WTCS Repository

10-804-197 College Algebra & Trig w Apps

Course Outcome Summary

Course Information

Description	This course covers skills needed for success in Calculus and many application areas at the baccalaureate level. Algebra topics include the real and complex number systems, polynomials, exponents, radicals, solving equations and inequalities, relations and functions, systems of equations and inequalities, graphing, and conic sections. Trigonometry topics include the unit circle, trigonometric functions, graphs, identities, equations, inverse functions, solutions of triangles, complex numbers, polar coordinates, and vectors.
Total Credits	5

Course History

Last Revision Date	5/7/2021

Pre/Corequisites

Prerequisite   Each Wisconsin Technical College determines the General Education course prerequisites used by their academic institution. If prerequisites for a course are determined to be appropriate, the final Course Outcome Summary must identify the prerequisites approved for use by the individual Technical College.

Course Competencies

1.   Analyze the features of a graph of a given function or relation

Assessment Strategies
1.1.   Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:
1.1.   differentiate between symmetry about the x-axis, the y-axis, and the origin
1.2.   determine the domain and range of a relation or function
1.3.   determine the inverse function of a 1-1 function
1.4.   specify the relation between the domain and the range of a function and its inverse
1.5.   apply basic transformations to the elementary functions
1.6.   differentiate among elementary functions

2.   Solve linear and quadratic equations and inequalities

Assessment Strategies
2.1.   Oral, Written, Graphic and/or Skill Assessment

Criteria

Your performance will be successful when you:

2.1.　　relate the solution of an equation to the x-intercept of a graph of the function and to the root (or zero) of the function
2.2.　　use appropriate notation when writing solutions of inequalities
2.3.　　solve quadratic equations using more than one method
2.4.　　use modeling techniques to solve applied problems

3.　　Analyze the properties of linear and quadratic functions

Assessment Strategies
3.1.　　Oral, Written, Graphic and/or Skill Assessment

Criteria

Your performance will be successful when you:

3.1.　　graph quadratic functions
3.2.　　determine the composition of two functions
3.3.　　create new functions by using function operations
3.4.　　apply transformations as compositions of functions
3.5.　　determine the characteristics of a quadratic function
3.6.　　find zeros of quadratic functions algebraically and graphically
3.7.　　convert between standard and vertex form of a quadratic function

4.　　Analyze polynomials

Assessment Strategies
4.1.　　Oral, Written, Graphic and/or Skill Assessment

Criteria

Your performance will be successful when you:

4.1.　　find zeros of polynomial functions
4.2.　　determine whether a function is increasing or decreasing on an interval.
4.3.　　determine the end-behavior of a polynomial function.
4.4.　　use graphical methods to estimate the roots of a polynomial equation.
4.5.　　identify local and global extrema
4.6.　　apply the intermediate value theorem
4.7.　　determine the number of roots of a polynomial equation using the fundamental theorem of algebra.
4.8.　　determine the number of roots of a polynomial function using the fundamental theorem of algebra.
4.9.　　 determine all solutions to polynomial equations including complex solutions

5.　　Analyze rational functions

Assessment Strategies
5.1.　　Oral, Written, Graphic and/or Skill Assessment

Criteria

Your performance will be successful when you:

5.1.　　identify removable discontinuities
5.2.　　graph rational functions
5.3.　　perform arithmetic operations with rational expressions
5.4.　　determine the domain of rational functions
5.5.　　determine all asymptotes
5.6.　　solve rational equations

6.　　Analyze radical functions

Assessment Strategies
6.1.　　Oral, Written, Graphic and/or Skill Assessment

Criteria

Your performance will be successful when you:

6.1.　　solve radical equations

6.2. graph radical functions
6.3. verify solutions to identify extraneous roots
6.4. determine the domain of radical expression

7. Analyze exponential and logarithmic functions

Assessment Strategies
7.1. Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:
7.1. define the exponential function with an arbitrary base
7.2. graph an exponential function with an arbitrary base
7.3. model exponential functions to real life applications
7.4. solve exponential equations
7.5. define logarithmic functions with an arbitrary base
7.6. identify the inverse relationship between the logarithmic function and the exponential function
7.7. graph a logarithmic function with an arbitrary base
7.8. solve logarithmic equations

8. Solve algebraic systems

Assessment Strategies
8.1. Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:
8.1. solve nonlinear systems of equations
8.2. solve systems of linear equations in three or more variables
8.3. use systems of three equations to solve applied problems
8.4. graph systems of linear inequalities
8.5. graph systems of nonlinear equations

