EL DORADO UNION HIGH SCHOOL DISTRICT
EDUCATIONAL SERVICES

Course of Study Information Page

COURSE TITLE **Function Analysis and Trigonometry**	
DISTRICT COURSE NUMBER **#0223**	4-DIGIT STATE COURSE CODE (COMPLETED BY SILT) **2422**
Rationale:	Students successfully completing this course will have an extensive background in advanced level mathematics preparing them for college level coursework.
Course Description that will be in the Course Directory:	This course is designed for college-bound students interested in math and science. Students will engage in an in-depth study of Common Core Standards for Mathematics. Topics will include equations, functions families and their graphs, rational, polynomial, exponential, logarithmic, and trigonometric functions, trigonometric identities and applications, and conic sections.
How Does this Course align with or meet State and District content standards?	This course is aligned with the California Common Core Standards. It draws from the conceptual categories of algebra, functions, number and quantity, and geometry as well as the standards for mathematical practices.
NCLB Core Subjects:	*Select up to two that apply:* ☐ Arts ☐ Civics and Government ☐ Not Core Subject ☐ Economics ☐ History ☐ English ☒ Mathematics ☐ Foreign Language ☐ Reading / Language Arts ☐ Geography ☐ Science
CDE CALPADS Course Descriptors: (See Page 2 for Definitions)	CTE TECH PREP COURSE INDICATORS ☐ Tech Prep (32) (Higher Ed) ☐ Tech Prep & ROP(33) (Higher Ed) ☐ ROP (30) ☒ N/A CTE COURSE CONTENT CODE ☐ CTE Introductory (01) ☐ CTE Concentrator (02) ☐ CTE Completer (03) ☐ VOC Subject ____ ☒ N/A INSTRUCTIONAL LEVEL CODE ☐ Remedial (35) ☐ Honors UC-Certified (39) ☐ Honors Non UC-Certified (34) ☐ College (40) ☒ N/A
Length of Course:	☒ Year ☐ Semester
Grade Level(s):	☐ 9 ☒ 10 ☒ 11 ☒ 12
Credit:	☒ Number of credits: **10** ☒ Meets graduation requirements (subject **Mathematics**) ☒ Request for UC "a–g" requirements CSU/UC requirement **"c"** ☒ College Prep
Prerequisites:	C or better in Advanced Algebra 2 / B or better in Algebra 2 or teacher recommendation
Department(s):	Mathematics
District Sites:	EDHS, ORHS, PHS, Virtual Academy
Board of Trustees COS Adoption Date:	May 14, 2013
Textbooks / Instructional Materials:	**Precalculus Enhanced with Graphing Utilities**, Sullivan & Sullivan, Pearson Publishing, Copyright 2013 – 6th Edition, ISBN: 978-0-13-283186-4

Funding Source:	General funds
Board of Trustees Textbook Adoption Date:	May 14, 2013

Definitions

CALPADS	California Longitudinal Pupil Achievement Data System
CTE Technical Prep	A course within a CTE technical career pathway or program that has been articulated with a postsecondary education or through an apprenticeship program of at least 2 years following secondary instruction.
Instructional Level Code	Represents a nonstandard instructional level at which the content of a specific course is either above or below a 'standard' course instructional level. These levels may be identified by the actual level of instruction or identified by equating the course content and level of instruction with a state or nationally recognized advanced course of study, such as IB or AP.
Instructional Level Honors, UC Certified	Includes all AP courses.
Instructional Level Honors, non UC Certified	Requires Board approval.
Instructional Level College	Includes ACE courses. Equivalent to college course and content, but not an AP course. Not related to section, but to course.

EL DORADO UNION HIGH SCHOOL DISTRICT

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Course Title: Function Analysis and Trigonometry #0223

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Department: **Mathematics**

Course Title: **Function Analysis and Trigonometry** Course Number: **#0223**

Unit Title: Function Families and Their Graphs

Content Area Standards (Please identify the source): List content standards students will master in this unit.

[F-IF.1] Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f*(*x*).

