MATH M11: COLLEGE ALGEBRA FOR THE LIBERAL ARTS

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College
Moorpark College

Attach Support Documentation (as needed)
MATH M11_state approval letter_CCC000608544.pdf

Discipline (CB01A)
MATH - Mathematics

Course Number (CB01B)
M11

Course Title (CB02)
College Algebra for the Liberal Arts

Banner/Short Title
College Algebra for Lib Arts

Credit Type
Credit

Start Term
Fall 2023

Catalog Course Description
Covers theory of functions including operations on functions, graphs, domain and range, and evaluation. Includes types of functions such as linear, quadratic, polynomial, rational, exponential and logarithmic functions. Analyzes graphs including curve sketching, intercepts, transformations, vertices and asymptotes. Covers linear and non-linear inequalities, solving exponential and logarithmic equations and complex numbers.

Course is intended primarily as a prerequisite for students taking Business Calculus, and for students requiring college algebra content for non-STEM majors.

Course Credit Limitations: MC, CSU: MATH M05 and MATH M11 combined: maximum 4 units.

UC Credit Limitations: MATH M05, MATH M07, and MATH M11 combined: maximum credit one course, no more than 5 semester or 7.5 quarter units.

Taxonomy of Programs (TOP) Code (CB03)
1701.00 - Mathematics, General

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
B - Satisfies Math/Quantitative Reasoning req (CSUGE-B B4, IGETC 2, or 4-yr)

Support Course Status (CB26)
N - Course is not a support course

Field trips
Will not be required

Grading method
(L) Letter Graded

Alternate grading methods
(O) Student Option- Letter/Pass
(P) Pass/No Pass Grading

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture
Minimum Contact/In-Class Lecture Hours
52.5

Maximum Contact/In-Class Lecture Hours
52.5

Activity

Laboratory

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
52.5
Total Maximum Contact/In-Class Hours
52.5

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class
Minimum Outside-of-Class Hours
105
Maximum Outside-of-Class Hours
105

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
157.5
Total Maximum Student Learning Hours
157.5

Minimum Units (CB07)
3
Maximum Units (CB06)
3

Prerequisites
Intermediate Algebra or placement as determined by the college's multiple measures assessment process.

Entrance Skills

Entrance Skills
- analyze and solve various equations, inequalities, and systems of equations.
- graph and interpret linear and quadratic functions.

Requisite Justification

Requisite Type
Prerequisite

Requisite
Intermediate Algebra

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Required by 4 year institution

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	identify transformations of basic functions and graph the function on a Cartesian plane.
2	determine all the real and complex roots of a polynomial function of degree three or higher using synthetic division, rational root theorem, and remainder theorem.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	state and apply the definition of a function and identify whether a relation is a function.
2	determine the domain and range of a function, and evaluate the function at a numerical or algebraic value.
3	perform basic operations on functions, including addition, subtraction, multiplication, division and composition of functions, and determining the inverse of a one-to-one function.
4	identify transformations of functions, in comparison to basic function graphs, including shape change, reflection, horizontal and vertical shift, and sketch graph.
5	identify features of the graph of a function, including intercepts, vertices, maximum and minimum values, asymptotes and symmetry.
6	solve equations and determine roots of various functions, including linear, quadratic, polynomial and rational functions.
7	solve inequalities, including linear, quadratic, polynomial and rational inequalities, stating answer in set notation or interval notation.
8	perform division of polynomials, including use of synthetic division to determine roots of higher order polynomials.
9	sketch the graph of a polynomial of degree three or higher, using the roots of the polynomial and its factored form.
10	sketch the graph of a rational function, using the roots, asymptotes and intervals where function is positive or negative.
11	sketch the graph of basic exponential and logarithmic graphs.
12	use properties of logarithms to simplify logarithmic expressions.
13	solve exponential equations using properties of exponents, logarithms, and the change of base formula to find numerical solutions to equations that may or may not have a common base on both sides of an equation.
14	solve logarithmic equations using properties of logarithms.
15	use the techniques of solving exponential and logarithmic equations to solve application problems in biology, economics or other scientific fields.
16	solve systems of linear equations involving two variables, using substitution or elimination, and stating whether system is independent, dependent or inconsistent.
17	solve systems of linear equations involving three variables, using substitution or elimination, and stating whether system is independent, dependent or inconsistent.
18	perform basic operations on complex numbers, including addition, subtraction, multiplication, division and determining the conjugate of a complex number.
19	determine all roots of a quadratic equation by using factoring, completing the square and the quadratic formula, including complex roots if they occur.

