class Work: 3 hours per week

GEOMETRY

2357 GEOM Year / Summer 10-12

Suggested Course Preparation: Grades of C or better in ALGEBRA I.

The objective of this course is to complete the study of geometric concepts and facts in a math-applied format. The course content includes all Euclidean facts regarding points, lines, angles, triangles, circles, polygons, solids, classical construction, transformations and some work including space. It also includes deductive reasoning, two column proofs, and proofs by contradiction, as well as an introduction to inductive reasoning.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class Work: 2.5 hours per week

GEOMETRY A

2358 GEOM A Year 10

Suggested Course Preparation: Grades of B or better in ALGEBRA IA.

The objective of this course is to complete a study of propositional Euclidean Geometry. All topics of geometry are learned at a higher level of abstraction and application than in the geometry course above. Algebra is integrated with the geometry and coordinates and transformations are used throughout the course. Emphasis is placed on deductive reasoning. The course content includes Euclidean topics such as points, lines, planes, triangles, circles, polygons, solids, and constructions. The course also includes an introduction to analytic geometry and trigonometry.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class Work: 3 hours per week

GEOMETRY / ALGEBRA 2 ADVANCED

2351 GEOM/ALG2A Year 9

Suggested Course Preparation: Grades of B+/A- or better in a full year Algebra course and teacher recommendation.

This course begins with a short review of second semester Algebra topics and then a short unit of inferential logic. This is followed by a complete Euclidean Geometry course with objectives and content similar in scope to Geometry A (above). During the fourth quarter, selected topics from Algebra 2 are studied.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class Work: 4 hours per week

ALGEBRA 2

ALGEBRA 2

2380 ALG2 Year 11-12

Suggested Course Preparation: Grades of C or better in both ALGEBRA I and GEOMETRY.

The objectives of this course include the following: extension of elementary algebra with emphasis on the structure of the real number system and eventual extension into the complex number system; a careful study of mathematical functions; a reinforcement of the connection between algebra and geometry, between number and space; a further extension of mathematical “systems.” The course content includes the following: the real number system and its extension into the system of complex numbers; mathematical functions—constant, linear, quadratic, rational, logarithmic, exponential and trigonometric; systems of equalities and inequalities; topics from analytic geometry and sequences. The graphing calculator is used in this course.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class Work: 3 hours per week

ALGEBRA 2 / TRIGONOMETRY HONORS

2365 ALG2TRIG H Year 10-11

Suggested Course Preparation: Grades of B- or better in both ALGEBRA IA and GEOMETRY A or ALGEBRA IA / GEOMETRY A.

The objectives of this course include those for Algebra 2 but include a more thorough treatment of trigonometry, including analytic trigonometry and a strong introduction to analytic geometry (graphs of conic, polar and parametric equations). This course utilizes extensively the TI-83 or 84 graphing calculator. Although this course is labeled Honors, it is NOT a weighted course according to the University of California standards, but it may be given extra consideration when applying to private colleges and universities.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6, 7
- Normal Out of Class Work: 3 hours per week

TRIGONOMETRY / ANALYTIC GEOMETRY

2359 TRG/ANLT H Year 10

Suggested Course Preparation: Grades of B or better in GEOMETRY / ALGEBRA 2 ADV or equivalent.

This course covers the topics included in Alg 2/Trig H, but with a higher level of abstraction and application. The objectives of this course include emphasis on functions, trigonometry, and analytic geometry. The course content includes polynomial, exponential, rational, logarithmic, and trigonometric functions: complex numbers, analytic geometry of points, lines, planes, surfaces, graphs, parametric equations and polar forms. Additional work in 3-D graphs is also included. There is extensive use of the graphic calculator in this course.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6, 7
- Normal Out of Class Work: 4 hours per week

ANALYSIS HONORS

2399 ANALYSIS H Year **11**
Suggested Course Preparation: Grades of B or better in TRIGONOMETRY / ANALYTIC GEOMETRY HONORS or equivalent.

This course has three main components:

1. Review, reinforce, and extend algebraic concepts necessary for Calculus;
2. Learn mathematical applications that are used in business, management, economics, and the life or social sciences;
3. Preparation for BC Calculus by completing Calculus A.

