Pre-Calculus Semester 1 Course Syllabus

The Plano ISD eSchool Mission is to create a borderless classroom based on a positive student-teacher relationship that fosters independent, innovative critical thinking and empower students to thrive, contribute, and compete in a global society.

Course Number: 155001

Course Title: Pre-Calculus Semester 1

Communications

All communication with your teacher will be through the utilization of electronic tools such as email and discussion boards. You will receive a Welcome email from your teacher when your course is ready for you. You may email your teacher at any time with questions that you might have.

Course Description

Pre-calculus completes the formal study of the functions begun in Algebra I and Algebra II. Students focus on modeling, problem solving, data analysis, trigonometric and circular functions and their inverses, polar coordinates, complex numbers, conics, and quadratic relations. Discrete topics include the Proof by Induction and the Binomial Theorem along with sequences and series. The instructional design is based on state standards and research stemming from the National Mathematics Advisory Panel's Final Report.

This course includes scaffolding in the form of animation, feedback, hints, and a glossary. Embedded critical mistakes and common misconceptions guidance lead students to understand the reasoning behind correct and incorrect responses. There is also an emphasis on repetition and practice. Projects, located on the Resource page, can be completed offline and help students move into higher-level thinking based on Bloom's Taxonomy.

Course Objectives and Student Learning Outcomes

Upon successful completion of this course, the student will be able to:

- Work with parent functions and transformations, properties of functions, limits and continuity, inverse functions, and piecewise functions
- Analyze and graph linear functions, and understand rates of change
- Explore sequences, series, and proofs by induction
- Analyze and graph polynomial and rational functions

- Analyze and graph exponential and logarithmic functions, including functions with base e
- Analyze, graph, and apply conic sections and functions in polar and parametric forms
- Perform matrix operations, find inverse matrices and determinants, and solve systems of equations by using matrix methods, including the Gauss-Jordan method, inverse matrices, and Cramer's rule
- Determine probably distributions, find linear, polynomial, exponential, and logarithmic graphs, of best fit using regression equations, and analyze frequency distributions

Course Materials

All course materials are available within the course. Pre-Calculus Toolkit is available on the student launch pad. The toolkit includes:

- Algebra Tiles
- Base Ten Blocks
- Calculator
- Conversion Chart
- Coordinate Graphing
- Counters
- Data Representation
- Fractions
- Geoboard
- Pre-Calculus Project I (Student Worksheet and Teacher Answer Key)
- Pre-Calculus Project II (Student Worksheet and Teacher Answer Key)

Academic Integrity/Copyright Policy:

Academic integrity violations, plagiarism, and copyright violations will not be tolerated. The Introductory unit of your course will teach you the details of PISD's expectations on such topics. Your teacher will utilize plagiarism check tools throughout the course.

Online Etiquette ("Netiquette"):

Netiquette is meant to help you communicate professionally and effectively in an online collaborative setting. Students will follow all guidelines relating to internet etiquette and will communicate respectfully with all people. The Introductory unit of your course will teach you the details of PISD's expectations on such topics. Your course will contain discussion boards, journals, blogs and/or wikis where your "netiquette" is important.

Grading and Evaluation

Your grade will be calculated using the following scale: 90-100 = A 80-89 = B 70-79 = C Below 70 – Not Passing

Assessments:

All courses contain a number of self-assessments (allowing the student to gauge their understanding of the material before proceeding to a graded assessment. Graded assessments include quizzes as well as exams. The student's school district (known as the receiving district), is required to prove proctors for major exams.

Class Participation:

Every student will have a specific schedule for completing and submitting assignments and tests. Students are required to adhere to their schedule. Students must maintain consistent email communication with their teacher. Students must complete the discussion assignments and collaborative activities throughout the course. Students who are not adhering to their course schedule, or students who are not maintaining the basic requirements of participation, such as maintaining email communication with their teacher, may be dropped from the course.

Grading Scale:

90-100 = A 80-89 = B 70-79 = C

Below 70 – Not Passing

Drop Policy:

Students may choose to drop the course within 15 days from their start date without penalty. Notify your school's/district's site coordinator to have them indicate such a drop situation to TxVSN.

