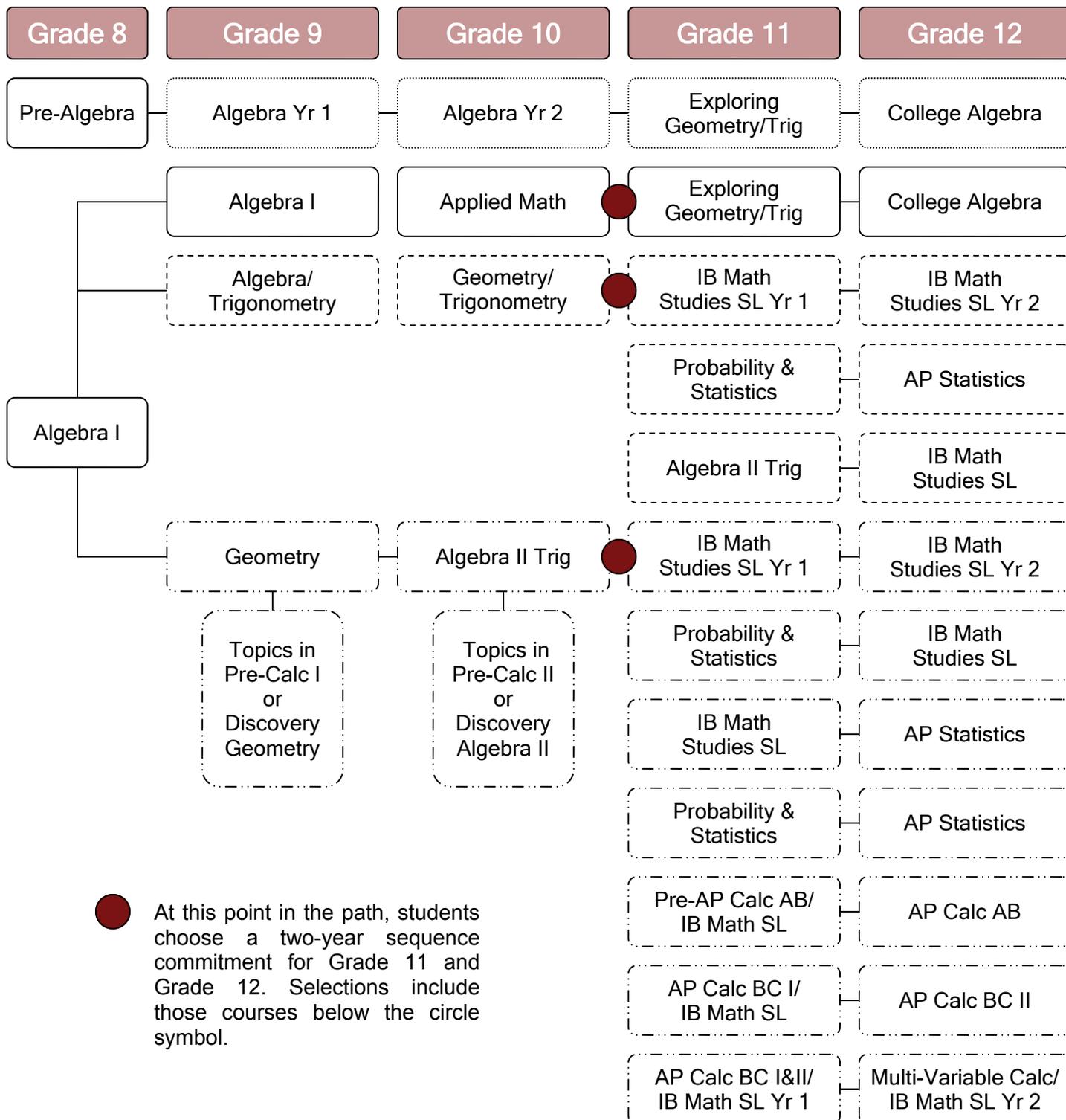


Mathematics and Computer Science

PATHWAYS IN MATHEMATICS



Mathematics and Computer Science

The Harrison High School Mathematics Department is committed to providing students with a challenging mathematics program. It is designed to enable students to gain confidence in their own mathematical ability, enhance their critical thinking and mathematics communication skills, and to connect their experiences in mathematics to the real world. All of our students are encouraged to take four years of mathematics to better meet the demands of our 21st century global society. To achieve this goal, we offer a variety of courses to meet the needs and interests of all students. Recommended prerequisites may be waived under rare circumstances where students demonstrate unusual and outstanding capacities for moving ahead.

