MATH-1530: COLLEGE ALGEBRA

Cuyahoga Community College

Viewing:MATH-1530 : College Algebra
Board of Trustees:
2017-05-25

Academic Term:
Spring 2019

Subject Code
MATH - Mathematics

Course Number:
1530

Title:
College Algebra

Catalog Description:
Topics include extensive function (linear, quadratic, polynomial, radical, power, piece-wise, exponential, logarithmic) representation including verbal, numeric, graphic, and algebraic, identifying properties of the different function types, transformation of functions, solve linear, polynomial, rational, absolute value, exponential and logarithmic equations. Solve quadratic, polynomial and rational inequalities in one variable. Determine and graph conic sections, solve non-linear systems of equations and inequalities and solve systems of equations using matrices, arithmetic and geometric sequences and series. Includes applications and activities to build skills in problem solving.

Credit Hour(s):
4

Lecture Hour(s):
4

Requisites
Prerequisite and Corequisite
MATH-0965 Intermediate Algebra or sufficient score on math placement test; or departmental approval for equivalent coursework.
Note: MATH-1200 or MATH-1280 taken prior to Fall 2016 or MATH-1270 taken prior to Summer 2017 will also be accepted to meet prerequisite requirements for this course.

I. ACADEMIC CREDIT

Academic Credit According to the Ohio Department of Higher Education, one (1) semester hour of college credit will be awarded for each lecture hour. Students will be expected to work on out-of-class assignments on a regular basis which, over the length of the course, would normally average two hours of out-of-class study for each hour of formal class activity. For laboratory hours, one (1) credit shall be awarded for a minimum of three laboratory hours in a standard week for which little or no out-of-class study is required since three hours will be in the lab (i.e. Laboratory 03 hours). Whereas, one (1) credit shall be awarded for a minimum of two laboratory hours in a standard week, if supplemented by out-of-class assignments which would normally average one hour of out-of-class study preparing for or following up the laboratory experience (i.e. Laboratory 02 hours). Credit is also awarded for other hours such as directed practice, practicum, cooperative work experience, and field experience. The number of hours required to receive credit is listed under Other Hours on the syllabus. The number of credit hours for lecture, lab and other hours are listed at the beginning of the syllabus. Make sure you can prioritize your time accordingly. Proper planning, prioritization and dedication will enhance your success in this course.

The standard expectation for an online course is that you will spend 3 hours per week for each credit hour.

II. ACCESSIBILITY STATEMENT

If you need any special course adaptations or accommodations because of a documented disability, please notify your instructor within a reasonable length of time, preferably the first week of the term with formal notice of that need (i.e. an official letter from the Student Accessibility Services (SAS) office). Accommodations will not be made retroactively.
For specific information pertaining to ADA accommodation, please contact your campus SAS office or visit online at http://www.tri-c.edu/accessprograms/. Blackboard accessibility information is available at http://access.blackboard.com.

III. ATTENDANCE TRACKING

Regular class attendance is expected. Tri-C is required by law to verify the enrollment of students who participate in federal Title IV student aid programs and/or who receive educational benefits through other funding sources. Eligibility for federal student financial aid is based in part on enrollment status.

Students who do not attend classes for the entire term are required to withdraw from the course(s). Additionally, students who withdraw from a course or stop attending class without officially withdrawing may be required to return all or a portion of their financial aid based on the date of last attendance. Students who do not attend the full session are responsible for withdrawing from the course(s).

Tri-C is responsible for identifying students who have not attended a course before financial aid funds can be applied to students’ accounts.

Therefore, attendance is recorded in the following ways:

- For in-person and blended-learning courses, students are required to attend the course by the 15th day of the semester (or equivalent for terms shorter than five weeks) to be considered attending. Students who have not met all attendance requirements for in-person and blended courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

- For online courses, students are required to login at least two times per week and submit one assignment per week for the first two weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for online courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

At the conclusion of the first two weeks of a semester or equivalent, instructors report any registered students who have "Never Attended" a course. Those students will be administratively withdrawn from that course. However, after the time period in the previous paragraphs, if a student stops attending a class or wants or needs to withdraw, for any reason, it is the student's responsibility to take action to withdraw from the course. Students must complete and submit the appropriate Tri-C form by the established withdrawal deadline.

Tri-C is required to ensure that students receive financial aid only for courses that they attend and complete. Students reported for not attending at least one of their registered courses will have all financial aid funds held until confirmation of attendance in registered courses has been verified. Students who fail to complete at least one course may be required to repay all or a portion of their federal financial aid funds and may be ineligible to receive future federal financial aid awards. Students who withdraw from classes prior to completing more than 60 percent of their enrolled class time may be subject to the required federal refund policy.

If illness or emergency should necessitate a brief absence from class, students should confer with instructors upon their return. Students having problems with coursework due to a prolonged absence should confer with the instructor or a counselor.

