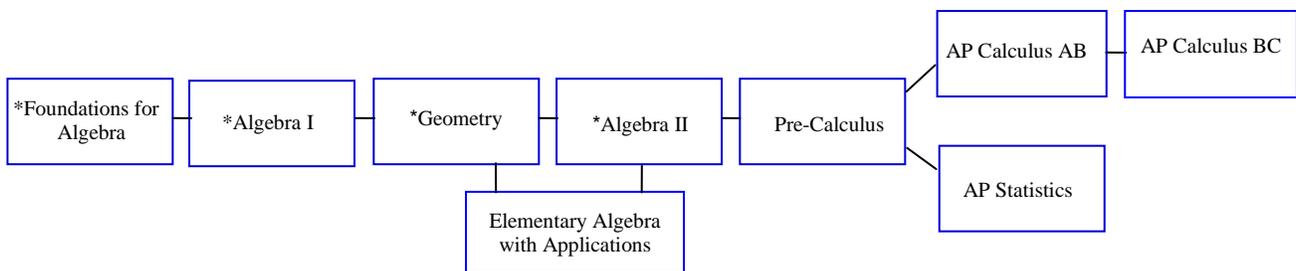# MATHEMATICS

The DeForest Area High School mathematics curriculum is implemented using *College Preparatory Mathematics* (CPM). CPM is a complete, balanced mathematics program for high school students who want to learn the basics and more. The U.S. Department of Education designated CPM "an exemplary program" in October 1999.

Under the careful guidance of their teachers, CPM students explore the major concepts of high school math in a variety of ways designed to provide them with several means to solve math problems. CPM students are assisted in making the transition to higher mathematics by doing problems that illuminate concepts in four major ways: numerically, symbolically, graphically and verbally.

The CPM curriculum aims to actively engage high school students in learning mathematics. It integrates basic skills with higher order thinking processes. Students learn and understand both basic algebraic operations and complex problem solving skills.

DeForest High School math program flow chart:

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                                                            ┌──────────────┐  ┌──────────────┐
                                                            │AP Calculus AB│──│AP Calculus BC│
                                                            └──────────────┘  └──────────────┘
                                                           ╱
┌──────────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────────┐
│*Foundations  │──│*Algebra I│──│*Geometry │──│*Algebra II│──│ Pre-Calculus │
│for Algebra   │  └──────────┘  └──────────┘  └──────────┘  └──────────────┘
└──────────────┘                     │            │        ╲
                              ┌───────────────────────┐     ┌──────────────┐
                              │ Elementary Algebra    │     │ AP Statistics│
                              │ with Applications     │     └──────────────┘
                              └───────────────────────┘
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*   Denotes entry points for incoming freshman to the high school math program. Once in the program, students will follow the progression of courses. All students will be able to complete Algebra II (required for college) or higher.

Additional information on our curriculum program can be found at www.cpm.org

Foundations for Algebra   **4440**   **Credit 1**

This course will prepare you for future Algebra courses. The contents of this course are many of the fundamental ideas and procedures necessary to be successful in subsequent math courses and many careers. During this course you will collaborate with other students as a member of a study team. The investigations, problems, and practice exercises are designed to develop your logical and mathematical reasoning skills. The sequence of problems leads to understanding the reasoning behind the mathematical concepts. You will complete guided investigations that explore and develop ideas, then practice them along with procedural skills in subsequent chapters. In order to be successful in mathematics it is critical that you actively participate in your learning.

<u>FFA2 Units</u>

Data Interpretation	Ratios and proportions
Integer Operations and Graphing Equations	Division of Fractions, Percents & Formulas
Pythagorean Theorem, Surface Area, Volume	Probability & Fractions
Algebraic Sentence	Slopes and Rates of Change
Solving Equations	Exponents, Scientific Notation, and Volume

      Prerequisite(s): Freshman standing

Algebra I   **4140**   **Credit 1**

In this course, you will be exposed to a powerful set of mathematical tools called Algebra. As a set of tools, Algebra is the foundation of higher mathematics. While you learn Algebra, you will become used to a new way of thinking: a way of investigating new situations, discovering new relationships, and figuring out what strategies can be used to solve problems. During this course you will collaborate with other students as a member of a study team. By the end of this course, you will have a powerful set of mathematical tools at your disposal. You will see how these tools connect with each other so that you can use them to solve new problems. In order to be successful in mathematics it is critical that you actively participate in your learning.

