Pre-Calculus (9400) Course Overview Curriculum Document

Course Description

Pre-calculus is a foundation course for calculus and other college-level mathematics classes. It is intended for students planning on pursuing higher levels of mathematics for a variety of careers in the areas of business, physical sciences, engineering, medical fields, social sciences, technical and computer fields, education, mathematics, actuarial study, etc. A student successfully completing this course would take AP Calculus or AP Statistics as their next math class. The course will cover a variety of upper level math topics with an emphasis on function analysis and trigonometry.

Credits	Prerequisites
1.0	Algebra 2 for Precalculus
Board Approved	**Revised**
November 2009, June 2023	August 2016, April 2023

Required Assessments

District-wide, standards-based common summative assessments

Textbooks/Resources

Carter, J. A., Guevas, G. J., Day, R., Malloy, C. (2014). *Precalculus*. McGraw-Hill Education.
ISBN: 978-0-07-664183-3

Course Essential Understandings	Course Relevance Questions
As a result of successfully completing this course, students will understand that: ● Functions can be solved, graphed, interpreted, and manipulated. ● Functions can be represented graphically or algebraically using tables, transformations, characteristics, and technology. ● Trig functions are ratios of sides of right triangles and allow you to find distances or angles that you could not have measured. ● Changes to the algebraic equation of a function cause predictable changes to the function's graph. ● Polar coordinates are an alternative way to specify location on the plane. ● Equations of conic sections can be reorganized and analyzed to produce adequate graphs. ● Matrices allow for a streamlined method for solving systems.	What is a function and how does it function?

Unit Overviews

Unit Name	Unit Description	Unit Relevance Question	Instructional Standards	Assessed Standards
Unit 1 - Functions	In this unit, students will graph and analyze key features of functions with an emphasis on polynomial, rational functions, radical functions, exponential, and logarithmic functions. Students should be able to explain and interpret their analysis of key features of these functions through detailed explorations and examinations between multiple representations. In addition, students will apply a variety of techniques to solve equations and inequalities in both mathematical and real-world problems.	What are the similarities and differences among various functions and their representations?	G.1: Graphing Functions I.1: Interpreting Functions M.1: Manipulating Functions S.1: Solving Functions	G.1: Graphing Functions I.1: Interpreting Functions M.1: Manipulating Functions S.1: Solving Functions
Unit 2 - Trigonometry	In this unit, students will develop an understanding of the periodic nature of trigonometric functions. Students will build on their previous knowledge of special right triangles and trigonometry as they develop a conceptual understanding of the relationship between angle positions on a unit circle. Students will work in both radians and degrees to evaluate trigonometric functions at various angles on the unit circle as well as co-terminal values. Students will then graph trig functions and inverse trig functions as well as analyze the key features of the graphs of these functions. Finally, students will manipulate expressions and equations to simplify trig expressions, verify trig identities, and solve trig equations.	What are the relationships between the angles and sides of a triangle?	G.2: Graphing Trigonometric Functions, I.2:Interpreting Trigonometric Functions, M.2:Manipulating Trigonometric Functions:, S.2: Solving Trigonometric Equations	G.2: Graphing Trigonometric Functions, I.2:Interpreting Trigonometric Functions, M.2:Manipulating Trigonometric Functions:, S.2: Solving Trigonometric Equations
Unit 3 - Alternate Representations of Relations	In this unit, students will be introduced to vectors, parametric equations, and polar equations. Students will represent vectors graphically and algebraically. Students will apply trigonometry to their study of parametric equations and polar equations. For polar equations, students will be introduced to the polar coordinate system. For both parametric equations and polar equations, students will convert between the given equations and an equation in rectangular form. Students will graph these relations with and without technology.	How can alternative representations be used to express relations?	G.3: Graphing Alternate Representations of Relations, M.3: Manipulating Alternate Representations of Relations, S.3: Solving Equations involving Alternate Representations of Relations	G.3: Graphing Alternate Representations of Relations, M.3: Manipulating Alternate Representations of Relations, S.3: Solving Equations involving Alternate Representations of Relations

Unit 4 - Essential Pre-Calculus Topics	In this unit, students will study conic sections: ellipses, circles, parabolas and hyperbolas. Students will extend their knowledge of sequences to the study of series. Students will calculate the nth term and nth partial sum of arithmetic and geometric sequences for both real world and mathematical situations. Students will represent series using sigma notation. Students will study matrices and their operations including matrix addition, subtraction, scalar multiplication, multiplication and inverses. Matrices will also be used to solve systems of equations.	How else are mathematical sets used or represented?	G.4: Graphing Conics I.4: Interpreting Conics and Sequences M.4: Manipulating Conics, Sequences/Series and Matrices S.4: Solving Involving Conics, Sequences/Series, and Matrices	G.4: Graphing Conics I.4: Interpreting Conics and Sequences M.4: Manipulating Conics, Sequences/Series and Matrices S.4: Solving Involving Conics, Sequences/Series, and Matrices