IV. LEARNING OUTCOMES ASSESSMENT

Occasionally, in addition to submitting assignments to their instructors for evaluation and a grade, students will also be asked to submit completed assignments, called 'artifacts,' for assessment of course and program outcomes and the College's Essential Learning Outcomes (ELOs). The artifacts will be submitted in Blackboard or a similar technology. The level of mastery of the outcome demonstrated by the artifact DOES NOT affect the student’s grade or academic record in any way. However, some instructors require that students submit their artifact before receiving their final grade. Some artifacts will be randomly selected for assessment, which will help determine improvements and support needed to further student success. If you have any questions, please feel free to speak with your instructor or contact the Learning Outcomes Assessment office.

V. CONCEALED CARRY STATEMENT

College policy prohibits the possession of weapons on college property by students, faculty and staff, unless specifically approved in advance as a job-related requirement (i.e., Tri-C campus police officers) or, in accordance with Ohio law, secured in a parked vehicle in a designated parking area only by an individual in possession of a valid conceal carry permit.

As a Tri-C student, your behavior on campus must comply with the student code of conduct which is available on page 29 within the Tri-C student handbook, available athttp://www.tri-c.edu/student-resources/documents/studenthandbook.pdf You must also comply with the College’s Zero Tolerance for Violence on College Property available at http://www.tri-c.edu/policies-and-procedures/documents/3354-1-20-10-zero-tolerance-for-violence-policy.pdf

Outcomes
CourseOutcome(s):
Represent functions verbally, numerically, graphically and algebraically.
Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.
Oral Communication: Demonstrate effective verbal and nonverbal communication for an intended audience that is clear, organized, and delivered effectively following the standard conventions of that language.

Objective(s):
1. Define and identify relation, domain, range, function.
2. Identify and perform transformations of functions.
3. Define, identify, and analyze linear, quadratic, polynomial, rational, root/radical/power and piece-wise functions algebraically and graphically, including the domain and range.
4. Determine the vertex of a quadratic function.
5. Identify and determine asymptotes of rational functions.
7. Determine exact and/or approximate zeros and sketch the graphs of polynomial functions of degree greater than two.
8. Use the Remainder Theorem and Factor Theorems for polynomial functions including the Fundamental Theorem of Algebra and the Rational Zero Theorem.
9. Define and determine zeros or roots of a polynomial function including irrational and complex zeros, based on operations with complex numbers.
10. Determine intervals on which the function is increasing, decreasing or constant.
11. Determine algebraically and graphically whether the graph of an equation exhibits symmetry.
12. Use the vertical line test to identify functions.
13. Graph functions and their inverses.
14. Determine if a function is even or odd.
15. Identify and determine relative maximum and minimum values in an interval of a function.
17. Determine the domain and ranges of exponential and logarithmic functions.
18. Graph exponential and logarithmic functions, using their properties.
19. Identify Properties of Logarithmic functions including the Product, Quotient, Power, and Change of Base Rules and use the properties to rewrite logarithmic functions.
20. Define and evaluate common and natural logarithms.
21. Use functions to model a variety of real-world problem-solving applications.
22. Use the horizontal line test to determine if a function is one-to-one.
23. Define and determine inverse functions algebraically.
24. Perform operations (sum, difference, product, and quotient) on functions and determine the domain of the resulting functions.
25. Divide a polynomial function by a linear function using synthetic division.
26. Divide a polynomial function by a polynomial function using long division.
27. Determine the composite of two functions and the domain of the composite function.
28. Decompose a function as a composite.

Course Outcome(s):
Solve Equations.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Apply the definition of absolute value to solve linear equations and inequalities.
2. Use the one-to-one property of exponential functions to solve one-to-one exponential equations.
3. Use the Properties of Logarithms and the one-to-one property of logarithmic functions to solve one-to-one logarithmic equations.
4. Use the inverse relationship between the exponential function and logarithmic function to solve exponential and logarithmic equations.
5. Evaluate applications involving exponential and logarithmic functions and equations including exponential growth and decay and periodic and continuous compounding.

Course Outcome(s):
Solve inequalities.
Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Apply the definition of absolute value to solve linear equations and inequalities.
2. Solve quadratic, polynomial and rational inequalities in one variable.
3. Write the solution using set builder notation.
4. Write the solution using interval notation.
5. Graph the solution.
6. Apply the definition of absolute value to solve linear, polynomial, and rational absolute value inequalities.
7. Write the solution using set builder notation.
8. Write the solution using interval notation.
9. Graph the solution.