[F-IF.2] Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

[F-IF.4] For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

[F-IF.5] Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*

[F-IF.7] Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

[F-IF.8] Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

[F-BF.3] Identify the effect on the graph of replacing *f*(*x*) by *f*(*x*) + *k*, *k f*(*x*), *f*(*kx*), and *f*(*x* + *k*) for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*

[F-BF.3.1] Solve problems involving functional concepts, such as composition, defining the inverse function and performing arithmetic operations on functions. (CA Standard Algebra II – 24.0)

[F-BF.4] Find inverse functions.

a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example, f*(*x*) =2x3 *or f*(*x*) = (*x*+1)/(*x*–1) *for x* ≠ 1.
b. (+) Verify by composition that one function is the inverse of another.
c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will determine whether a relation represents a function by examining given points and/or graph. [F-IF]

Students will understand function notation and perform operations on functions including composition of functions. [F-IF], [F-BF]

Students will identify domain and range of a function given an equation or a graph. [F-IF]

Students will graph parent functions, their transformations, and piecewise-defined functions. [F-IF], [F-BF]

Students will obtain information from or about the graph of a function (domain, range, intercepts, symmetry, increasing/decreasing behaviors, local minimums/maximums, end behavior). [F-IF]

Students will determine if a function is even, odd or neither both algebraically and graphically. [F-IF]

Students will calculate the average rate of change of a graph. [F-IF]

Students will build and analyze functions. [F-IF], [F-BF]

Students will identify one-to-one functions. [F-BF]

Students will find inverses of functions both algebraically and graphically. [F-BF]

Students will verify that two functions are inverses of each other algebraically. [F-BF]

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Teachers will use a variety of instructional strategies that may include, direct instruction utilizing Smart Notebook, investigative approaches and simulations or demonstrations with graphing calculators and mathematical software.

Students may take notes in pre-printed notepackets or workbooks.

Teachers will guide practice as students work independently, collaboratively in pairs or in groups to discover, investigate, practice and apply the concepts of the course to a mastery level. Smart Responders will be used to assess and adjust student progress.

Standards for Mathematical Practices #4&5: TI emulator will be used to demonstrate graphical interpretations of concepts.

Students will analyze and interpret functions using a graphing calculator.

Students will interpret problems to build functions.

Standards for Mathematical Practices #3&6: Students will work independently, in pairs and in groups to practice, apply and discuss each concept.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Formative assessments will include warm-ups, classwork, homework, individual and collaborative quizzes, investigative activities and multi-step performance tasks.

Summative assessments will include unit tests, semester finals and culminating projects that simulate and apply the common core standards.

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

Students may access additional remedial sessions available by teacher, math department or site. These may include teacher office hours, peer tutoring and on-line textbook resources.

EDUCATIONAL SERVICES

Department: **Mathematics**

Course Title: **Function Analysis and Trigonometry** Course Number: **#0223**

Unit Title: Power, Polynomial and Rational Functions

Content Area Standards (Please identify the source): List content standards students will master in this unit.

[A-APR.2] Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).

[A-APR.3] Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

[A-SSE.1.a] Interpret expressions that represent a quantity in terms of its context.
a. Interpret parts of an expression, such as terms, factors, and coefficients.

[A-SSE.2.1] Apply basic factoring techniques to second- and simple third-degree polynomials. These techniques include finding a common factor for all terms in a polynomial, recognizing the difference of two squares, and recognizing perfect squares of binomials.

[A-CED.1] Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

[A-CED.2] Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

[A-REI.2] Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

[N-CN.1] Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.

[N-CN .3] (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.

[N-CN. 8] (+) Extend polynomial identities to the complex numbers. *For example, rewrite* $x^2 + 4$ *as* $(x + 2i)(x – 2i)$.

[N-CN.9] (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

[F-IF.4] For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

[F-IF.5] Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

[F-IF.7] Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

[F-IF.8.a] Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will graph polynomial and rational functions and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior. [F-IF]

Students will use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph. [F-IF]

Students will identify zeros of polynomials using the Rational Roots Theorem, factoring, and synthetic division. [A-APR], [A-SSE]

Students will solve polynomial equations over the complex numbers. [N-CN]

Students will solve rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. [A-REI]

Students will create polynomial equations by applying the Fundamental Theorem of Algebra. [N-CN]

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Teachers will use a variety of instructional strategies that may include, direct instruction utilizing Smart Notebook, investigative approaches and simulations or demonstrations with graphing calculators and mathematical software.

Students may take notes in pre-printed notepackets or workbooks.