ALGEBRA 1

*Course No.: 314c Grades Offered: 9
Credit: 1.0 Examination: Algebra I Regents*

This is the first in the three-year sequence of Common Core State Standards of Mathematics. Successful completion of this course is the minimum requirement to receive a High School Diploma. The primary focus in this course is to develop a strong foundation in relationships between quantities, and reasoning with equations and their graphs. The topics of study include: descriptive statistics, linear and exponential functions, polynomial and quadratic expressions, equations and functions, and a synthesis of modeling with equations and functions. The intent is for students to demonstrate their mathematical thinking through modeling, constructing arguments, attending to precision in problems, and reasoning abstractly and quantitatively. It is required that students use a TI-84+ graphing calculator.

TOPICS IN PRE-CALCULUS I

*Course No.: 319 Grades Offered: 9
Credit: 0.5 (Alternate Day Full Year)
Examination: School Exam
Prerequisite: Algebra 1*

This course is designed for students who wish to accelerate themselves into BC calculus in 11th grade. It will meet every-other day and is designed to be taken at the same time as Geometry. Additionally, those highly motivated

mathematics students who intend to take AP Calculus-BC will become very well prepared for the pre-requisite. It is recommended that students provide their own TI-83 or TI-84+ graphing calculator.

TOPICS IN PRE-CALCULUS II

*Course No.: 323 Grades Offered: 10
Credit: 0.5 (Alternate Day Full Year)
Examination: School Exam
Prerequisite: Topics in Pre-Calculus I*

This course is intended to be the second in a two-year sequence that begins in ninth grade with Topics in Pre-calculus I. The course is generally taken at the same time as Algebra II. By completing the two Topics courses by the end of tenth grade, students then have the option to take AP Calculus BC, either over two years in grades eleven and twelve, or over one year in grade eleven. The latter pathway prepares students to take SUPA Multivariable Calculus in grade twelve. Course topics include set theory, probability, conic sections, polar coordinates, and limits. It is recommended that students provide their own TI-83 or TI-84+ graphing calculator.

GEOMETRY

*Course No.: TBA Grades Offered: 9-11
Credit: 1.0 Examination: Geometry Regents*

This course is the second in the three-year Common Core Standards of High School mathematics sequence. The heart of this course is the study of transformations through constructions and the role transformations play in defining congruence. The topics of study are: congruence, similarity, right triangles and trigonometry, circles, expressing geometric properties with equations, geometric measurement and dimension, and modeling with geometry. The intent is to provide a variety of ways for students to acquire and demonstrate mathematical reasoning ability when solving problems. Students will investigate, explore, and discover many important concepts in Geometry. Students are required to use graphing calculator such as TI-83 or TI-84+ (students may not use calculators that are capable of symbol manipulation or that can communicate with other calculators through any

means), geometric compass with center-wheel, and a ruler.

DISCOVERY GEOMETRY

*Course No.: 388 Grades Offered: 9
Credit: 0.5 (Alternate Day Full Year)
Co-requisite: Integrated Geometry*

This course is designed to gain deeper knowledge of the content from the Geometry curriculum. This course will highlight common areas of struggle for students. Alternative problem solving strategies will be an area of discussion. Topical reviews will occur for both the Geometry midterm and Regents exam.

DISCOVERY TRIGONOMETRY

*Course No.: 389 Grades Offered: 10
Credit: 0.5 (Alternate Day Full Year)
Co-requisite: Algebra II Trigonometry*

This course is designed to gain deeper knowledge of the content from the Algebra 2/Trigonometry Curriculum. This course will highlight common areas of struggle for students. Alternative problem solving strategies will be an area of discussion. Topical reviews for both the Algebra 2/Trig midterm and Regents exams will be included