Course Content

Lecture/Course Content

15% A. Equations and Inequalities
1. Solving linear equations
2. Solving quadratic equations
3. Solving polynomial equations

4. Solving linear inequalities
5. Solving quadratic and other polynomial inequalities

10% B. Theory of Functions

1. Definition of a relation and a function
2. Determine whether a relation is a function and determine domain and range
3. Evaluating a function at a value
4. Addition, subtraction, multiplication, division and composition of functions
5. One-to-one functions and inverses

20% C. Graphs of Functions

1. Graphs of basic functions
2. Transformations, shifts, shape change, reflection and vertices
3. Graph symmetry
4. Features of the graph of a parabola
5. Graphs of polynomials including roots and intercepts
6. Graphs of rational functions, including roots and asymptotes

20% D. Polynomial and Rational Functions

1. Quadratic functions, completing the square and the quadratic formula
2. Roots of polynomial functions
3. Synthetic division, Remainder Theorem and Rational Root Theorem
4. Sketching graph of polynomial function using roots
5. Rational functions
6. Roots of rational functions
7. Horizontal and vertical asymptotes
8. Sketching graph of rational function
9. Solving polynomial inequalities
10. Solving rational inequalities
11. Complex numbers
12. Basic operations on complex numbers and conjugate
13. Complex roots of quadratic and polynomial functions

25% E. Exponential and Logarithmic Functions

1. Graph of an exponential functions
2. Solving exponential equations in same base
3. The natural exponent "e"
4. The definition of logarithm
5. Properties of logarithms and simplifying logarithmic expressions
6. Graph of a logarithmic function
7. Solving logarithmic equations
8. Solving exponential equations using logarithms
9. Applications of logarithms in economics and sciences
10. Compound and continuous interest (optional)
11. Exponential growth and decay (optional)

10% F. Systems of Equations

1. Solving linear systems in two variable by graphing, substitution or elimination
2. Independent, dependent and inconsistent systems of equations
3. Solving linear systems of equations in three variable by Gaussian elimination
4. Solving non-linear systems of equations in two variables (optional)
5. Solving linear inequalities in two variables (optional)

Laboratory or Activity Content

Not applicable

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Written expression
Problem solving exercises
Skills demonstrations

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Computational homework
Individual projects
Objective exams
Problem-solving exams
Problem-solving homework

Quizzes
Other (specify)

Other

Quizzes and graded work will be used to evaluate students for the critical thinking skills needed to solve math problems. Problems must require students to demonstrate analytic skills and the step-by-step details required for the solution.

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Class activities
Class discussions
Collaborative group work
Demonstrations
Distance Education
Group discussions
Instructor-guided interpretation and analysis
Instructor-guided use of technology
Lecture
Problem-solving examples
Other (specify)

Specify other method of instruction

All instructors will use best practices to provide an inclusive learning environment that respects all forms of racial, ethnic, age, and gender diversity, and provides for the individual needs of students of all learning styles.

Describe specific examples of the methods the instructor will use:

1. Use of whiteboard or overhead projector to demonstrate solutions to calculations, such as identifying zeros, roots, domains and asymptotes of polynomial or rational functions.
2. Classroom discussion, with student response, such as discussing the meaning of the definition of function.
3. In class group activities, such as guided practice on solving various types of equations such as polynomial, exponential or logarithmic equations for numerical solutions.

