MATH 010: COLLEGE ALGEBRA

Originator
jmagbuhat

Justification / Rationale
AB 705 statement update

Effective Term
Fall 2019

Credit Status
Credit - Degree Applicable

Subject
MATH - Mathematics

Course Number
010

Full Course Title
College Algebra

Short Title
COLLEGE ALGEBRA

Discipline

Disciplines List
Mathematics

Modality
Face-to-Face

Catalog Description
This is a function oriented course that includes an examination of the general concept of a function and function notation, as well as an in depth investigation of polynomial, rational, exponential, and logarithmic functions, particularly their equations, graphs, and behavior. Other topics include the binomial theorem, conic sections, and matrices as they
apply to systems of linear equations. (C-ID MATH 150)
Note: All students now can enroll in this transfer-level course without completing posted requisites. Please refer to AB 705 (under How do I enroll in courses at COD?) or see a Counselor.

Schedule Description
This is a function oriented course including the concept of a function and function notation.
Prerequisite: MATH 040 or MATH 049
Advisory: ENG 061
IGETC: 2A*

Lecture Units
3
Lecture Semester Hours
54

Lab Units
1
Lab Semester Hours
54

In-class Hours
108

Out-of-class Hours
108

Total Course Units
4

Total Semester Hours
216

Prerequisite Course(s)
MATH 040 or MATH 049
Advisory: ENG 061

Required Text and Other Instructional Materials

Resource Type
Book

Author
Stewart, James;, Redlin, Lothar; Watson, Saleem

Title
College Algebra

Edition
7th

Publisher
Cengage

Year
2016

College Level
Yes

ISBN #
9781305115545

Resource Type
Web/Other

Description
Other Instructional Materials:
Scientific calculator

Class Size Maximum
35

Entrance Skills
Demonstrate an understanding that the key characteristic of a linear model is its constant rate of change.

Prerequisite Course Objectives
MATH 040-Comprehend that the key characteristic of a linear model is its constant rate of change.
MATH 049-Comprehend that the key characteristic of a linear model is its constant rate of change. Recognize when a table, graph or equation is linear.

Entrance Skills
Interpret slope as a rate of change.

Prerequisite Course Objectives

MATH 040-Interpret slope as a rate of change.
MATH 049-Interpret slope as a rate of change, in preparation for generalizing the rate of change to the derivative in the Calculus course.

Entrance Skills

Recognize when a table, graph, or equation is linear.

Prerequisite Course Objectives

MATH 040-Recognize when a table, graph, or equation is linear.
MATH 049-Comprehend that the key characteristic of a linear model is its constant rate of change. Recognize when a table, graph or equation is linear.

Entrance Skills

Create a linear model in the form of a table, graph, or equation.

Prerequisite Course Objectives

MATH 040-Create a linear model in the form of a table, graph, or equation.
MATH 049-Create and comprehend a linear model in the form of a table, graph, or equation from a verbal description, using the rule of 4.

Entrance Skills

Find the equation of a line and apply it to solve problems with a constant rate of change.

Prerequisite Course Objectives

MATH 040-Find the equation of a line and apply it to solve problems with a constant of change.
MATH 049-Find the equation of a line and apply it to solve problems with a constant rate of change.

Entrance Skills

Solve 2x2 and 3x3 systems of linear equations.

Prerequisite Course Objectives

MATH 040-Solve 2x2 and 3x3 systems of linear equations.
MATH 049-Solve 2x2 and 3x3 systems of linear equations apply this to model circles, parabolas lines from given data, as a lead into generalizing to least square methods in the Calculus sequence.

Entrance Skills

Graph systems of linear inequalities in two dimensions.

Prerequisite Course Objectives

MATH 040-Graph systems of linear inequalities in two dimensions.
MATH 049-Graph systems of linear inequalities in two dimensions. Introduction to non-linear inequalities.

Entrance Skills

Graph and find the equation of a circle.

Prerequisite Course Objectives

MATH 040-Graph and find the equation of a circle.
MATH 049-Graph and find the equation of a circle. Graph the circle to discuss the domain range of the explicit functions defined from the implicit circular relation, to prepare for applications of circles in Trigonometry.