Teachers will guide practice as students work independently, collaboratively in pairs or in groups to discover, investigate, practice and apply the concepts of the course to a mastery level. Smart Responders will be used to assess and adjust student progress.

Standards for Mathematical Practices #4&5: TI emulator will be used to demonstrate graphical interpretations of concepts.

Standards for Mathematical Practices #3&6: Students will work independently, in pairs and in groups to practice, apply and discuss each concept.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Formative assessments will include warm-ups, classwork, homework, individual and collaborative quizzes, investigative activities and multi-step performance tasks.

Summative assessments will include unit tests, semester finals and culminating projects that simulate and apply the common core standards.

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

Students may access additional remedial sessions available by teacher, math department or site. These may include teacher office hours, peer tutoring and on-line textbook resources.

EL DORADO UNION HIGH SCHOOL DISTRICT

EDUCATIONAL SERVICES

Department: **Mathematics**

Course Title: **Function Analysis and Trigonometry** Course Number: **#0223**

Unit Title: Exponential and Logarithmic Functions

Content Area Standards (Please identify the source): List content standards students will master in this unit.

[F-IF.7.e] Graph exponential and logarithmic functions showing intercepts and end behavior.

[F-IF.8.b] Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

a. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/20}$, *and classify them as representing exponential growth and decay.*

[F-BF.5] (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents

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[F-LE.1.c] Distinguish between situations that can be modeled with linear functions and with exponential functions.

c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.

[A-SSE.1.b] Interpret expressions that represent a quantity in terms of its context.

b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret* $P(1 + r)^n$ *as a product of P and a factor not dependent on P*.

[A-SSE.3.c] Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

c. Use the properties of exponents to transform expressions for exponential functions. *For example, the expression* 1.15^t *can be rewritten as* $(1.15^{t/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

[A-SSE.3.d] Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

[A-SSE.3.f] Understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values.

[A-CED.1.1] Judge the validity of an argument according to whether the properties of real numbers, exponents, and logarithms have been applied correctly at each step.

[A-CED.2] Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will create and graph exponential and logarithmic functions, showing intercepts and end behavior. [F-IF], [F-LE]

Students will understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. [F-BF]

Students will understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values. [A-SSE]

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

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Standards for Mathematical Practices #4&5: TI emulator will be used to demonstrate graphical interpretations of concepts.

Standards for Mathematical Practices #3&6: Students will work independently, in pairs and in groups to practice, apply and discuss each concept.

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Formative assessments will include warm-ups, classwork, homework, individual and collaborative quizzes, investigative activities and multi-step performance tasks.

Summative assessments will include unit tests, semester finals and culminating projects that simulate and apply the common core standards.

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

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EDUCATIONAL SERVICES

Department: **Mathematics**

Course Title: **Function Analysis and Trigonometry** Course Number: **#0223**

Unit Title: Trigonometric Functions

Content Area Standards (Please identify the source): List content standards students will master in this unit.

[F-IF.4] For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

[F-IF.7.e] Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

[F-BF.4.d] Find inverse functions.

d.(+) Produce an invertible function from a non-invertible function by restricting the domain.

[F-TF.3.1] Know the definitions of the tangent and cotangent functions and graph them.

[F-TF.3.2] Know the definitions of the secant and cosecant functions and graph them.

[F-TF.4] (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

[F-TF.5] Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

[F-TF.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.

[F-TF.6.1] Know the definitions of the inverse trigonometry functions and graph the functions.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will graph trigonometric and inverse trigonometric functions, and extract key features from these graphs. [F-IF], [F-TF]

Students will restrict the range of trigonometric functions in order to produce an inverse that is also a function. [F-BF], [F-TF]

Students will model periodic phenomena using sine/cosine functions and use that model to predict behavior. [F-TF]

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Teachers will use a variety of instructional strategies that may include, direct instruction utilizing Smart Notebook, investigative approaches and simulations or demonstrations with graphing calculators and mathematical software.

Students may take notes in pre-printed notepackets or workbooks.

Teachers will guide practice as students work independently, collaboratively in pairs or in groups to discover, investigate, practice and apply the concepts of the course to a mastery level. Smart Responders will be used to assess and adjust student progress.

Standards for Mathematical Practices #4&5: TI emulator will be used to demonstrate graphical interpretations of concepts.

