Pequannock Township School District Curriculum Syllabus

PreCalculus Honors

Course Description:

Pre-Calculus Honors is a course designed to integrate topics from Algebra I, Geometry and Algebra II Honors culminating with an introduction to Calculus. Throughout the year students will visit a myriad of topics including, but not limited to, functions, graphs of functions, analytic geometry, trigonometric functions and their graphs, proof by induction, parametric equations and their graphs, an introduction to limits, limit definition of a derivative, differentiation rules (product, quotient chain rules, trigonometric derivatives) and derivative applications (tangent/normal lines, implicit differentiation, related rates).

All topics mentioned will also be explored through the use of the Texas Instruments (TI-89) graphing utility.

A student who successfully completes this class is expected to be proficient in the development of quantitative reasoning and problem-solving skills, they will have developed the ability to understand and communicate mathematical ideas effectively and ultimately have an advanced knowledge of the operation and implementation of the TI-89 graphing utility within the realm of topics covered.

Course Standards:

The following is a list of NJSLS that describe what students are expected to know and be able to do as a result of successfully completing this course. The following NJSLS are the basis of the assessment of student achievement. The learner will demonstrate mastery of:

Algebra
Reasoning with Equations and Inequalities
1. Solve systems of equations.
   A.REI.C.8,
2. Represent and solve equations and inequalities graphically.
   A.REI.D.11, A.REI.D.12

Functions
Interpreting Functions
1. Interpret functions that arise in applications in terms of the context.
   F.IF.B.4, F.IF.B.5, F.IF.B.6

2. Analyze functions using different representations.
F.IF.C.7e, 9

Trigonometric Functions
3. Extend the domain of trigonometric functions using the unit circle.
F.TF.A.1, F.TF.A.2, F.TF.A.3, F.TF.A.4
4. Model periodic phenomena with trigonometric functions.
F.TF.B.5, F.TF.B.6, F.TF.B.7
5. Prove and apply trigonometric identities.
F.TF.C.8, F.TF.C.9

Geometry
Expressing Geometric Properties with Equations
1. Translate between the geometric description and the equation for a conic section
G.GPE.A.3, G.GPE.A.3a

Standards for Mathematical Practice
1. Make sense of problems and persevere in solving them. *SMP1*
2. Reason abstractly and quantitatively. *SMP2*
3. Construct viable arguments and critique the reasoning of others. *SMP3*
4. Model with mathematics. *SMP4*
5. Use appropriate tools strategically. *SMP5*
6. Attend to precision. *SMP6*
7. Look for and make use of structure. *SMP7*
8. Look for and express regularity in repeated reasoning. *SMP8*

Scope and Sequence

Unit 1: Trigonometry: Functions, Analytics, Applications (Marking Periods 1-2)

This unit will define trigonometric functions, exploring domain and range, how to find values of the function, graphing and developing a list of properties. The unit defines the six inverse trigonometric functions and investigates their properties. Lastly, this unit defines trigonometric functions using right triangles.

Unit 2: Analytic Geometry, Systems of Equations and Inequalities (Marking Periods 2-3)

This unit will expose students to:
● Conics
● The Parabola, Ellipse, Hyperbola
● Solving systems of equation and inequalities
● Partial Fraction Decomposition

- Solving non-linear equations
- LRAM, RRAM, MRAM, Trapezoid Rule

Unit 3: Limits, Derivatives, Related Rates, Optimization (**Marking Periods 3-4**)

This unit will introduce the students to a fundamental concept of calculus - the notion of a limit. The students will learn how to evaluate limits and how they are used to model real-life problems. The concept of a limit is useful in applications involving maximization such as verifying the maximum volume of an open box. Limits are also seen in the tangent line problem and finding the area under a curve.

Assessments

Evaluation of student achievement in this course will be based on the following:

a. Tests & Quizzes
b. Classwork
c. Projects

Curriculum Resources

Instructional resources
Precalculus textbook and resources

Technology resources
http://teacher.desmos.com
www.illustrativemathematics.org
www.openmiddle.com
www.kutasoftware.com

Home and School Connection

The following are suggestions and/or resources that will help parents support their children:
- Khan Academy: www.kahnacademy.com
- Teacher Google Classroom