Unit	Course Content and Assignments			
Functions and Graphs	Unit Objective: Students will work with parent functions and transformations, properties of functions, limits and continuity, inverse functions, and piecewise functions.			
	Lessons:			
	 Parent Functions and Transformations Properties of Functions Limits and Continuity Inverse Functions Piecewise Functions 			
	Authentic Tasks:			
	 Authentic Task: Restricting the Domain of Inverse Functions 			
Polynomial and Rational	Unit Objective: Students will analyze and graph polynomial and rational functions.			
Functions	Lessons:			
	 Roots of Polynomial Functions 			
	 Graphs of Polynomial Functions Binomial Theorem Rational Functions 			
Exponential and	Unit Objective: Students will analyze and graph exponential and logarithmic functions, including functions with base e.			
Logarithmic	Lessons:			
Functions	Exponential and Logarithmic Functions and Graphs			
	Base e			
	Authentic Tasks:			
	Authentic Task: Graphing Exponential and Logarithmic Functions			
	Authentic Task: Exponent and Natural Log Functions with Base e			
The Unit	Unit Objective: Students will analyze radians and degrees.			
Circle	Lessons:			
	Right-Angle Relationships in the Unit Circle			
	Periodic Functions			
	Autnentic lasks:			

Trigonometric	Lessons:
Functions	Trigonometric Functions
	Transformations
	Reciprocal Functions
	Inverse Trigonometric Functions

§111.42. Precalculus, Adopted 2012 (One-Half to One Credit).

Source: The provisions of this §111.42 adopted to be effective September 10, 2012, 37 TexReg 7109.

(a) General requirements. Students shall be awarded one-half to one credit for successful completion of this course. Prerequisites: Algebra I, Geometry, and Algebra II.

(b) Introduction.

(1) The desire to achieve educational excellence is the driving force behind the Texas essential knowledge and skills for mathematics, guided by the college and career readiness standards. By embedding statistics, probability, and finance, while focusing on fluency and solid understanding, Texas will lead the way in mathematics education and prepare all Texas students for the challenges they will face in the 21st century.

(2) The process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

(3) Precalculus is the preparation for calculus. The course approaches topics from a function point of view, where appropriate, and is designed to strengthen and enhance conceptual

understanding and mathematical reasoning used when modeling and solving mathematical and real-world problems. Students systematically work with functions and their multiple representations. The study of Precalculus deepens students' mathematical understanding and fluency with algebra and trigonometry and extends their ability to make connections and apply concepts and procedures at higher levels. Students investigate and explore mathematical ideas, develop multiple strategies for analyzing complex situations, and use technology to build understanding, make connections between representations, and provide support in solving problems.

(4) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(c) Knowledge and skills

TEKS	Bloom's Taxonomy	How / where addressed	
The student defines functions, describes characteristics of functions, and translates among verbal, numerical, graphical, and symbolic representations of functions, including polynomial, rational, power (including radical), exponential, logarithmic, trigonometric, and piecewise defined functions.			
(A) describe parent functions symbolically and	Understand	PC090	
graphically, including $f(x) = xn$, $f(x) = 1n x$, $f(x) = \log x$, $f(x) = 1/x$, $f(x) = ex$, $f(x) = x $, $f(x) = ax$, $f(x) = \sin x$, $f(x) = \arcsin x$, etc.;		Lesson Quiz	
		PC800 AT	
		PC230	
		AQPC230	
		PC260	
		AQPC260	
		PC270	
		AQPC270	
		PC280	
		PC830 AT	
		AQPC285	
(B) determine the domain and range of functions	Analyze	PC020	
using graphs, tables, and symbols;		AQPC020	
		Lesson Quiz	
(C) describe symmetry of graphs of even and odd	Understand	PC030	

TEKS	Bloom's Taxonomy	How / where addressed	
functions;		AQPC030	
		Lesson Quiz	
(D) recognize and use connections among	Apply	PC190	
significant values of a function (zeros, maximum values, minimum values, etc.), points on the		AQPC190	
graph of a function, and the symbolic		Lesson Quiz	
representation of a function; and		PC220	
		AQPC220	
		PC230	
		AQPC230	
		Lesson Quiz	
(E) investigate the concepts of continuity, end	Analyze	PC040	
behavior, asymptotes, and limits and connect		AQPC040	
graphically and numerically.		PC050	
		AQ050	
		Lesson Quiz	
		PC2520	
		AQPC250	
		Lesson Quiz	
(2) The student interprets the meaning of the symbolic representations of functions and operations on functions to solve meaningful problems. The student is expected to:			
(A) apply basic transformations, including a •	Apply	PC010	
$f(x)$, $f(x) + d$, $f(x - c)$, $f(b \cdot x)$, and compositions with absolute value functions, including $ f(x) $ and		Lesson Quiz	
f(x), to the parent functions;		PC060	
		AQ060	
		Lesson Quiz	
(B) perform operations including composition on	Understand	PC060	
functions, find inverses, and describe these procedures and results verbally, numerically, symbolically, and graphically; and		AQPC060	
		PC070	
		AQPC070	
		Lesson Quiz	