<u>Algebra Units</u>

Problem Solving	Systems of Equations
Variables and Proportions	Linear Relationships
Graphs and Equations	Quadratics
Multiple Representations	Inequalities
Multiplication and Proportions	Simplifying and Solving

      Prerequisite(s): Foundations for Algebra with a minimum grade of C recommended, or
                                  recommendation of teacher

Elementary Algebra with Applications   4239   Credit 1
  Dual Credit Option

This course offers traditional algebra topics with applications. Learners develop algebraic problem solving techniques needed for technical problem solving and for more advanced algebraic studies. Topics include linear equations, exponents, polynomials, rational expressions, and roots and radicals. Successful completion of this course prepares learners to succeed in technical mathematics courses**.**

Prerequisite(s): Junior or Senior standing. Recommendation by current math teacher or counselor; Compass test score: Pre-Algebra 43 – 99 or Algebra 1 – 39

This is a dual-credit Madison College (MATC) course. Students who successfully complete the course may earn both DAHS and Madison College (MATC) credits.

Geometry   4544   Credit 1

Geometry centers on the study of shapes. As you study geometry, you will be investigating new situations, discovering relationships, and figuring out what strategies can be used to solve problems. The ideas in this course will be revisited several times and connected to other topics. During this course you will collaborate with other students as a member of a study team. By the end of the course, you will have an understanding of a variety of geometric principals and properties that govern the world around us. You will see how these principles and properties interweave so that you can use them together to solve new problems. In order to be successful in mathematics it is critical that you actively participate in your learning.

Geometry Units
  Shapes and Transformations   Congruent Triangles
  Angles and Measurement   Proof and Quadrilaterals
  Justification and Similarity   Polygons and Circles
  Trigonometry and Probability   Solids and Constructions
  Trigonometry and Triangle Tool Kit   Circles and Expected Values

  Prerequisite(s): Algebra with a minimum grade of C recommended

Algebra II   **4141**   **Credit 1**

In Algebra 2, you will deepen and extend your knowledge of algebra to build a powerful set of mathematical tools for solving problems. Algebra is a way of thinking: a way of investigating new situations, discovering relationships and figuring out strategies to apply to problems. You will apply these tools to a variety of situations and use them to draw conclusions about the real world. During this course you will collaborate with other students as a member of a study team. By the end of the course, you will have a powerful understanding of properties and principles of functionality. You will see how these properties and principles connect with each other so that you can use them together to model real life situations. In order to be successful in mathematics it is critical that you actively participate in your learning.

Algebra 2 Units
      Investigations and Functions   Trigonometric Functions
      Sequences and Exponential Functions   Polynomial Functions
      Transformations of Parent Graphs   Conic Sections
      Solving and Intersections   Trigonometry
      Inverse and Logarithms   Discrete Math

      Prerequisite(s): Algebra I and Geometry with a minimum grade of C recommended

Pre-Calculus   **4700**   **Credit 1**

In Pre-Calculus, you will get to put together what you have learned in your previous math classes and see how these ideas are used in other fields. You will continue to develop a deeper understanding of trigonometric, exponential, logarithmic and complex algebraic functions. In addition to these essential algebraic concepts, you will develop the necessary intellectual preparation for calculus. The concepts of calculus theme will help you understand the big ideas of calculus – limits, integrals and derivatives – without being taught the formal rules. You will spend time gaining an intuitive concept of what each calculus concept means. During this course you will collaborate with other students as a member of a study team. By the end of the course, you will have a deep understanding of essential algebraic concepts and the big ideas of calculus. In order to be successful in mathematics it is critical that you actively participate in your learning.