ALGEBRA II TRIGONOMETRY

*Course No.: 335 Grades Offered: 10-12
Credit: 1.0
Examination: Regents Exam*

This is the third course of the three-unit sequence of credit required for a Regents diploma with Advanced Designation. It is a continuation and extension of both Integrated Algebra and Geometry. While developing the algebraic techniques that will be required of those students that continue their study of mathematics, this course is also intended to develop alternative solution strategies and algorithms. *It is recommended that students provide their own TI-83 or TI-84+ graphing calculator.*

APPLIED MATHEMATICS

*Course No.: 334 Grades Offered: 10-11
Credit: 1.0 Examination: School Exam
Recommended Prerequisite: Algebra I*

This course is designed to reinforce algebraic mathematical concepts and introduce higher-level mathematics

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inquiry. Students will be engaged in activities to investigate and expand on the concepts covered in the Algebra I curriculum. This course will conclude with the completion of a school exam or the Common Core Algebra I exam.

ALGEBRA / TRIGONOMETRY

Course No.: 365 Grades Offered: 9-10
Credit: 1.0 Examination: School Exam

This course is designed for students who wish to strengthen their foundational algebra skills. Topics will build on those covered in Algebra I and II, and expand to include real world applications of trigonometry. The project based nature of this course is intended to develop critical thinking skills as well as prepare students for higher level math courses including IB.

GEOMETRY / TRIGONOMETRY

Course No.: 366 Grades Offered: 10-11
Credit: 1.0 Examination: School Exam

The course will include selected topics from both Geometry and Trigonometry designed to provide foundational skills for higher level math courses. Therefore, students will need to have successfully completed Integrated Algebra and/ or Algebra/ Trigonometry courses. The project based nature of this course is intended to develop critical thinking skills, as well as prepare students for higher level math courses including IB.

IB MATH STUDIES SL

Course No.: 346 Grades offered: 11-12
Credit: 1.0
Examination: Internal Assessment, IB Math Studies SL exam
Prerequisite: Courses taken in Algebra and Geometry

This is a one year IB math standard level course that focuses on a variety of mathematical concepts including algebra, statistics, logic, sets, probability, geometry, trigonometry and calculus. As an IB course, Math Studies will help students to communicate their mathematical understandings clearly and confidently. This course will culminate with an independent project where students will collect or generate measurements to analyze and evaluate the information. In addition, students are expected to sit for the IB

Math Studies SL examinations in May. In accordance with the IB Syllabus, a TI-84+ graphing calculator is an essential tool for this course.

IB MATH STUDIES SL YR 1 & YR 2

Course No.: 347 (Yr 1) 348 (Yr 2)
Credit: 1.0 Grades offered: 11-12
Examination: Internal Assessment, IB Math Studies SL Exam
Prerequisite: Courses taken in Algebra and Geometry

This is a two-year IB math sequence that focuses on a variety of mathematical concepts including algebra, statistics, logic, sets, probability, geometry, trigonometry and calculus. Students will be provided with opportunities to explore different ways of approaching a problem. Therefore, students will need to possess knowledge of basic mathematical concepts, and be equipped with the skills needed to apply simple mathematical techniques correctly. Students will have two years to complete the IB requirements of an independent project and the IB Math Studies SL Exams. In accordance with the IB Syllabus, a TI-84+ graphing calculator is an essential tool for this course.

PRE-AP CALCULUS AB / IB MATH STUDIES SL

Course No.: 342 Grades Offered: 10-12
Credit: 1.0
Examination: School Exam plus IB Internal and External Assessments
Recommended Prerequisite: Algebra 2/Trig

The course content is designed to fulfill the requirements of the IB Math Studies program, as well as prepare students who are interested in taking AP Calculus-AB. Students will be required to complete an internal assessment, which is a statistics based project, as well as take the Math Studies SL exam to receive their IB certificate. There will be a wide range of topics covered that include statistics, functions, conic sections, trigonometry, and an introduction to calculus. *It is recommended that students provide their own TI-83 or TI-84+ graphing calculator.*

ACT / SAT MATHEMATICS PREP

Course No.: 329 Grades Offered: 10-12
Credit: 0.25 (Alternate Days for a Semester)
Examination: Ongoing Sample ACT/SAT Exams
Recommended Prerequisite: Algebra 2/Trig

The ACT/SAT course is an introductory one. Students in this course will explore the typical types of questions found on the ACT/SAT tests: multiple choice questions, and student-response questions. Students will receive instruction in each area, practice their skills and test strategies, and take actual ACT/SAT examinations. These courses will meet every other day for 20 weeks. ACT/SAT Mathematics Prep courses are also offered after school during the academic year and during the summer, but are not credit bearing. Students will have access to the Wilson-Prep on-line ACT/SAT program.