9. Analyze conic sections

Assessment Strategies
9.1. Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:
9.1. identify all conic sections based on a graph
9.2. identify all conic sections based on an equation
9.3. analyze the characteristics of all conic sections
9.4. sketch the graph of all conic sections given their equations

10. Analyze trigonometric functions

Assessment Strategies
10.1. Oral, Written, Graphic and/or Skill Assessment

Criteria

Your performance will be successful when you:
10.1. graph angles in standard position given degree measure
10.2. solve problems involving special right triangles
10.3. use reference angles to find exact values of trigonometric functions in any quadrant
10.4. find the exact value of a trigonometric function given a point on the terminal side of an angle
10.5. find the exact value of a trigonometric function given a right triangle
10.6. use reciprocal identities
10.7. use quotient identities
10.8. use Pythagorean identities
10.9. use even-odd identities
10.10. use cofunction identities

11. **Evaluate the trigonometric functions**

Assessment Strategies

11.1.   Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:

11.1.   identify exact values of trigonometric functions
11.2.   find approximate values of trigonometric functions using a calculator
11.3.   solve right triangles using inverse trigonometric functions
11.4.   solve right triangles using trigonometric functions

12. **Apply the unit circle and radian measure**

Assessment Strategies

12.1.   Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:

12.1.   use the concept of a reference angle
12.2.   graph angles in standard position given radian measure
12.3.   relate radian measures to real numbers
12.4.   convert between radian measures and degree measures of angles
12.5.   find exact and approximate values of trigonometric functions given in radian measure
12.6.   analyze the unit circle

13. **Analyze graphs of trigonometric functions**

Assessment Strategies

13.1.   Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:

13.1.   sketch graphs of basic trigonometric functions
13.2.   apply transformations to the graphs of trigonometric functions
13.3.   identify domains and ranges given trigonometric functions
13.4.   identify domains and ranges given graphs of trigonometric functions
13.5.   find equations from graphs of trigonometric functions

14. **Analyze inverse trigonometric functions**

Assessment Strategies

14.1.   Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:

14.1.   define the inverse trigonometric functions
14.2.   identify domains and ranges of inverse trigonometric functions
14.3.   evaluate the inverse trigonometric functions
14.4.   evaluate the composition of trigonometric and inverse trigonometric functions

15. **Manipulate trigonometric identities**

Assessment Strategies

15.1.   Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:

15.1.   use identities to evaluate trigonometric functions
15.2.   use trigonometric identities to verify other identities
15.3.   apply sum and difference identities

15.4. apply double-angle and half-angle identities
15.5. apply sum-to-product and product-to-sum identities

16. Solve trigonometric equations

Assessment Strategies
16.1. Oral, Written, Graphic and/or Skill Assessment

Criteria

Your performance will be successful when you:
16.1. solve equations involving trigonometric expressions of a single angle
16.2. solve equations involving trigonometric expressions of multiple angles
16.3. use correct notation to express infinite and finite solution sets of trigonometric equations

17. Solve oblique triangles

Assessment Strategies
17.1. Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:
17.1. use the Law of Sines to solve oblique triangles
17.2. use the Law of Cosines to solve oblique triangles
17.3. solve application problems involving oblique triangles

18. Complete vector operations

Assessment Strategies
18.1. Oral, Written, Graphic and/or Skill Assessment

Criteria

You will know you are successful when you:
18.1. define a vector
18.2. define unit vectors i and j
18.3. identify the horizontal and vertical components of a vector
18.4. find the magnitude of a vector
18.5. find the direction of a vector
18.6. perform vector addition
18.7. perform scalar multiplication of vectors
18.8. compute dot product of vectors
18.9. determine if two vectors are perpendicular
18.10. find the angle measure between two vectors

19. Complete operations with complex numbers in trigonometric form

Assessment Strategies
19.1. Oral, Written, Graphic and/or Skill Assessment

Criteria

Your performance will be successful when you:
19.1. convert complex numbers between rectangular form and trigonometric form
19.2. graph complex numbers in trigonometric form and rectangular form
19.3. find products of complex numbers written in trigonometric form
19.4. find quotients of complex numbers written in trigonometric form

20. Analyze the polar coordinate system

Assessment Strategies
20.1. Oral, Written, Graphic and/or Skill Assessment

Criteria

Your performance will be successful when you:

20.1.   identify points in the polar coordinate system
20.2.   translate between rectangular coordinates and polar coordinates for a given point
20.3.   convert an equation between polar form and rectangular form
20.4.   explore graphs of equations in polar form