Entrance Skills

Solve quadratic equations by factoring, completing the square, taking square roots or the quadratic formula.

Prerequisite Course Objectives

MATH 040-Solve quadratic equations by factoring, completing the square, taking square roots or the quadratic formula.

MATH 049-Solve quadratic equations by factoring, completing the square, taking square roots and the quadratic formula.

Entrance Skills

Solve quadratic inequalities.

Prerequisite Course Objectives

MATH 040-Solve quadratic inequalities.
MATH 049-Solve quadratic inequalities. Also solve inequalities of higher degree polynomials graphically in preparation for the the first and second derivative tests in Calculus. If time permits, solve rational inequalities.

Entrance Skills

Recognize when a table, graph, or equation is quadratic.

Prerequisite Course Objectives

MATH 040-Recognize when a table, graph, or equation is quadratic.
MATH 049-Recognize when a table, graph, or equation is quadratic.

Entrance Skills

Create a quadratic model with a table, graph, or equation and solve maximum and minimum problems.

Prerequisite Course Objectives

MATH 040-Create a quadratic model with a table, graph, or equation and solve maximum and minimum problems.
MATH 049-Create a quadratic model with a table, graph, or equation and solve maximum and minimum problems. Start to develop the terminology and notation associated with the Extreme Value Theorem in Calculus.

Entrance Skills

Graph a parabola by finding the vertex, intercepts, and using properties of symmetry.

Prerequisite Course Objectives

MATH 040-Graph a parabola by finding the vertex, intercepts, and other symmetric points.
MATH 049-Graph a parabola by finding the vertex, intercepts, and other symmetric points. Graph a circle by finding the "extreme points" and center.

Entrance Skills

Understand and manipulate rational exponents and Nth roots.

Prerequisite Course Objectives

MATH 040-Comprehend and manipulate rational exponents and Nth roots.
MATH 049-Comprehend and manipulate rational exponents and Nth roots, and solve radical equations.

Entrance Skills

Solve equations involving square roots.

Prerequisite Course Objectives

MATH 040-Solve root equations.
MATH 049-Comprehend and manipulate rational exponents and Nth roots, and solve radical equations.

Entrance Skills

Demonstrate an understanding of the definition of a function including function notation and terminology (domain and range).

Prerequisite Course Objectives

MATH 040-Apply the definition of a function including function notation and terminology (domain and range).
MATH 049-Apply the definition of a function including function notation and terminology (domain and range), especially as function notation relates to a graph. Develop the ability to read a graph and precisely describe how the output variable changes wrt (with respect to) the output variable, using function notation and inequality notation.

Entrance Skills

Demonstrate an understanding that the key characteristic of an exponential function is its constant growth (decay) factor.

Prerequisite Course Objectives

MATH 040-Comprehend that the key characteristic of an exponential function is its constant growth (decay) factor.
MATH 049-Comprehend that the key characteristic of an exponential function is its constant growth (decay) factor. Recognize when a table, graph or function is exponential.

Entrance Skills

Recognize when a table, graph, or equation is exponential and when a word problem can be modeled with an exponential function.

Prerequisite Course Objectives

MATH 040-Recognize when a table, graph, or equation is exponential and when a word problem can be modeled with an exponential function.
MATH 049-Recognize when a table, graph, or equation is exponential and when a word problem can be modeled with an exponential function. Develop the language associated with an exponential function such as: growth or decay factor; percent increase or decrease.

Entrance Skills

ADVISORY SKILLS:
Demonstrate critical thinking skills when reading, composing and participating in class discussions.

Prerequisite Course Objectives

ENG 061-Demonstrate the ability to think critically and express ideas using various patterns of development.

Entrance Skills

Develop, organize and express complex ideas in both expository and research papers.

Prerequisite Course Objectives

ENG 061-Use theses to organize paragraphs into coherent analyses.
ENG 061-Demonstrate the ability to use research skills including library resources such as books, periodicals, electronic databases and online resources such as the internet.

Entrance Skills

Define, analyze, evaluate, explain, classify, compare and contrast ideas in written form.