EXPLORING GEOMETRY / TRIG

Course No.: 367 Grades Offered: 11-12
Credit: 1.0 Examination: School Exam

This course covers topics in algebra, geometry, statistics, and trigonometry in order to prepare students for introductory college level mathematics. Students will be introduced to concepts of Algebra II, plane geometry, and descriptive statistics with an emphasis on applications to problem solving. Therefore, students will need to have successfully completed Algebra I prior to taking this course. Topics include simplification of radicals; identifying and evaluating functions; angle relationships; coordinate geometry; geometric probability; right triangle trigonometry; and systems of equations.

COLLEGE ALGEBRA

Course No.: 368 Grades Offered: 12
Credit: 1.0 Examination: School Exam

This is an introductory course in college mathematics. The focus of the course is to prepare students for a College Math placement exam. Topics include fluency with arithmetic without, linear equations, geometry of lines and circles, quadratic equations, functions, and radical expressions and equations.

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AP CALCULUS BC I / IB MATH STUDIES SL

Course No.: 345 Grades Offered: 10-12
Credit: 1.0

Examination: School Exam plus IB Internal Assessments

Recommended Prerequisite: Pre-Calculus

This course is the first in a two year sequence preparing students for the AP Calculus BC exam, which is taken at the end of the second year. Topics covered in the first year are limits, differential calculus, and integral calculus. Applications including particle motion, mathematical modeling, and related rates give students critical insight into the importance of mathematics in the real world. Topics in IB Math Studies are also presented, in preparation for the IB Math Studies exam, which will be taken at the end of the first year. Those topics include logic, probability, set theory, and financial mathematics. It is highly recommended that students take Topics in Pre calculus I and Topics in Pre calculus II before taking this course.

AP CALCULUS BC I AND II / IB MATH STUDIES SL YEAR 1

Course meets for a period and one-half every other day.

Course No.: 356 Grades Offered: 11-12
Credit: 1.5

Examination: AP Calculus BC Exam plus IB Internal Assessments

Recommended Prerequisite: Pre-Calculus

This course is designed for highly motivated students, who wish to successfully complete AP Calculus BC in the Spring of their junior year. Successfully completing AP Calculus BC in one year provides students with the opportunity to study Multivariate Calculus in senior year of High School. The fundamentals and mechanics of Calculus are presented from graphical, numerical, and analytical perspectives. Technology is employed to complete investigations, develop concepts, and illustrate examples. Students will also review and extend their knowledge of Algebra, Geometry, Trigonometry and Pre-Calculus. Furthermore, this class will also lead students to a certificate in IB math studies SL. It is the first year of a two year sequence in IB Math studies that prepares students for the IB math studies exam taken in their senior

year. The course also meets for a double period every other day.

AP CALCULUS BC II

Course No.: 353 Grades Offered: 11-12
Credit: 1.0 Examination: AP Calculus BC
Recommended Prerequisite: AP Calculus BC I

This course is the second in a two year sequence preparing students for the AP Calculus BC exam, which is taken at the end of the year. Topics include techniques of integration, parametric equations and applications to particle motion, polar equations, differential equations, infinite series and Taylor polynomials. It is highly recommended that students take AP Calculus BC I before taking this course.

PROBABILITY AND STATISTICS

Course No.: 386 Grades Offered: 10-12
Credit: 1.0 Examination: School Exam
Recommended Prerequisite: Integrated Geometry

This course designed for students who have an interest in probability and statistics and would like to continue into Advanced Placement Statistics the following year. Data collection, description, and analysis are studied as ways to report findings and build mathematical models for prediction and decision-making. This course is designed to help students build connections between statistics and the real world. Applications will include business, social science and health. An understanding and foundation in algebra is highly recommended. *It is recommended that students provide their own TI-84 graphing calculator.*

AP CALCULUS AB

Course No.: 344 Grades Offered: 11-12
Credit: 1.0

Examination: AP Calculus AB Exam

Recommended Prerequisite: Pre-Calculus

This course is a one year course that culminates in AP credit. It is equivalent to the first semester of college-level calculus (3 credits) and although it is a very rigorous course, it does not move at the same pace as AP Calculus BC. It provides students with experience in advanced placement mathematics and prepares them for college-level coursework. Students will have opportunities

to gain understanding of functions, limits, analytical geometry, curve sketching, and the differential and integral calculus of algebraic and transcendental functions with applications. A review will be given for the Calculus-AB Advanced Placement exam. It is recommended that students provide their own TI-89 graphing calculator.