Pre-Calculus Units
      Tools for Pre-Calculus   Extending Periodic Functions
      Circular Functions   More on Limits
      Introduction to Limits   Parametric Equations & Vectors
      Area Under Curves   Rates of Change
      Exponentials & Logarithms   Algebra for College Mathematics

      Prerequisite(s): Geometry and Algebra 2 with a minimum grade of C recommended.

Advanced Placement Statistics   4704   **Credit 1**

Advanced Placement Statistics is designed for students taking an introductory high school statistics course and includes all the topics in the Advanced Placement (AP) Statistics syllabus. Students will learn to explore, summarize, and display data; design surveys and experiments; use probability to understand random behavior; make inferences about populations by looking at samples from those population; and make inferences about the effect of treatments from designed experiments. After taking this course students will be prepared to take the AP Statistics Exam.

AP Statistics Units

Statistical Reasoning	Probability Distributions
Investigating a Claim of Discrimination	Sampling Distributions
Exploring Distributions	Inference of Proportions
Relationships Between Two	Inference for means
Quantitative Variables	Chi-Square Tests
Sample Surveys & Experiments	Inference for Regression
Probability Models	Statistics in Action: Case Studies

Prerequisite(s): Algebra 2 with a minimum grade of C recommended.

Advanced Placement Calculus AB   4240   **Credit 1**

The course develops calculus in an intuitive, conceptual manner and prepares students for the AP calculus exam. The course starts with five major problems that introduce the big ideas of calculus: optimization, limits, differential equations, exponential functions, the relationships between distance and velocity, piecewise functions, volumes of revolution, volume by slicing, and the Fundamental Theorem of Calculus. Each of these five major problems is revisited during the course for students to solve using new calculus knowledge. The curriculum contains several key labs and hands-on activities throughout the course to introduce concepts. Laboratory experiments and hands-on activities are integrated throughout the curriculum as key concepts for learning and conceptual understanding. Students are expected to work collaboratively in study teams; explain; justify and present ideas; and demonstrate persistence when asked to develop difficult concepts for themselves.

This calculus course will incorporate technology on a daily basis as a tool for learning. All chapters have labs and other major investigations which will rely on student's proficiency with the graphing calculator. The course has three major activities during which the students use a CBL or CBR to collect data and analyze rates of change. Key problems also rely on the regression feature of the calculator. Since the AP exam requires students to be proficient in using a graphing calculator, this course assumes that students have access to one in class and at home.

Calculus Units

Big Ideas of Calculus	Optimization & Derivative Tools
Exploring Functions	Completing the Derivative Toolkit
Instantaneous Rates & Riemann Sums	Related Rates and Integration Tools
Slope Functions & Curve Analysis	Volumes of Revolution
The Fundamental Theorem of Calculus	

Prerequisite(s): Pre-Calculus with a minimum grade of C recommended

Advanced Placement Calculus BC   **4241**   **Credit 1**

Calculus BC is primarily concerned with developing the students' understanding of the concepts of calculus and providing experience with its methods and applications. The courses emphasize a multi-representational approach to calculus, with concepts, results, and problems being expressed graphically, numerically, analytically, and verbally. The connections among these representations also are important.

Course Goals
- Work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal. They should understand the connections among these representations.
- Understand the meaning of the derivative in terms of a rate of change and local linear approximation and they should be able to use derivatives to solve a variety of problems.
- Understand the meaning of the definite integral both as a limit of Riemann sums and as the net accumulation of change and should be able to use integrals to solve a variety of problems.
- Understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.
- Communicate mathematics both orally and in well-written sentences and should be able to explain solutions to problems.
- Model a written description of a physical situation with a function, a differential equation, or an integral.
- Use technology to help solve problems, experiment, interpret results, and verify conclusions.
- Determine the reasonableness of solutions, including sign, size, relative accuracy, and units of measurement.
- Develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment.

Prerequisite(s): C- or better in AP Calculus AB and **Application Required**