Prerequisite Course Objectives

ENG 061-Use theses to organize paragraphs into coherent analyses.
ENG 061-Recognize features of style such as purpose, audience and tone integrate these elements into academic and professional writing.
ENG 061-Demonstrate the ability to read and respond in writing beyond the literal interpretation of the text.

Entrance Skills

Demonstrate comprehension of rational numbers and their representation as decimals and fractions. Demonstrate the ability to judge relative sizes of rational numbers and the ability to add, subtract, multiply, and divide rational numbers without a calculator.

Entrance Skills

Demonstrate a high level of proficiency in the operations of addition, subtraction, multiplication, and division as well as computing exponents and roots.

Course Content

1. Functions, including function-notation, domain and range, piecewise defined functions, and rates of change.
2. Symmetry of functions, transformations of functions, and the algebra of functions, including composition of functions and inverses of functions.

3. Polynomial functions: roots (zeroes); factoring; polynomial division and the remainder and factor theorems; roots and complex numbers; the graphs of and behavior of polynomial functions; polynomial functions as models.
4. Rational functions: roots (zeroes); vertical asymptotes; horizontal asymptotes; oblique asymptotes; the graph of and behavior of rational functions; rational functions as models.
5. Inverse functions, their significance and the computation of an inverse function.
6. Exponential and logarithmic functions; the graphs and behavior of exponential and logarithmic functions.
7. Solving exponential and logarithmic equations.
8. Applications of polynomial, rational, exponential and logarithmic functions, including growth and decay.
9. Matrices and the use of matrices to solve systems of linear equations, including Gauss-Jordan elimination and Cramer's Rule.
10. Conic sections: graphing conics; their behavior and characteristic properties; their use in solving application problems.
11. Linear, nonlinear and absolute value inequalities.
12. Sequences and Series

Lab Content

1. Analyze and investigate properties of functions;
2. Synthesize results from the graphs and/or equations of functions;
3. Recognize the behavior of polynomial, rational, exponential, and logarithmic functions by applying transformations to the graphs of functions;
4. Recognize the relationship between functions and their inverses graphically and algebraically;
5. Solve and apply rational, linear, polynomial, radical, absolute value, exponential, and logarithmic equations and solve linear, nonlinear, and absolute value inequalities;
6. Solve linear and nonlinear systems of equations and inequalities;
7. Apply techniques for finding zeros of polynomials and roots of equations including, factoring, polynomial division, the remainder theorem, and factor theorem;
8. Solve and apply linear systems using matrices and determinants including, Gauss-Jordan elimination and Cramer's Rule;
9. Analyze conics algebraically and graphically;
10. Apply conics to model STEM applications;
11. Apply functions and other algebraic techniques to model applications in a variety of disciplines, including STEM fields, business and economics;
12. Exploration of sums of finite and infinite series.
13. Exploration of applications that involve combinations of multiple topics from lecture.
14. Demonstration of mathematical reasoning in either written work or oral presentations.

Course Objectives

	Objectives
Objective 1	Analyze and investigate properties of functions; Represent a function graphically, numerically, and analytically and synthesize information from these representations.
Objective 2	Demonstrate an understanding of function notation and operations including inverses and compositions of functions; Recognize the relationship between functions and their inverses graphically and algebraically
Objective 3	Compute average rates of change and interpret as slope of a secant line.
Objective 4	Recognize, graph and solve equations involving polynomial, rational, exponential, root, and logarithmic functions; Solve linear, nonlinear and absolute value inequalities.
Objective 5	Recognize the behavior of polynomial, rational, exponential, and logarithmic functions; Use transformations to graph polynomial, rational, exponential, and logarithmic functions.
Objective 6	Recognize and apply the appropriate function to solve problems involving tables, graphs, equations or words.
Objective 7	Use matrix reduction techniques such as Gauss-Jordan elimination and Cramer's Rule to solve systems of linear equations.
Objective 8	Create a system of linear equations modeling an application problem in STEM fields, Business and Economics.
Objective 9	Recognize and graph the equations of parabolas, circles, ellipses, and hyperbolas.
Objective 10	Recognize the behavior and characteristic properties of parabolas, circles, ellipses, and hyperbolas; Describe these characteristic properties in terms of how they are expressed in the standard form of the equation of a conic.
Objective 11	Use linear, exponential and logarithmic equations and equations of conics to model application problems in STEM fields, Business and Economics.
Objective 12	Apply studied principles and skills to new situations in addition to situations that mirror those on the homework and those shown in class

