



## Course Number and Title: MAT 190 Precalculus

**Campus Location:**

Georgetown, Dover, Stanton, Wilmington

**Effective Date:**

2022-51

**Prerequisite:**

MAT 180 or MAT 183, SSC 100 or concurrent

**Co-Requisites:**

None

**Course Credits and Hours:**

4.00 credits

4.00 lecture hours/week

1.00 lab hours/week

**Course Description:**

This course includes a study of exponential, logarithmic, and trigonometric functions; vector applications; complex numbers; simple curve sketching of algebraic and trigonometric functions; nonlinear systems; matrix methods; polar coordinates; and properties of conic sections.

**Required Text(s):**

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

**Additional Materials:**

Graphing Calculator: TI 83 or TI 84

**Schedule Type:**

Classroom Course

**Disclaimer:**

None

**Core Course Performance Objectives (CCPOs):**

1. Solve application problems using exponential and logarithmic functions and their graphs. (CCC 2, 6)
2. Solve trigonometric equations and application problems. (CCC 2, 6)
3. Graph trigonometric functions. (CCC 6)
4. Solve application problems involving vectors. (CCC 2, 6)
5. Examine polar equations. (CCC 6)
6. Demonstrate principles of analytic geometry working with conic sections. (CCC 2, 6)
7. Solve linear and nonlinear systems, and perform operations on matrices. (CCC 2, 6)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

**Measurable Performance Objectives (MPOs):**

Upon completion of this course, the student will:

1. Solve application problems using exponential and logarithmic functions and their graphs.
  1. Solve exponential equations.
  2. Determine the domain, range, and asymptotes of exponential functions.
  3. Graph exponential functions.
  4. Use exponential functions to solve application problems.
  5. Convert between logarithmic and exponential notation.
  6. Use properties of logarithms and the change of base formula to simplify logarithmic expressions.
  7. Solve logarithmic equations.
  8. Determine the domain, range, and asymptotes of logarithmic functions.
  9. Graph logarithmic functions.
  10. Use logarithmic functions to solve application problems.
2. Solve trigonometric equations and application problems.
  1. Convert between degree and radian measures.
  2. Find arc lengths and areas of sectors of circles.
  3. Apply radian measure properties to angular and linear speed.
  4. Use radian measure of an angle to evaluate trigonometric functions.
  5. Define trigonometric functions in terms of the unit circle, and evaluate trigonometric functions of any angle.
  6. Use a calculator to evaluate trigonometric functions and their inverses.
  7. Use reciprocal, even-odd, co-function, and Pythagorean identities to evaluate trigonometric functions.
  8. Use inverse trigonometric functions to solve trigonometric equations and application problems.
  9. Use the sum and difference formulas for sine, cosine, and tangent to evaluate trigonometric functions.
  10. Use the double-angle and half-angle formulas to evaluate trigonometric functions.
  11. Prove trigonometric identities.
  12. Simplify and manipulate trigonometric expressions to other forms.
  13. Find the area of a triangle using right triangle trigonometry.
  14. Use the law of sines and the law of cosines to solve application problems involving oblique triangles.
3. Graph trigonometric functions.
  1. Determine whether trigonometric functions are even or odd.
  2. Determine the roots of trigonometric equations algebraically and graphically.
  3. Graph the six basic trigonometric functions.
  4. Graph transformations of sine and cosine.
4. Solve application problems involving vectors.
  1. Perform calculations with vectors in component form.
  2. Express a vector as a linear combination of unit vectors.
  3. Express a vector in terms of its magnitude and direction.
  4. Use the dot product to find the angle between two vectors.
  5. Solve applied problems involving velocity and force.
5. Examine polar equations.
  1. Perform arithmetic operations on complex numbers.
  2. Graph points given their polar coordinates.
  3. Convert between rectangular and polar coordinates.
  4. Convert between rectangular and polar equations.
  5. Graph polar equations.
  6. Write and graph complex numbers in polar form.
  7. Use DeMoivre's theorem to find powers and roots of complex numbers.
6. Demonstrate principles of analytic geometry working with conic sections.
  1. Apply the distance formula.
  2. Identify the equations of a circle, parabola, ellipse, and hyperbola.
  3. Graph conic sections.
7. Solve linear and nonlinear systems, and perform operations on matrices.
  1. Solve systems of linear and nonlinear equations and inequalities by graphing.
  2. Solve systems of linear and nonlinear equations algebraically.
  3. Solve application problems using systems of linear and nonlinear equations.
  4. Use matrices to solve systems of linear equations.
  5. Find and apply the determinant of a matrix.
  6. Use inverse matrices to solve systems of linear equations.
  7. Use Cramer's rule to solve systems of linear equations.
  8. Add, subtract, and multiply two matrices and perform scalar multiplication.

**Evaluation Criteria/Policies:**

The grade will be determined using the Delaware Tech grading system:

90	-	100	=	A
80	-	89	=	B
70	-	79	=	C
0	-	69	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

**Final Course Grade:**

Calculated using the following weighted average

Evaluation Measure	Percentage of Final Grade
6 Tests (summative) (equally weighted)	70%
Labs (formative)	10%
Homework (formative)	10%
Formative Assessments (formative)	10%
TOTAL	100%

**Core Curriculum Competencies (CCCs are the competencies every graduate will develop):**

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

**Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):**

None

**Disabilities Support Statement:**

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.