The Pre-Calculus topics that will be reviewed are all basic functions, the trigonometric functions, and the logistic functions. An extended study of vectors in 2-D and 3-D, polar graphs, mathematical induction, and a formal study of limits will also be included. The Finite Mathematics portion of the course will include a study of probability and combinatorics, statistics, matrices and their applications, Markov Chains, series and sequences. The course concludes with Calculus A which includes limits of difference quotients, the derivative and an introduction to the integral.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class Work: 4 hours per week

PRE-CALCULUS

PRE-CALCULUS

2371 PRE CALC Year **12**
Suggested Course Preparation: Grades of C or better in ALGEBRA 2 or grade of C- in ALGEBRA 2 / TRIGONOMETRY HONORS.

The objective of this course is to broaden the student's mathematical understanding of functions. The course will include exponentials, logarithms and extensive study of trigonometry, including sinusoidal applications and polar applications, topics in probability, statistics, sequence and series. The students will also be introduced to the concepts of limit and rate of change.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class Work: 3 hours per week

INTRODUCTORY ANALYSIS & CALCULUS

2385 INTANL/CALC Year **11-12**
Suggested Course Preparation: C or better in ALGEBRA 2 / TRIGONOMETRY HONORS or A- or better in ALGEBRA 2.

The objective of this course is to provide an in-depth study of functions, including trigonometric, exponential, and logarithmic. Trigonometric identities, trigonometric equations, polar coordinates, complex numbers, vectors, matrices. The course will include an introduction to limits, difference quotients, the derivative, and the definite integral.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6
- Normal Out of Class 3 hours per week

COLLEGE CALCULUS AP

AB CALCULUS AP

2449 AB CALC AP Year 12

Suggested Course Preparation: Grade of B or better in ALGEBRA 2 / TRIG H or INTRODUCTORY ANALYSIS AND CALCULUS or equivalent.

NOTE: This course will be open to **seniors** who have completed Alg 2/Trig H or IAC with a B or better (or written teacher approval). The objective of this course is to develop the students' understanding of the concepts of calculus and the ability to represent their results geometrically, numerically, algebraically and verbally. The course content focuses on the four main concepts of calculus—limit, derivative, definite integral, and indefinite integral. Students who perform well in the class may choose to take the Advanced Placement Exam in Calculus AP, administered by CEEB, possibly receiving college placement and/or credit. A graphing calculator is required for this course.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6, 7
- Normal Out of Class Work: 4 hours per week

BC CALCULUS AP

2459 BC CALC AP Year 12

Suggested Course Preparation: Grades of B- or better in ANALYSIS HONORS or equivalent.

The objective of this course is to provide the student with the equivalent of the first year of college calculus. The course of study follows that of the Advanced Placement Program. Students who satisfactorily complete the course will take an Advanced Placement Examination in Mathematics, accepted by most colleges as evidence that the student has mastered the material for the first year of college mathematics and should be given credit and/or special placement in college. The course content includes the following: functions and limits, derivatives of algebraic functions, the definite and indefinite integral, area, volumes of revolution, differentiation of exponential, logarithmic, trigonometric and inverse trigonometric functions, methods of integration, infinite series, simple differential equations, vectors and applications. A graphing calculator is required for this course.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6, 7
- Normal Out of Class Work: 5 hours per week

ADVANCED PLACEMENT STATISTICS

2319 AP STAT Year 11-12

Required Course Preparation: B or better in Alg 2 or equivalent.

The objective of this course is to provide the students with the equivalent of an introductory college-level statistics course for which Advanced Placement credit is an option (pending successful completion of an AP Exam). Course content involves examination of exploratory data analysis, experimental and survey design, the study of random variables (including some probability theory), and inferential statistics for one and two variables. Graphing calculators and computers will be used extensively as an aide to statistical analysis. This course is specifically designed to use the statistical software package on the TI-83 graphing calculator.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6, 7
- Normal Out of Class Work: 2.5 hours per week

PROGRAMMING CONCEPTS

4593 PROGCONCPT Semester 10-12

Suggested Course Preparation: B or higher in GeomA, AlgIA/Geom, or GeomAlg2.