Objective 13	Use formulas to find sums of finite and infinite series.
Objective 14	Apply techniques for finding zeros of polynomials and roots of equations including , factoring, polynomial division, the remainder theorem, and factor theorem

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Apply algebraic and geometric principles to contrast different families of functions.
Outcome 2	Demonstrate problem solving skills in application problems, with an emphasis on the concept of function.
Outcome 3	Create, analyze, and interpret graphs of functions.
Outcome 4	Explain the role of deductive reasoning in mathematics and determine appropriate usage of deductive reasoning and mathematics in human life and culture.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Lecture	Lecture will be used for introduction and explanation of course topics.
Discussion	Discussion will be used to review, analyze, and evaluate various methods of solution.
Laboratory	Lab will be used, in groups or individually, for student exploration of the topics of the course.
Activity	Activities in the lab portion of the class will include using various tools for developing problem solving skills.

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Written homework	Students will be evaluated by homework amounting to at least six hours per week.	Out of Class Only
Mid-term and final evaluations	Students will be evaluated by examinations involving problems that require the application of studied principles and skills to new situations as well as problems that mimic those done on homework and in class.	In Class Only
Mid-term and final evaluations	Students will be evaluated by a comprehensive two-hour final exam.	In Class Only
Computational/problem-solving evaluations	Students will be evaluated by completing challenging problem sets requiring careful reasoning and application of a variety of course topics.	In and Out of Class
Laboratory projects	Students will apply course topics to solve significant problems emphasizing applications in business, science, and mathematics.	In Class Only
Student participation/contribution	Students will be evaluated by their participation in lab activities and may be required to turn in written summaries of these activities.	In Class Only

Assignments

Other In-class Assignments
1. Read textbooks and supplementary assignments.
2. Attend classroom lectures and take notes.
3. Participate in classroom discussions to review, analyze, diagnose and evaluate various methods of solution used in homework.
4. Complete examinations involving problems that apply studied principles to new situations.

Other Out-of-class Assignments

1. Read textbooks and supplementary assignments.
2. Complete assigned homework including problem solving exercises to improve skills and mathematical understanding.

Grade Methods
Letter Grade Only

COD GE
C4.B - Language and Rationality - Communication and Analytical Thinking

CSU GE
B4 - Mathematics

IGETC GE
2A - Mathematical Concepts & Quantitative Reasoning

MIS Course Data

CIP Code
27.0101 - Mathematics, General.

TOP Code
170100 - Mathematics, General

SAM Code
E - Non-Occupational

Basic Skills Status
Not Basic Skills

Prior College Level
Not applicable

Cooperative Work Experience
Not a Coop Course

Course Classification Status
Credit Course

Approved Special Class
Not special class

Noncredit Category
Not Applicable, Credit Course

Funding Agency Category
Not Applicable

Program Status
Program Applicable

Transfer Status
Transfer CSU, limited UC

C-ID
MATH 150

Allow Audit
No

Repeatability

No

Materials Fee

No

Additional Fees?

No

Approvals

Curriculum Committee Approval Date

02/05/2019

Academic Senate Approval Date

02/14/2019

Board of Trustees Approval Date

03/15/2019

Course Control Number

CCC000255006

Programs referencing this course

Computer Information Systems Associate of Science and Transfer Preparation (http://catalog.collegeofthedesert.eduundefined?key=221)

Liberal Arts: Business and Technology AA Degree (http://catalog.collegeofthedesert.eduundefined?key=27)

Liberal Arts: Math and Science AA Degree (http://catalog.collegeofthedesert.eduundefined?key=29)

Interdepartmental Environmental Studies AS Degree (http://catalog.collegeofthedesert.eduundefined?key=77)