COURSE TITLE: Precalculus (MAT 160)

DEPARTMENT: STEM (Science, Technology, Engineering & Mathematics)

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OFFICE HOURS: By Appointment

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OBJECTIVE: To provide the student with the necessary background in: algebra, trigonometry and analytic trigonometry & geometry, so student will be prepared to continue on to Calculus I. Upon successful completion of MAT 160 (with a C or better) the student may enroll in MAT 170 Calculus I.

COURSE CONTENT: This course covers the following chapters & sections:

Chapter 1: Functions and Their Graphs Sections: 1.1 - 1.5
Chapter 2: Polynomial and Rational Functions Sections: 2.1 - 2.7
Chapter 3: Exponential and Logarithmic Functions Sections: 3.1 - 3.5
Chapter 4: Trigonometric Functions Sections: 4.1 - 4.8
Chapter 5: Analytic Trigonometry Sections: 5.1 - 5.5
Chapter 6: Additional Topics in Trigonometry Sections: 6.1 - 6.2
Chapter 7: System of Equations Sections: 7.1 - 7.3
Chapter 8: Matrices and Determinants Sections: 8.1 - 8.5
Chapter 12: Limits and Intro to Calculus Sections: 12.1-12.4

Other sections may be included if time permits.

STUDENT LEARNING OUTCOMES:

1. Demonstrate comprehension of fundamental concepts associated with functions such as computing, evaluating, graphing and/or stating domain & range of functions and their inverses.
2. Analyze and graph Polynomial and Rational functions such as stating domain & range, calculating intercepts, equations of asymptotes and/or evaluating infinite and 1-sided limits.
3. Analyze Exponential and Logarithmic functions
4. Analyze and solve various trigonometric problems such as interpreting the graphs of trigonometric functions, solving trigonometric equations,
verifying trigonometric identities and/or solving a problem using either sum, difference, half-angle or double-angle formulas

