

COURSE DESCRIPTION

This course is designed to provide a comprehensive exploration of algebraic and trigonometric principles as well as preparing students for success in college level mathematics. College Algebra and Trigonometry is a data-driven blended course consisting of classroom based instruction and the ALEKS web-based program. The content of the course is an integration of Algebra and Geometry Review, Equations and Inequalities, Graphs and Functions, Polynomial and Rational Functions, Exponential and Logarithmic Functions, Trigonometric Functions, Trigonometric Identities and Equations. Real world applications will be solved using graphing calculator technology. College readiness math skills will be measured through Accuplacer and/or ALEKS throughout the course. The curriculum is aligned to the New Jersey Student Learning Standards.

Prerequisites: Algebra 2

ALEKS Topics:

Algebra and Geometry Review *A.SSE.1, A.APR.1, N.RN.A.1, N.RN.A.2, A.APR.B.1*

- ◆ Real Numbers and Algebraic Expressions
- ◆ Exponents
- ◆ Polynomial Expressions
- ◆ Factoring Polynomials
- ◆ Rational Expressions
- ◆ Perfect Squares and nth Roots
- ◆ Rational Exponents
- ◆ Radical Expressions
- ◆ Geometry

Equations and Inequalities *A.REI.1, A.REI.3, A.REI.B.4b, A.CED.1, A.CED.3, N.CN.A.1*

- ◆ Linear Equations and Applications
- ◆ Absolute Value Equations
- ◆ Linear Inequalities and Applications
- ◆ Rational Equations that Simplify to Linear
- ◆ Complex Numbers
- ◆ Quadratic Equations
- ◆ Rational Equations that Simplify to Quadratic
- ◆ Radical Equations

Graphs and Functions *A.REI.10, A.REI.12, F.IF.1, F.IF.7, A.CED.2*

- ◆ The Coordinate Plane, Distance, and Midpoint
- ◆ Graphs of Equations

◆ Slope and Equations of Lines

◆ Linear Applications

◆ Circles

◆ Functions

Graphs and Functions cont'd A.REI.10, A.REI.12, F.IF.1, F.IF.7, A.CED.2

◆ Graphs of Functions

◆ Transformations

◆ Combining Functions; Composite Functions; Inverse Functions

Polynomial and Rational Functions F.IF.C.7c, A.APR.B.2, A.APR.B.3,

◆ Quadratic Functions

◆ Polynomial Functions

◆ Division of Polynomials; Remainder and Factor Theorems

◆ Real Zeros of Polynomial Functions

◆ Complex Zeros of Polynomials Functions

◆ Rational Functions

◆ Polynomial and Rational Inequalities

Exponential and Logarithmic Functions F.IF.A.1, F.IF.A.2, F.IF.7b, F.IF.C.7e

◆ Graphing Exponential Functions

◆ Applications of Exponential Functions

◆ Logarithmic Functions

◆ Properties of Logarithms

◆ Logarithmic and Exponential Equations

◆ Applications

Trigonometric Functions F.TF.A.3, F.TF.A.4, F.TF.B.6, A.CED.2, F.BF.B.4, F.BF.B.6

◆ Angles and Their Measure

◆ The Unit Circle and Evaluating Trigonometric Functions

◆ Right Triangle Trigonometry

◆ Trigonometric Functions of Angles

◆ Graphs of Sine and Cosine Functions

◆ Graphs of Other Trigonometric Functions

◆ Inverse Trigonometric Functions

Trigonometric Identities and Equations F.TF.C.7, F.TF.C.8

◆ Verifying Trigonometric Identities

◆ Sum and Difference Formulas

◆ Double–Angle, Half–Angle, Product–to–Sum, and Power Reducing Formulas

◆ Trigonometric Equations

Additional Topics in Trigonometry F.TF.C.9, G.SRT.D.9, G.SRT.D.10, G.SRT.D.11

◆ Laws of Sines and Cosines

Student Learning Objectives

- Graph and write equations of lines using: two ordered pairs; the slope and a point, x & y intercepts; the slope and y-intercept.
- Graph and write equations of parallel and perpendicular lines.
- Graph linear inequalities in two variables.
- Solve absolute value equations and inequalities.
- Factor polynomials.
- Graph Polynomials.
- Use transformations to shift graphs.
- Apply the definition and rules of exponents to simplify expressions.
- Simplify expressions involving square roots.
- Add and subtract complex numbers.
- Evaluate complex numbers with values of i .
- Simplify rational expressions.
- Solve quadratic equations by factoring, completing the square, and using the quadratic formula
- Perform fundamental operations on polynomials and factoring.
- Perform operations with rational and radical expressions, including complex numbers.
- Solve quadratic, radical, and rational equations.
- Solve quadratic and rational inequalities.
- Simplify expressions involving rational exponents and radicals.
- Understand the meaning of relation and function.
- Identify the domain and range of a function, as well as the graph.
- Find the composition of two functions.
- Find the inverse of a function.
- Simplify exponential and logarithmic expressions.
- Solve and Graph exponential and logarithmic equations.
- Solve Triangles using Right Triangle Trigonometry, Law of Sines, and Law of Cosines.
- Graph Trigonometric Functions
- Solve Trigonometric Equations
- Solve for Angle Measures using The Unit Circle, Sum and Difference Formulas, Double-Angle & Half-Angle Formulas
- Verify Trigonometric Identities
- Graph Trigonometric Functions
- Solve real world applications