AP STATISTICS

Course No.: 363 Grades Offered: 11-12
Credit: 1.0

Examination: AP Statistics Exam;

Recommended Prerequisite: Probability and Statistics and Algebra 2/Trig or Calc AB

AP Statistics is a college level course that will introduce students to the major concepts and tools for collecting, assessing, synthesizing, evaluating, and drawing conclusions based on data from a variety of sources. A strong focus of this course is reading, writing and interpreting data. Students will work on activities to collect, explore and make inferences about real world data. It is essential that students have a TI-84+ graphing calculator.

MULTIVARIABLE CALCULUS / IB MATH STUDIES SL YEAR 2

Course No.: 355 Grades Offered: 12
Credit: 1.0

Examination: School Exam; IB Math Studies SL Exam

Recommended Prerequisite: AP Calculus BC Exam

Multivariate Calculus is a course designed for students who wish to pursue Mathematics, Science or Engineering in college, as well as students who wish to take an advanced course in mathematics. This course covers the concepts of vectors, vector valued functions, functions of several variables, partial derivatives and multiple integration. Students will take the Math studies exam in the spring of the school year to complete the requirements for IB credit. As a result of taking this course, students will be eligible to earn course credit for college-level Calculus from Syracuse University's Project Advance (SUPA). To receive credit from Syracuse, students will need to pay a fee and score a 4 or 5 on the AP Calculus BC exam.

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Computer Science

Introduction to
Computer Science (.5)

JAVA Computer Science (.5)

AP Computer Science A (1)

Computer Software
Engineering (SUPA) (1)

INTRODUCTION TO COMPUTER SCIENCE

*Course No.: 644 Grades Offered: 9-12
Credit: 0.5 Examination: School Exam*

This course is designed to teach students to use computer programming as a method of problem solving. Students will learn how to write programs to solve a variety of problems using the visual basic programming language. A large emphasis is placed on analysis of problems and the development of effective algorithms and flowcharts. In addition, the course introduces programming concepts such as operators, decision statements, loops, functions, arrays and sub-procedures. Assignments will include simulations, games, and applications. Students are not required to have a background in computer programming.

JAVA COMPUTER SCIENCE

*Course No.: 645 Grades Offered: 9-12
Credit: 0.5 Examination: School Exam*

This course is an introduction to the JAVA programming language. It includes examples that demonstrate the syntax of the language in an object-

oriented framework, along with standard programming practices such as defining instance methods, working with the built-in data types, creating user-defined data types, and working with reference variables.

AP COMPUTER SCIENCE A

*Course No.: 646 Grades Offered: 10-12
Credit: 1.0
Examination: AP Computer Science Exam
Recommended Prerequisite: Intro to Computers and JAVA*

This course is a college-level programming course in Java. The course will emphasize program methodology, abstraction, and analysis. The course will contain the standard data structures including arrays, files, structures, and classes. Algorithmic design will include searching, sorting, and merging. Major programming projects will be required as well as the modifying and enhancing of existing large programs. This course prepares students for the AP Computer Science A. exam.

COMPUTER SOFTWARE ENGINEERING (SUPA)

*Course No.: 652 Grades Offered: 11-12
Credit: 1.0
Examination: Final Project/Syracuse University Assessments and Final
Recommended Prerequisite: Computer Science A*

This course focuses on software design principles. The course covers the design of computer programs including top-down and object oriented design, analysis, testing, user interface, documentation, data structures, and graphic I/O. Applications are drawn from science and engineering, and programmed in C++. This course is a dual enrollment course through Syracuse University (SUPA). As a result of taking this course, students will be eligible to earn course credit for college-level Calculus from Syracuse University's Project Advance. To receive credit from Syracuse, students will pay a fee.