The purpose is to give the students an introduction to programming basics. At the end of the class, the students should be able to write programs using functional and sequential programming. The student should have knowledge of concepts such as iteration, recursion, data structures, file I/O, and data abstraction.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6, 7
- Normal Out of Class Work: 1-2 hours per week

COMPUTER SCIENCE ADVANCED PLACEMENT

2489 COMPSCI AP Year 11-12

Required Course Preparation: A grade of B or better in both Programming Concepts and Intro to Java or completing the AP Computer Science Summer homework.

The course is designed to prepare students for the Advanced Placement Exam. The course includes top down design, iteration, procedures, functions, user-defined types, classes, arrays, files, sets, linked data structures, stacks, queues, pointers binary trees, searching and sorting algorithms. The students should be able to analyze code, in terms of functionality, efficiency, readability, reusability, modularity, and meaning.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6, 7
- Normal Out of Class Work: 4 hours per week

PROGRAMMING USING JAVA

2366 PROG JAVA Semester 10-12

Suggested Course Preparation: Programming Concepts is strongly encouraged. B or higher in Alg 2 or B or higher in GeomA, GeomAlg2 or AlgIA/Geom.

The student should finish this course with a basic, working knowledge of how to write simple JAVA programs. The student will learn how to transfer the techniques from Programming concepts to another language. Additional concepts will include an emphasis on object-oriented programming. Graphics, program design, and the distinction between a compiled and interpreted language will be also part of the course.

The following outcomes/ESLRs can be addressed through this course:

- ESLRs: 1, 2, 5, 6, 7
- Normal Out of Class Work: 1-2 hours per week

NEW MATHEMATICS COURSES FOR 2009-2010

ADVANCED PROBLEM SOLVING IN MATHEMATICS 9-10

2401 ADVPROB I Semester 9-10

2402 ADVPROB II Semester 9-10

Suggested Course Preparation: Grades of "B" or better in 8th grade Algebra or concurrent enrollment in a 9th or 10th grade A or Honors level

The objective of this course is to foster excellence through competition. The course is offered in two discrete semesters, one not the prerequisite of the other, to 9th and 10th graders interested in expanding their mathematical horizon beyond the usual high school curriculum. Mathematical discovery and

alternate methods of proof, shortcuts and multiple solutions to challenging problems and cross-curricular applications are explored. This course is ideal for students interested in participating in contests like the American Mathematics Competition and the Mathematics Olympiad. A minimum of 25 students combined in both AdvProb I, II and AdvProb III, IV is needed for the class to be offered.

Homework average is 2-3 hrs/week.

ADVANCED PROBLEM SOLVING IN MATHEMATICS 11-12

2403	ADVPROB III	Semester	11-12
2403	ADVPROB IV	Semester	11-12

Suggested Course Preparation: Grades of “B” or better in Analysis Honors, AB Calculus or BC Calculus, or a grade of A in IAC/PreCalcA

The objective of this course is to foster excellence through competition. The course is offered in two discrete semesters, one not the prerequisite of the other, to 11th and 12th graders interested in expanding their mathematical horizon beyond the usual high school curriculum. Mathematical discovery and alternate methods of proof, shortcuts and multiple solutions to challenging problems and cross-curricular applications are explored. This course is ideal for students interested in participating in contests like the American Mathematics Competition and the Mathematics Olympiad. A minimum of 25 students combined in both AdvProb I, II and AdvProb III, IV is needed for the class to be offered.

Homework average is 3-5 hrs/week.

ANIMATION IN A VIRTUAL WORLD

3283	ANIMATION	Semester	9-12
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The student will use the computer to tell stories or write games. It incorporates 3D Sims-quality characters and objects (literally—these will be created by Electronic Arts!) combined with a drag-and-drop programming environment to make interesting animations easy. Along the way, the student will learn about 3D modeling, loops, variables, conditionals, event-based programming, concurrent programming, list processing, storyboarding, and object-oriented programming.

Normal homework load 1-2 hours per week.