

# Pre-Calculus Course Overview

Content Area: **Math**  
Course(s): **PRE-CALCULUS**  
Time Period:  
Length: **Full Year**  
Status: **Published**

## Cover

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### **EAST BRUNSWICK PUBLIC SCHOOLS**

**East Brunswick New Jersey**

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Dr. Victor P. Valeski

#### **Mathematics**

**Pre-Calculus-Course Number: 1161**

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#### **Mathematics Department Chairperson (Grade 8-12)**

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#### **Revisions Prepared By**

Dr. Manjit K. Sran

**Course Adoption:** 4/21/1986

**Curriculum Adoption:** 9/1/2017

**Date of Last Revision Adoption:** 9/1/2017

## **Course Overview**

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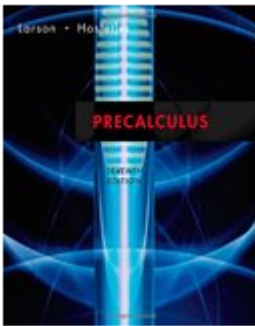
### **COURSE DESCRIPTION:**

This course includes a review of essential skills from algebra, introduces polynomial, rational, exponential and logarithmic functions, and gives the student an in-depth study of trigonometric functions and their applications. Modern technology provides tools for supplementing the traditional focus on algebraic procedures, such as solving equations, with a more visual perspective, with graphs of equations displayed on a screen. Students can then focus on understanding the relationship and behavior of the function, in preparation for the advanced study of calculus. Students further explore functions in real-life situations, including science, economics, biology and navigation. The focus of the course will be twofold. First, students will be able to understand and describe the general behavior of functions, including transcendental functions, and secondly, to develop an in depth understanding of trigonometry and its applications.

## **Textbooks and other resources**

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**Textbook:** PreCalculus 7<sup>th</sup> Edition; R. Larson & R. Hostetler; Houghton Mifflin; copyright 2007, adopted 6/15/2006



TI-83 or TI-84 graphing calculator is required for this course

## Scope and Sequence

Sequential Unit Description:	Marking Period Guide	Other Pacing Guide References	Proficiency (Sum Assessment)
<b>Unit 0</b> Students will explore algebra topics including graphing and writing linear equations (point-slope form), factoring, zero-product property and the quadratic formula.	1	Summer Assignment Review  7 days	Teacher Assessment  Diagnostic Performance Assessment
<b>Unit 1</b> Students will explore functions, including step and piecewise functions (for absolute value), as well as the Difference Quotient function. They will describe the behavior of functions, including the application of transformations and their inverses.	1	Text Chapter 1 Sections 4-7  30 days	Vocabulary Check Teacher Assessment  Quiz/Test
<b>Unit 2</b> Students will evaluate trigonometric functions of all angles. They will use trigonometric functions to solve triangles.	1	Text Chapter 4 Sections 1-4  20 Days	Vocabulary Check Teacher Assessment  Quiz/Test
<b>Unit 3</b> Students will sketch the graphs of trigonometric functions, including sine, cosine, tangent, co-tangent, secant, cosecant and inverse trigonometric functions. Students will solve real life problems.	1/2	Text Chapter 4 Sections 5-8  20 days	Vocabulary Check Teacher Assessment  Quiz/Test
<b>Unit 4</b> Students will verify trigonometric identities. They will solve trigonometric equations and evaluate trigonometric functions using trigonometric identities.	2/3	Text Chapter 5  32 days	Vocabulary Check Teacher Assessment  Quiz/Test
<b>Unit 5</b> Students will use Law of Sines and Law of Cosines model and solve problems involving oblique triangles.	3 & 4	Text Chapter 6 Sections 1-2  15 days	Project  Quiz/Test
<b>Unit 6</b> Students will use trigonometry to represent complex numbers and use DeMoivre's Theorem.	4	Text Chapter 6 Sections 2.4, 6.5  10 days	Project  Quiz/Test