**SPECIFIC COURSE OBJECTIVES:**

1. Find the domain and range of a function algebraically and graphically.
2. Evaluate the difference quotient for various functions such as a quadratic or rational function.
3. Sketch graphs of basic functions by the method of translation.
4. Evaluate a function for different values of x or y.
5. Find the local maximum and/or local minimum of a function-
6. Find a linear function and interpret the meaning of slope, x and y intercepts-
7. Find a quadratic function given the vertex and one point.
8. Set up a function and maximize or minimize the function.
10. Determine if two functions are inverses using the definition.
11. Find the inverse function of linear, quadratic, cubic, and rational functions.
12. Sketch the graph of a polynomial function using the method of factoring along with polynomial behavior.
13. Divide polynomials using the long division algorithm and synthetic division.
14. Solve a polynomial equation of degree three or higher.
15. Find a polynomial function given the degree, intercepts and one point.
16. Analyze a rational function:
   a. Find horizontal and vertical asymptotes, b- Find x and y intercepts, if any,
   c. Sketch the graph.
17. Sketch the graph of an exponential function by method of translation and show the x and y intercepts if any and the horizontal asymptote.
18. Find the inverse function of an exponential function.
19. Find the domain and range of exponential and logarithmic functions.
20. Use the definition to evaluate logarithms without a calculator.
21. Solve an exponential equation two ways
   a. By taking the log of both sides
   b. By equating the bases on both sides
22. Use properties of logarithms to
   a. Expand an expression into sums and differences
   b. Write an expression as a single logarithm
   c. Evaluate expressions without a calculator
23. Solve logarithmic equations and express the answer in exact form and as a decimal approximation.
24. Apply the growth/decay formula in a word problem
   a. Use given information to find the growth or decay constant, k
   b. Set up the model and use the model to answer question about the population
25. Graph a translated ellipse and give.
   a. center
b. vertices
c. foci
d. length of major and minor axes
e. eccentricity
26. Graph a hyperbola and give:
a. foci
b. vertices
c. equations of the asymptotes
27. Complete a right triangle using the Pythagorean Theorem and find the values of the six trigonometric functions of one of the angles of the triangle using the definition of the trig functions.
28. Know the exact values of the trigonometric functions for 30°, 45°, and 60° and the quadrantal angles.
29- Evaluate trigonometric functions of special angles without a calculator
30. Use a calculator to evaluate trigonometric values of angles.
31. Simplify trigonometric expressions using identities and/or algebra.
32. Solve right triangle word problems.
33. Verify trigonometric identities using the fundamental identities-Pythagorean, reciprocal, tangent, and cotangent.
34. Solve trigonometric equations.
35. Sketch the graph of the inverse sine, cosine, and tangent functions.
36. Given an angle, find multiple co-terminal angles.
37. Convert from degrees to radians and radians to degrees.
38. Find the exact values of the six trigonometric functions for a general angle using reference triangles or the unit circle.
39. Find the values of the six trigonometric functions for an angle t with given conditions on the unit circle including the quadrantal angles.
40. Use the formulas for negatives to rewrite trigonometric expressions.
41. Graph the sine, cosine, and tangent functions with changes in amplitude, period, and vertical shifts.
42. Given a unit circle labeled in radians, find the value of a trigonometric function of a given radian value or find the radian measure of an angle given the value of a trigonometric function.
43. Find the reference angle for any given angle.
44. Use reference angles to compute the exact/approximate value of a trigonometric function of any given angle.
45. Using a calculator, find the trigonometric function of any given angle or given the value of a trigonometric function, find the measure of the angle on a given interval.
46- Given a sine or cosine function, find the amplitude, period, and phase shift and sketch the curve.
47. Given the graph of a sine or cosine function or the amplitude, period and phase shift; write a sine or cosine function.
48. Given a tangent function, find the period and phase shift and sketch the curve showing the vertical asymptotes.
49. Write a specified part of a right triangle in terms of two other specified parts.
50. Solve application problems involving right triangles using the trigonometric functions.
51. Solve trigonometric equations over the set of real numbers or on a given interval.
52. Rewrite trigonometric expressions as a cofunction of a complementary angle.
53. Use an addition or subtraction formula to evaluate or simplify an expression.
54. Use an addition or subtraction formula to verify an identity or rewrite an expression.
55. Use a double-angle formula to evaluate or simplify an expression.
56. Use a double-angle formula to verify an identity or rewrite an expression.
57. Use a double-angle formula to solve a trigonometric equation on a given interval.
58. Evaluate expressions involving the inverse trig functions.
59. Solve trigonometric equations on a given interval.
60. Solve application problems using the inverse trigonometric functions.
61. Use the Law of Sines to solve triangles.
63. Use the Law of Cosines to solve triangles.
64. Solve applications using the Law of Cosines.
65. Solve 2x2 systems by substitution and elimination methods.
66. Solve a 3x3 system of linear equations using elimination and back substitution.
67. Use partial fraction decomposition methods to rewrite a fraction as the sum of two fractions. (if time permits)
68. Given parametric equations, write an x/y equation by eliminating the parameter and sketch the curve. (if time permits)
69. Convert from rectangular to polar coordinates or polar coordinates to rectangular coordinates. (if time permits)
70- Convert a polar equation to a rectangular equation or a rectangular equation to a polar equation. (if time permits)
71- Sketch the graph of a polar equation. (if time permits)

TESTING FINAL EXAM &
GRADING POLICY: Your course grade will be determined as follows:
Final exam: 20%
4 or 5 unit exams: 60%
Quizzes: 15%
Attendance & participation: 5%

The Department Grade Scale is as follows:

A 93-100
A- 90-92
B+ 87-89
B 83-86
B- 80-82
C+ 77-79
C 75-74
C- 70-69
D+ 67-66
D 63-62
D- 60-59
F 0-59
Academic dishonesty - breaking the standards of academic honesty - is taken very seriously by the College. Breaking the rules of academic honesty will result in immediate disciplinary consequences.

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