Weekly Outline

Week 1	Algebra & Geometry Review
Week 2	Equations & Inequalities
Week 3	Graphs & Functions
Week 4	Polynomial Functions
Week 5	Rational Functions
Week 6	Exponential & Logarithmic Functions
Week 7	Right Triangle Trigonometry
Week 8	The Unit Circle
Week 9	Graphs of Trigonometric Functions
Week 10	Law of Sines and Cosines
Week 11	Sum and Difference Formulas
Week 12	Double and Half Angle Identities
Week 13	Trigonometric Equations
Week 14 & 15	Verifying Trigonometric Identities
Week 16	Final Review & Final Exam

TRIGONOMETRIC APPLICATION PROBLEMS

To be used with Graphing Calculator

Right Triangle Trigonometry:

<https://www.khanacademy.org/math/geometry/hs-geo-trig/hs-geo-modeling-with-right-triangles/e/applying-right-triangles>

<http://jwilson.coe.uga.edu/emt668/emat6680.folders/brooks/6690stuff/righttriangle/Applicationps.html>

<http://jwilson.coe.uga.edu/emt668/emat6680.folders/brooks/6690stuff/righttriangle/Applications.html>

http://www.algebralab.org/lessons/lesson.aspx?file=Trigonometry_TrigApplications.xml

<http://jwbales.us/precacal/part4/part4.5.html>

Trigonometric Functions of Angles:

<https://blog.udemy.com/trigonometry-word-problems/>

http://www.cengage.com/resource_uploads/downloads/0547167059_149912.pdf

Graphs of Trigonometric Functions:

<https://www.manasquanschools.org/cms/lib6/NJ01000635/Centricity/Domain/117/Graphing%20Quiz%20Review%20Sheet.pdf>

http://jmh.nbed.nb.ca/sites/jmh.nbed.nb.ca/files/noteattach//y2015/May/day_62_-_applications_of_sinusoidal_functions_1.pdf

<http://www4.smsd.org/aaronsayers/docs/Doc-167823.pdf>

Trigonometric Equations:

<https://www.saylor.org/site/wp-content/uploads/2011/11/MA003-3.1.pdf>

http://dbhs.wvusd.k12.ca.us/ourpages/auto/2009/5/8/55918698/ch7_trig_equation_worksheet.pdf

<https://1.cdn.edl.io/6drcb7n6JviftsD675sEh6UvmSjAq0DZKhTf4fPl0NhOrJZf.pdf>

<http://mrsk.ca/12U/PRACTICEf2sinusoidalWordProb.pdf>

Law of Sines and Cosines:

<https://wheelerdrice.edublogs.org/files/2016/02/Precalc-word-problems-1-9-2kcvvmp.pdf>

<http://lhsblogs.typepad.com/files/applications.pdf>

<http://teachersites.schoolworld.com/webpages/JCasalinuovo/files/trig%20worksheet%20151.pdf>

<http://www.ignacioschools.org/view/487.pdf>

<http://frontenacss.limestone.on.ca/teachers/dcasey/0F7D4264-00870BC8.31/F2%20-%20Sine%20and%20Cosine%20Word%20Problems%20-%20Group%20Work.pdf>

ADDITIONAL RESOURCES

Slope and Equations of Lines:

<https://www.kyrene.org/cms/lib2/AZ01001083/Centricity/Domain/2067/Slope-Intercept%20Form%20Word%20Problems%20wkst.pdf>

<http://www.shmoop.com/linear-equation-systems/word-problems-lines.html>

https://www.bigideasmath.com/protected/content/ipe_na/grade%208/03/g8_03_04.pdf

Linear Application Problems:

<http://tutorial.math.lamar.edu/Classes/Alg/LinearApps.aspx>

<https://www.khanacademy.org/math/algebra/linear-word-problems>

http://www.algebralab.org/practice/practice.aspx?file=Word_LinearEquations.xml

Applications with Circles:

<https://www.boundless.com/algebra/textbooks/boundless-algebra-textbook/conic-sections-341/the-circle-and-the-ellipse-50/applications-of-circles-and-ellipses-218-5895/>

http://www.algebralab.org/practice/practice.aspx?file=Word_WP-CircleApplications.xml

Transformation of Parent Functions:

<http://tutorial.math.lamar.edu/Classes/Alg/Transformations.aspx>

http://www.radford.edu/rumath-smpdc/Units/src/Deplazes_CivilEng.pdf

Polynomial Functions:

<https://brainenie.ck12.org/skills/106914>

<https://brainenie.ck12.org/skills/106896>

http://tulyn.com/wordproblems/polynomial_functions.htm

<http://www.cobblearning.net/marthamorton/files/2015/01/15-Applications-of-Polynomials-2dmv hdc.pdf>

<http://precalc.readthedocs.io/en/latest/objectives/4.html>

<http://www.onlinemathlearning.com/polynomial-equation-word-problem.html>