<p><b>Unit 7</b></p> <p>Students will write, solve, and graph a rational function and a polynomial inequality.</p>	4	<p><b>Text Chapter 2</b></p> <p>Sections 5-7</p> <p>12 days</p>	<p><b>Vocabulary Ch</b></p> <p><b>Quiz/Test</b></p>
<p><b>Unit 8</b></p> <p>Students will write and graph an exponential and logarithmic functions. They will use these functions to model real life situations, including applications.</p>	4	<p><b>Text Chapter 3</b></p> <p>13 days</p>	<p><b>Vocabulary Ch</b></p> <p><b>Quiz/Test</b></p>

## NJ Student Learning Standards

MA.F-TF.A.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
MA.F-TF.A.2	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
MA.F-TF.A.3	Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$ , $\pi/4$ and $\pi/6$ , and use the unit circle to express the values of sine, cosines, and tangent for $\pi - x$ , $\pi + x$ , and $2\pi - x$ in terms of their values for $x$ , where $x$ is any real number.
MA.F-TF.A.4	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
MA.F-TF.B.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
MA.F-TF.B.6	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
MA.F-TF.B.7	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.
MA.F-TF.C.8	Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$ , $\cos(\theta)$ , or $\tan(\theta)$ given $\sin(\theta)$ , $\cos(\theta)$ , or $\tan(\theta)$ and the quadrant of the angle.
MA.F-TF.C.9	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

## Standards for Mathematical Practices

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.

MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

## **Grading and Evaluation Guidelines**

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### **GRADING GUIDELINES:**

As per Math Department Policy, grades will be determined by a variety of assessment strategies, including Major Assessments, Minor Assessments, and Performance Assessments. In addition to tests and quizzes, students will be evaluated on a combination of performance assessment instruments, including homework completions, cooperative group participation, note-taking, open ended question responses, lab reports and/or supplemental projects.

### **GRADING PROCEDURES:**

Grading procedures must be described in sufficient detail so that a pupil will understand, the minimal to advanced proficiency, expected of him/her as the outcome of each unit, for the marking period, for the semester, and for the course as a whole. Benchmark level assessments associated with the course also need to be identified. While assessments of proficiency levels must be valid and reliable they do not need to be the same for all students. Other criteria to be considered in grading must be identified and the degree to which such criteria will be considered in a grade. Each pupil must receive a copy of the grading procedures, proficiencies and criteria for each unit and/or course.

### **COURSE EVALUATION:**

Course achievement will be evaluated as the percent of all pupils who achieve the minimum level of proficiency (final average grade) in the course. Student achievement levels above minimum proficiency will also be reported. Final grades, and where relevant mid-term and final exams, will be analyzed by staff for the total cohort and for sub-groups of students to determine course areas requiring greater support or modification.

**In terms of proficiency the East Brunswick grades are as follows:**

<b>A</b>	<b>Excellent</b>	<b>Advanced Proficient</b>
<b>B</b>	<b>Good</b>	<b>Above Average Proficient</b>
<b>C</b>	<b>Fair</b>	<b>Proficient</b>

<b>D</b>	<b>Poor</b>	<b>Minimally Proficient</b>
<b>F</b>	<b>Failing</b>	<b>Partially Proficient</b>

In Pre-Calculus the goal is that a minimum of 95% of the pupil's will meet at least the minimum proficiency level (D or better) set for the course. The department will analyze the achievement of students on Unit Assessments, Mid-term and Final Exams and Final Course Grades, and for Final Course Grades the achievement of sub-groups identified by the state to determine if modifications in the curriculum and instructional methods are needed.

**Course evaluation requires the answering of the following questions:**

1. Are course content, instruction and assessments aligned with the required NJSLs?
2. Is instruction sufficient for students to achieve the Standards?
3. Do all students achieve the set proficiencies/benchmarks set for the course?

## Other Details

**SCED**

### **02110 Pre-Calculus**

This courses combines the study of Trigonometry, Elementary Functions, Analytic Geometry, and Math Analysis topics as preparation for calculus. Topics typically include the study of complex numbers; polynomial, logarithmic, exponential, rational, right trigonometric, and circular functions, and their relations, inverses and graphs; trigonometric identities and equations; solutions of right and oblique triangles; vectors; the polar coordinate system; conic sections; Boolean algebra and symbolic logic; mathematical induction; matrix algebra; sequences and series; and limits and continuity.