Course Outcome(s):
Define, Determine, and Graph Conic Sections and solve Non-linear Systems of Equations and Inequalities.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Define and use the distance and midpoint formulas.
2. Define and identify circles, ellipses, parabolas, and hyperbolas graphically.
3. Define and identify circles, ellipses, parabolas, and hyperbolas algebraically in standard and general forms.
4. Graph the conic sections centered at the origin and at the point (h, k) using the center, radius, major and minor axes, vertices, foci, directrix, axis of symmetry, and oblique asymptotes as necessary.
5. Solve systems of nonlinear equations using the substitution and elimination methods.
7. Solve real life application of conic sections including wheels, radar dish, support cables, and Earth's orbit.

Course Outcome(s):
Solve systems of linear equations using matrices.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Describe and use the basic properties of matrices.
2. Use Gaussian and Gauss-Jordan elimination methods.
3. Use matrices to decompose a rational expression into partial fractions.

Course Outcome(s):
Recognize and differentiate arithmetic and geometric sequences and series, and determine specified terms and their sums if they exist.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Define and identify arithmetic and geometric sequences and series.
2. Determine the general term of a sequence.
3. Determine the sum of a series.
4. Determine the sum of the first n terms of an arithmetic sequence.
5. Determine the sum of the first n terms of a geometric sequence.
6. Determine the sum of an infinite geometric sequence.

Methods of Evaluation:
1. Exams
2. Quizzes
3. Homework
4. Online coursework
5. Projects
6. In-class collaborative work
7. Comprehensive final exam
8. Participation

Course Content Outline:
1. Functions verbally, numerically, graphically and algebraically
   a. Relation, domain, range, function
   b. Vertical line test
   c. Horizontal line test
   d. Inverse functions
   e. Sum, difference, product, and quotient of functions and their domain
   f. Synthetic division
   g. Long division
   h. Composite of functions and the domain
   i. Decompose a function as a composite
   j. Transformations of functions
   k. Linear, quadratic, polynomial, rational, root/radical/power and piece-wise functions, range and domain
   l. Vertex of quadratic functions
   m. Asymptotes of rational functions
   n. Graphs of rational functions
   o. Exact and/or approximate zeros and graphs of polynomial functions
   p. Remainder Theorem and Factor Theorems, the Fundamental Theorem of Algebra and Rational Zero Theorem
   q. Zeros or roots of a polynomial function, irrational and complex zeros using operations with complex numbers
   r. Increasing, decreasing, constant intervals of functions
   s. Symmetry algebraically and graphically
   t. Graph functions and inverses
   u. Even or odd functions
   v. Relative maximum and minimum values in an interval of a function
   w. Exponential and logarithmic function definition
   x. Domain and range of exponential and logarithmic function
   y. Graphs, properties of exponential and logarithmic functions
   z. Properties of logarithmic functions including the Product, Quotient, Power, and Change of Base Rules and use to rewrite logarithmic functions
   aa. Common and natural logarithms
   bb. Functions to model a variety of real-world problem-solving applications
2. Solve Equations
   a. Solve absolute value equations
   b. One-to-one property of exponential functions to solve one-to-one exponential equations
   c. One-to-one property of logarithmic functions to solve one-to-one logarithmic equations
   d. Inverse relationship of exponential and logarithmic function to solve exponential and logarithmic functions
   e. Applications of exponential and logarithmic functions and equations including exponential growth and decay and periodic and continuous compounding
3. Solve inequalities
   a. Absolute value, quadratic, polynomial and rational inequalities in one variable
   b. Set builder notation with inequalities
   c. Interval notation with inequalities
d. Graph solutions of inequalities

e. Solve linear, polynomial, and rational absolute value inequalities

f. Set builder notation with absolute value inequalities

g. Interval notation with absolute value inequalities

h. Graph solutions with absolute value inequalities

4. Graph Conic Sections and solve Non-linear Systems of Equations and Inequalities

a. Distance and midpoint formulas

b. Circles, ellipses, parabolas, and hyperbolas graphically

c. Circles, ellipses, parabolas, and hyperbolas algebraically

d. Graph the conic sections centered at the origin and at the point \((h, k)\) using the center, radius, major and minor axes, vertices, foci, directrix, axis of symmetry, and oblique asymptotes

e. Substitution and elimination methods to solve systems of nonlinear equations

f. Graphing to solve systems of non-linear inequalities

g. Real life application of conic sections including wheels, radar dish, support cables, and Earth’s orbit

5. Systems of equations using matrices

a. Basic properties of matrices

b. Gaussian and Gauss-Jordan elimination methods

c. Matrices to decompose a rational expression into partial fractions

6. Arithmetic and geometric sequences and series

a. Arithmetic and geometric

b. General term of a sequence

c. Sum of a series

d. Sum of the first \(n\) terms of an arithmetic sequence

e. Sum of the first \(n\) terms of a geometric sequence

f. Sum of an infinite geometric sequence

Resources


Resources Other

1. Software provided through the publisher corresponding to the textbook

2. Software and E-book

3. TI-83 or TI-84 graphing calculator

Instructional Services

OAN Number:
TMM001 and TMM002 (1 of 2 courses, both must be taken)

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