Teachers will use dynamic geometry software such as Geometer's Sketchpad or GeoGebra to illustrate the transformations trigonometric functions undergo when the parent function is manipulated.

Standards for Mathematical Practices #1: Students adjust their calculator's viewing window to account for changes in a trigonometric function's amplitude and vertical shift.

Standards for Mathematical Practices #4: Students model periodic phenomena such as sound or water waves using the sine functions.

Standards for Mathematical Practices #7: Students recognize that the patterns for sine and cosine functions that repeat every 2π radians and contrast this with the pattern for tangent that repeats every π radians.

Standards for Mathematical Practices #3&6: Students will work independently, in pairs and in groups to practice, apply and discuss each concept.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Formative assessments will include warm-ups, classwork, homework, individual and collaborative quizzes, investigative activities and multi-step performance tasks.

Summative assessments will include unit tests, semester finals and culminating projects that simulate and apply the common core standards.

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

Students may access additional remedial sessions available by teacher, math department or site. These may include teacher office hours, peer tutoring and on-line textbook resources.

EDUCATIONAL SERVICES

Department: **Mathematics**

Course Title: **Function Analysis and Trigonometry** Course Number: **#0223**

Unit Title: Trigonometric Identities and Equations

Content Area Standards (Please identify the source): List content standards students will master in this unit.

[F-TF.1] Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

[F-TF.1.1] Understand the notion of angle and how to measure it, in both degrees and radians. Convert between degrees and radians.

[F-TF.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.

[F-TF.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, cosine, and tangent for $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number.

[F-TF.6.2] Compute, by hand, the values of the trigonometric functions and the inverse trigonometric functions at various standard points.

[F-TF.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.

[F-TF.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.

[F-TF.9] (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

[F-TF.10] Demonstrate an understanding of half-angle and double-angle formulas for sines and cosines and can use those formulas to prove and/or simplify other trigonometric identities.

[G-SRT.8] Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

[G-SRT.8.1] Know and use angle and side relationships in problems with special right triangles, such as 30°, 60°, and 90° triangles and 45°, 45°, and 90° triangles.

[G-SRT.11] (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students know how to use radian measures synonymously with degree measures in conjunction with the unit circle to calculate the trigonometric values of standard points and common angles. [F-TF], [G-SRT]

Students use inverse trigonometry and trigonometric identities to solve equations. [F-TF]

Students can prove trigonometric identities such as $\sin^2\theta + \cos^2\theta = 1$ and the addition and subtraction identities. [F-TF], [G-SRT]

Students can prove and use formulas involving trigonometric functions such as the Laws of Sines and Cosines and the area of a triangle $A = {}^1/_2 ab\sin(C)$. [G-SRT]

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Teachers will use a variety of instructional strategies that may include, direct instruction utilizing Smart Notebook, investigative approaches and simulations or demonstrations with graphing calculators and mathematical software.

Students may take notes in pre-printed notepackets or workbooks.

Teachers will guide practice as students work independently, collaboratively in pairs or in groups to discover, investigate, practice and apply the concepts of the course to a mastery level. Smart Responders will be used to assess and adjust student progress.

Standards for Mathematical Practices #4&5: TI emulator will be used to demonstrate graphical interpretations of concepts.

Standards for Mathematical Practices #3: Students will use previously proven identities (i.e. the addition and subtraction identities) to prove new identities such as the double-angle identities.

Standards for Mathematical Practices #5: Students will understand that using inverse trigonometry on a calculator will, at times, produce angles that are not appropriate for the given situation. Students will know to find coterminal angles that satisfy the criterion of a problem.

Standards for Mathematical Practices #8: Students will notice that the trigonometric values of coterminal angles are equivalent. They will extend this idea to understand that trigonometric functions repeat themselves over given intervals, resulting in periodic behavior.

Standards for Mathematical Practices #3&6: Students will work independently, in pairs and in groups to practice, apply and discuss each concept.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Formative assessments will include warm-ups, classwork, homework, individual and collaborative quizzes, investigative activities and multi-step performance tasks.

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Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

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EL DORADO UNION HIGH SCHOOL DISTRICT

EDUCATIONAL SERVICES

Department: **Mathematics**

Course Title: **Function Analysis and Trigonometry** Course Number: **#0223**

Unit Title: Conic Sections

Content Area Standards (Please identify the source): List content standards students will master in this unit.

