Course Outcome Summary

Course Information

Description: Topics include: vectors; trigonometric functions and their graphs; identities; exponential and logarithmic functions and equations; radical equations; equations with rational exponents; dimension of a circle; velocity; sine and cosine graphs; complex numbers in polar and rectangular form; trigonometric equations; conic sections; and analysis of statistical data. Emphasis will be on the application of skills to technical problems.

Total Credits: 4.00

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. Graph exponential and logarithmic functions

   Assessment Strategies
   1.1. in an oral, written, or graphic product

   Criteria
   Performance will be satisfactory when you:
   1.1. graph exponential functions
   1.2. graph logarithmic functions
   1.3. relate logarithmic functions to its inverse function
   1.4. graph functions on logarithmic or semi-logarithmic scales
   1.5. apply skill to technical problems
   1.6. utilize appropriate technology
   1.7. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

2. Solve exponential and logarithmic equations

   Assessment Strategies
   2.1. in an oral, written, or graphic product

   Criteria
   Performance will be satisfactory when you:
   2.1. solve exponential equations
   2.2. solve logarithmic equations
2.3. solve applied problems involving exponential or logarithmic equations, such as growth and decay
2.4. utilize appropriate technology
2.5. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

3. Perform operations with exponents and radicals
   Assessment Strategies
   3.1. in an oral, written, or graphic product
   Criteria
   Performance will be satisfactory when you:
   3.1. evaluate an expression containing rational powers on numbers with rational roots
   3.2. convert between rational powers and radical notation
   3.3. simplify radical expressions

4. Solve equations with radicals and rational exponents
   Assessment Strategies
   4.1. in an oral, written, or graphic product
   Criteria
   Performance will be satisfactory when you:
   4.1. convert between radical and fractional exponent form
   4.2. solve radical equations involving one variable
   4.3. solve equations with fractional exponents
   4.4. verify solutions by substitution into the original equation
   4.5. apply skill to technical problems
   4.6. utilize appropriate technology
   4.7. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

5. Use formulas involving radicals and exponents
   Assessment Strategies
   5.1. in an oral, written, or graphic product
   Criteria
   Performance will be satisfactory when you:
   5.1. choose formula when appropriate
   5.2. identify unknown value(s)
   5.3. relate the given values to the variables in the formula formed after given values are substituted into a formula that includes radical expressions
   5.4. transform a formula by isolating a variable which is contained in a radical expression
   5.5. solve equations formed after given values are substituted into a formula that includes radical expressions
   5.6. apply skill to technical problems
   5.7. utilize appropriate technology
   5.8. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

6. Calculate unknown dimensions as related to a circle
   Assessment Strategies
   6.1. in an oral, written, or graphic product
   Criteria
   Performance will be satisfactory when you:
   6.1. calculate the length of a circular arc, given the radius and central angle
   6.2. calculate the central angle and the chord depth, given the radius and chord length of a circle
6.3. calculate the area of a sector of a circle, given the radius and central angle
6.4. calculate the area of a segment of a circle, given the radius, central angle, and area of sector to which the segment belongs
6.5. calculate the length of a chord, given the radius and the angle between the chord and a tangent at one end of the chord
6.6. calculate the angle between two tangents, given the radius of a circle and the length of the segments attached to the circle
6.7. apply skill to technical problems
6.8. utilize appropriate technology
6.9. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

7. Solve rotational, linear, and angular velocity problems

Assessment Strategies
7.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:
7.1. calculate the linear velocity of a point on the circumference of a wheel, given either the diameter or radius and the angular velocity
7.2. calculate the angular velocity of a point on the circumference of a wheel when given either the diameter or radius and the linear velocity
7.3. convert between radians over time and revolutions over time
7.4. apply skill to technical problems
7.5. utilize appropriate technology
7.6. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

8. Perform operations with vectors

Assessment Strategies
8.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:
8.1. determine the resultant of two or more vectors
8.2. resolve vectors by components
8.3. apply skill to technical problems
8.4. utilize appropriate technology
8.5. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

9. Perform arithmetic operations using complex numbers in both polar and rectangular forms

Assessment Strategies
9.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:
9.1. add, subtract, multiply, and divide in rectangular form
9.2. multiply and divide in polar form
9.3. apply skill to technical problems
9.4. utilize appropriate technology
9.5. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)
10. **Relate complex (rectangular) notation to polar notation**

   **Assessment Strategies**
   10.1. in an oral, written, or graphic product

   **Criteria**

   *Performance will be satisfactory when you:*
   10.1. convert between polar and rectangular form
   10.2. use the quadratic equation to find non-real solutions
   10.3. apply skill to technical problems
   10.4. utilize appropriate technology
   10.5. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

11. **Interpret sine/cosine graphs**

   **Assessment Strategies**
   11.1. in an oral, written, or graphic product

   **Criteria**

   *Performance will be satisfactory when you:*
   11.1. identify the amplitude from a sine or cosine wave graph
   11.2. identify the phase shift
   11.3. write the equation of a sine/cosine graph
   11.4. label amplitude, period, phase shift, and frequency for graph
   11.5. apply skill to technical problems
   11.6. utilize appropriate technology
   11.7. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

12. **Graph sine/cosine waves**

   **Assessment Strategies**
   12.1. in an oral, written, or graphic product

   **Criteria**

   *Performance will be satisfactory when you:*
   12.1. plot a graph of sine/cosine wave from an equation
   12.2. plot a graph of sine/cosine wave given the amplitude, frequency, and phase shift
   12.3. apply skill to technical problems
   12.4. utilize appropriate technology
   12.5. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

13. **Solve trigonometric equations**

   **Assessment Strategies**
   13.1. in an oral, written, or graphic product

   **Criteria**

   *Performance will be satisfactory when you:*
   13.1. manipulate identities
   13.2. factor trigonometric expressions
   13.3. write a trigonometric expression in terms of sine and cosine
   13.4. solve trigonometric equations with multiple solutions
   13.5. apply skill to technical problems
   13.6. utilize appropriate technology
13.7. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

14. **Analyze the equations of conic sections and their graphs**

**Assessment Strategies**

14.1. in an oral, written, or graphic product

**Criteria**

*Performance will be satisfactory when you:*

14.1. determine, by inspection, whether a given second-degree equation represents a circle, ellipse, parabola, or hyperbola
14.2. write the equation of a circle, ellipse, parabola, or hyperbola from given information
14.3. construct a graph of any of the conic sections from equation(s)
14.4. apply skill to technical problems
14.5. utilize appropriate technology
14.6. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

15. **Analyze data statistically**

**Assessment Strategies**

15.1. in an oral, written, or graphic product

**Criteria**

*Performance will be satisfactory when you:*

15.1. calculate measures of central tendency
15.2. calculate measures of dispersion
15.3. construct a graph that describes data
15.4. interpret data in terms of statistics
15.5. apply skill to technical problems
15.6. utilize appropriate technology
15.7. apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)