TEKS	Bloom's Taxonomy	How / where addressed
(C) investigate identities graphically and verify	Evaluate	PC290
them symbolically, including logarithmic		PC295
exponential properties.		TR160
		AQTR160
		TR170
		TR175
		Lesson Quiz
(3) The student uses functions and their properties solve meaningful problems. The student is expected	, tools and techn I to:	ology, to model and
(A) investigate properties of trigonometric and	Evaluate	PC190
polynomial functions;		AQPC190
		PC220
		AQPC220
		PC230
		AQPC230
		TR080
		Lesson Quiz
		TR090
		AQTR090
		TR100
		AQTR100
		Lesson Quiz
		TR130
		AQTR130
		TR140
		AQTR140
		Lesson Quiz
(B) use functions such as logarithmic,	Analyze	PC220
exponential, trigonometric, polynomial, etc. to		AQPC220
		PC270

TEKS	Bloom's Taxonomy	How / where addressed
		AQPC270
		PC300
		Lesson Quiz
		PC840 AT
		TR010
		Lesson Quiz
(C) use regression to determine the	Apply	PC490
appropriateness of a linear function to model real- life data (including using technology to determine		AQPC490
the correlation coefficient);		
(D) use properties of functions to analyze and	Analyze	PC220
solve problems and make predictions; and		AQPC220
		PC270
		AQPC270
		PC490
		AQPC49-
		PC500
		AQPC500
		Lesson Quiz
(E) solve problems from physical situations using	Evaluate	TR010
trigonometry, including the use of Law of Sines, Law of Cosines, and area formulas and		Lesson Quiz
incorporate radian measure where needed.		TR020
		AQTR020
		TR030
		AQTR030
		TR040
		AQTR040
		Lesson Quiz
(4) The student uses sequences and series as well as tools and technology to represent,		

analyze, and solve real-life problems. The student is expected to:

TEKS	Bloom's Taxonomy	How / where addressed
(A) represent patterns using arithmetic and	Understand	PC120
geometric sequences and series;		AQPC120
		PC130
		AQPC135
		PC140
		AQPC145
(B) use arithmetic, geometric, and other	Analyze	PC120
sequences and series to solve real-life problems;		AQPC120
		PC130
		AQPC135
		PC140
		AQPC145
		PC150
		AQPC150
		Lesson Quiz
(C) describe limits of sequences and apply their	Understand	PC160
properties to investigate convergent and divergent series: and		AQPC160
		PC170
		AQPC170
		Lesson Quiz
(D) apply sequences and series to solve problems	Apply	PC120
including sums and binomial expansion.		AQPC120
		PC130
		PC135
		PC140
		PC145
		PC150
		AQPC150
		Lesson Quiz
		PC240

TEKS	Bloom's Taxonomy	How / where addressed	
		AQPC240	
		Lesson Quiz	
(5) The student uses conic sections, their properties, and parametric representations, as well as tools and technology, to model physical situations. The student is expected to:			
(A) use conic sections to model motion, such as	Analyze	PC310	
the graph of velocity vs. position of a pendulum		AQPC310	
		PC320	
		AQPC320	
		PC340	
		AQPC340	
		Lesson Quiz	
(B) use properties of conic sections to describe	Apply	PC850 AT	
physical phenomena such as the reflective		PC860 AT	
(C) convert between parametric and rectangular	Analyze	PC380	
forms of functions and equations to graph them;		AQPC380	
		PC870 AT	
(D) use parametric functions to simulate	Apply	PC380	
problems involving motion.		AQPC380	
		PC390	
		AQ390	
		Lesson Quiz	
(6) The student uses vectors to model physical situations. The student is expected to:			
(A) use the concept of vectors to model situations	Apply	TR200	
defined by magnitude and direction; and		Lesson Quiz	
(B) analyze and solve vector problems generated	Analyze	TR200	
by real-life situations.		Lesson Quiz	
		TR220	
		AQTR220	

TEKS	Bloom's Taxonomy	How / where addressed
		TR230
		AQTR230
		Lesson Quiz