[G-GPE.2] Derive the equation of a parabola given a focus and directrix.

[G-GPE.3.2] Given a quadratic equation of the form $ax^2 + by^2 + cx + dy + e = 0$, use the method for completing the square to put the equation into standard form and recognize whether the graph of the equation is a circle, ellipse, parabola, or hyperbola. Then graph the equation.

[G-GPE.3.3] Be familiar with conic sections, both analytically and geometrically.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will write equations of ellipses, parabolas, and hyperbolas given key characteristics of the graph. [G-GPE]

Given a quadratic equation of the form $ax^2 + by^2 + cx + dy + e = 0$, students will use the method for completing the square to put the equation into standard form and recognize whether the graph of the equation is a circle, ellipse, parabola, or hyperbola then graph the equation. [G-GPE]

Students will be able to graph and identify key characteristics of ellipses, parabolas, and hyperbolas. [G-GPE]

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Teachers will use a variety of instructional strategies that may include, direct instruction utilizing Smart Notebook, investigative approaches and simulations or demonstrations with graphing calculators and mathematical software.

Students may take notes in pre-printed notepackets or workbooks.

Teachers will guide practice as students work independently, collaboratively in pairs or in groups to discover, investigate, practice and apply the concepts of the course to a mastery level. Smart Responders will be used to assess and adjust student progress.

Standards for Mathematical Practices #4&5: TI emulator will be used to demonstrate graphical interpretations of concepts.

Standards for Mathematical Practices #3&6: Students will work independently, in pairs and in groups to practice, apply and discuss each concept.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Formative assessments will include warm-ups, classwork, homework, individual and collaborative quizzes, investigative activities and multi-step performance tasks.

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Students may access additional remedial sessions available by teacher, math department or site. These may include teacher office hours, peer tutoring and on-line textbook resources.

EDUCATIONAL SERVICES

Department: **Mathematics**

Course Title: **Function Analysis and Trigonometry** Course Number: **#0223**

Unit Title: Polar Equations and Complex Numbers

Content Area Standards (Please identify the source): List content standards students will master in this unit.

[N-CN.3] (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.

[N-CN.4] (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.

[N-CN.5] (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example,* $(-1 + \sqrt{3}\,i)^3 = 8$ *because* $(-1 + \sqrt{3}\,i)$ *has modulus* 2 *and argument* 120°.

[N-CN.6] (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.

[Polar Coordinates and Curves.1] Be familiar with polar coordinates. In particular, determine polar coordinates of a point given in rectangular coordinates and vice versa.

[Polar Coordinates and Curves.2] Represent equations given in rectangular coordinates in terms of polar coordinates.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will be familiar with polar equations. They will determine polar coordinates of a point given in rectangular coordinates and vice versa. [Polar Coordinates and Curves.1]

Students will represent and graph equations given in rectangular coordinates in terms of polar coordinates. [Polar Coordinates and Curves.2]

Students will find and use the conjugate of a complex number. [N-CN.3]

Students will represent complex numbers in the complex plane in rectangular and polar form and explain why the rectangular and polar forms of a given complex number represent the same number. [N-CN.4]

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Teachers will use a variety of instructional strategies that may include, direct instruction utilizing Smart Notebook, investigative approaches and simulations or demonstrations with graphing calculators and mathematical software.

Students may take notes in pre-printed notepackets or workbooks.

Teachers will guide practice as students work independently, collaboratively in pairs or in groups to discover, investigate, practice and apply the concepts of the course to a mastery level. Smart Responders will be used to assess and adjust student progress.

Standards for Mathematical Practices #4&5: TI emulator will be used to demonstrate graphical interpretations of concepts.

Standards for Mathematical Practices #3&6: Students will work independently, in pairs and in groups to practice, apply and discuss each concept.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Formative assessments will include warm-ups, classwork, homework, individual and collaborative quizzes, investigative activities and multi-step performance tasks.

Summative assessments will include unit tests, semester finals and culminating projects that simulate and apply the common core standards.

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

Students may access additional remedial sessions available by teacher, math department or site. These may include teacher office hours, peer tutoring and on-line textbook resources.