Representative Course Assignments

Writing Assignments

1. Stating the answer to a mathematical problem in any of various forms, such as stating the answer to an inequality in interval notation or set builder notation.
2. Writing the interpretation of an answer to a mathematical problem, such as the meaning of the solution to an exponential equation, with proper labeling of units.
3. Writing a short answer explaining the meaning of mathematical terms, such as the difference between relation, function, and one-to-one function.

Critical Thinking Assignments

1. Compare and contrast methods of solving a mathematical problem, such as determining whether to factor, complete the square or apply the quadratic formula to solve a quadratic equation.
2. Describe and analyze the steps in solving a problem, such as identifying and labeling the several steps in solving a linear system in three variables, using Gaussian elimination.
3. Interpret and describe the meaning of the solution to a mathematical application problem, such as an answer representing either time, an amount of money, or an interest rate in a compound interest application problem solved by using logarithms.

Reading Assignments

1. Reading concepts from the textbook, such as the description of the differences between a relation, function and one-to-one function.
2. Reading instructor created materials, such as a prepared handout describing the meaning of intercepts, roots, turning points and asymptotes in the graphs of functions.
3. Reading resource materials from the library or online concerning real-life applications of exponents and logarithms in economics and sciences.

Skills Demonstrations

1. Demonstrate computational skills such as factoring or simplifying mathematical expressions.
2. Demonstrate understanding of the meaning of an answer, such as interpreting the meaning of an ordered-pair answer in an application problem.

Problem-Solving and Other Assignments (if applicable)

1. Use a calculator to find the numerical solution to an application problem involving exponents or logarithms, and express the answer with proper numerical rounding and labeling.
2. Solve linear systems of equations in two variables by elimination and substitution.
3. Determine all solutions to logarithmic equations and eliminate extraneous solutions.

Outside Assignments

Representative Outside Assignments

1. Individual or group assignments, such as viewing diagrams and graphs in textbooks illustrating the various shapes of graphs, such as those of exponential, logarithmic, polynomial or rational functions.
2. Additional problem sets assigned as homework from the book, such as practice on finding roots and asymptotes of rational functions, or practice on determining all complex roots of a quadratic function.

Articulation

C-ID Descriptor Number

MATH 150

Status

Approved

Comparable Courses within the VCCCD

MATH R101 - Algebra for the Liberal Arts Major
MATH V04 - College Algebra
MATH M05 - College Algebra for STEM Studies
MATH R115 - College Algebra

Equivalent Courses at other CCCs

College	Course ID	Course Title	Units
Antelope Valley College	MATH 128	College Algebra for Liberal Arts	3
Copper Mountain College	MATH 10	College Algebra for Liberal Arts	4
Glendale CC	MATH 111	College Algebra for Business and Liberal Arts	3

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

D2. Communication/Analytical Thinking

Approved

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

Course is CSU transferable

Yes

CSU Baccalaureate List effective term:
FALL 2020

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

B4 Mathematical/Quantitative Reasoning
Proposed
Approved

Date Proposed:
2/27/2019

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

UC TCA

UC TCA
Approved

Date Proposed:
6/5/2019

IGETC

Area 1: English Communication

Area 1A: English Composition
Proposed
Approved

Date Proposed:
12/15/2019

Effective term:
Fall 2020

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 2A: Mathematical Concepts & Quantitative Reasoning
Proposed

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Textbook

Classic Textbook
No

Description
Young, Cynthia Y. *College Algebra*. 5th ed., Wiley, 2021.

Resource Type
Textbook

Classic Textbook
No

Description
Blitzer, Robert F. *College Algebra.* 8th ed., Pearson, 2022.

Resource Type
Textbook

Classic Textbook
No

Description
Sullivan, