College Algebra; MAC-1105

Term: Spring, 2019

Instructor: Mrs. Eileen Corelli
Office: EFSC Melbourne - Building 7, Room 316
Office Phone: (321) 433-5633
Email: corellie@easternflorida.edu

Department Chair: Mrs. Shannon Dexter
Email: dexters@easternflorida.edu

Instructor Schedule & Office Hours will be posted in Canvas and on my office door. No appointment is necessary.

Author(s): Lial, Hornsby, Schneider, Daniels

A Scientific Calculator is also required. Graphing Calculators cannot be used in this course.

Course Description: Meets Gordon Rule General and Education requirements. This course prepares the student for precalculus, statistics, essentials of calculus, and other related disciplines. This course includes functions and function notation; domain, range, and graphs of functions and relations; operations on functions; inverse functions; linear, quadratic, rational, radical, exponential and logarithmic equations and functions; piecewise and higher degree monomial functions; systems of equations and inequalities; applications. This course is a state designated core course.

Gordon Rule: Yes

Prerequisite: Minimum grade of "C" in MAT 1033 or appropriate placement test.

Credits: 3

Syllabus Addendum: Please read the Syllabus Addendum which discusses Course Policies, Student Resources and Study Tips.

Syllabus Disclaimer: This syllabus is subject to change at the discretion of the instructor.
Course Competencies (Topics you will learn):

1. Analyze Functions
   (a) Recognize functions in ordered pair form
   (b) Recognize functions in equation form
   (c) Determine the domain of a function algebraically
   (d) Determine the range of a function algebraically
   (e) Use function notation
   (f) Determine intervals of the domain over which a function is increasing, decreasing or constant
   (g) Determine intervals of the domain over which a function is continuous
   (h) Construct algebraic combinations of functions
   (i) Determine domains of algebraic combinations of functions
   (j) Determine the composition of functions
   (k) Determine domains of composite functions
   (l) Determine whether a given function is even or odd
   (m) Determine the simplified form of the difference quotient
   (n) Apply symmetry tests for determining the x-axis, y-axis, and origin symmetry
   (o) Determine the value of a piecewise function for a given value of the domain
   (p) Identify zeros of a function
   (q) Identify basic functions: linear, quadratic, cubic, radical, exponential, logarithmic, absolute value

2. Analyze Linear Functions
   (a) Define linear functions
   (b) Determine the slope of a linear function
   (c) Write an equation for a line parallel to a given line
   (d) Write an equation for a line perpendicular to a given line
   (e) Identify the intercepts of a linear function
   (f) Write equations in slope-intercept form
   (g) Write equations in standard form
   (h) Write equations in function notation
   (i) Write the equation of a horizontal line through a given point
   (j) Write the equation of a vertical line through a given point
   (k) Determine the domain of a linear function
   (l) Determine the range of a linear function
   (m) Graph a linear function
   (n) Solve linear equations
   (o) Solve applied problems involving linear equations

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3. Analyze polynomial functions
   (a) Define quadratic functions
   (b) Determine the domain of a quadratic function
   (c) Determine the range of a quadratic function
   (d) Determine the zeros of a quadratic function
   (e) Identify the vertex of a quadratic function
   (f) Identify the axis of symmetry of a quadratic function
   (g) Identify the intercepts of a quadratic function
   (h) Graph a quadratic function in the form \( f(x) = ax^2 + bx + c \)
   (i) Solve quadratic equations by factoring
   (j) Solve quadratic equations by using the square root property
   (k) Solve quadratic equations by completing the square
   (l) Solve quadratic equations by using the quadratic formula
   (m) Solve equations that are quadratic in form
   (n) Solve applied problems involving quadratic equations
   (o) Recognize polynomial functions
   (p) Determine the domain of a polynomial function
   (q) Graph \( f(x) = x^n, n > 2 \)
   (r) Graph transformations of \( f(x) = x^n, n > 2 \)
   (s) Apply the basic concepts of complex numbers
   (t) Apply basic operations on complex numbers
   (u) Simplify powers of \( i \)

4. Analyze Graphs
   (a) Recognize functions from graphs
   (b) Determine the domain of a function graphically
   (c) Determine the range of a function graphically
   (d) Graph functions by plotting points
   (e) Calculate the length of a line segment
   (f) Identify the midpoint of a line segment
   (g) Convert from general form of a circle to center-radius form
   (h) Identify the center and radius of a circle
   (i) Graph a circle
   (j) Graph piecewise functions
   (k) Examine graphs of basic functions: linear, quadratic, cubic, radical, exponential, logarithmic, absolute value
   (l) Apply shift, scaling, and reflection transformations to basic functions
   (m) Relate even and odd functions to symmetry

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5. Analyze Absolute Value Functions
   (a) Define absolute value
   (b) Determine ordered pairs of an absolute value function
   (c) Determine the domain of an absolute value function
   (d) Determine the range of an absolute value function
   (e) Solve absolute value equations
   (f) Solve absolute value inequalities

6. Solve systems of equations and inequalities
   (a) Solve 2 X 2 systems of linear & nonlinear equations by substitution and elimination methods
   (b) Solve 3 X 3 systems of linear equations
   (c) Recognize inconsistent and consistent systems
   (d) Solve applications using a system of two equations
   (e) Graph solution sets of systems of inequalities in two variables

7. Analyze inverse functions
   (a) Define one-to-one functions
   (b) Recognize one-to-one functions
   (c) Determine if a function is one-to-one using the horizontal line test
   (d) Define the inverse function
   (e) Determine whether two functions are inverses
   (f) Determine the inverse of a one-to-one function
   (g) Determine the domain of a one-to-one function and its inverse
   (h) Determine the range of a one-to-one function and its inverse
   (i) Graph a one-to-one function and its inverse
   (j) Determine the inverse of a one-to-one function with a restricted domain
   (k) State the domain and range of a one-to-one function with a restricted domain
   (l) State the domain and range of the inverse of a one-to-one function with a restricted domain

8. Analyze Exponential Functions
   (a) Define exponential functions
   (b) Graph exponential functions, including functions with base e
   (c) Describe the properties of exponential functions
   (d) Determine the domain of exponential functions
   (e) Determine the range of exponential functions
   (f) Solve exponential equations
   (g) Graph exponential functions using transformations
   (h) Solve applications of exponential functions

9. Analyze Logarithmic Functions
(a) Define logarithmic functions
(b) Graph logarithmic functions, including functions with base e and base 10
(c) Describe the properties of logarithmic functions
(d) Use the properties of logarithms
(e) Determine the domain of logarithmic functions
(f) Determine the range of logarithmic functions
(g) Solve logarithmic equations
(h) Graph logarithmic functions using transformations
(i) Solve applications of logarithmic functions

10. Apply Variation Concepts
   (a) Solve direct variation problems
   (b) Solve inverse variation problems
   (c) Solve joint variation problems

11. Analyze Rational Functions
   (a) Define rational functions
   (b) Determine the domain of a rational function
   (c) Determine the intercepts of a rational function
   (d) Determine the equations of the vertical asymptotes of a rational function
   (e) Determine the equation of the horizontal asymptotes of a rational function
   (f) Graph rational functions

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**Syllabus Disclaimer:** This syllabus is subject to change at the discretion of the instructor.
**Tentative Schedule:**

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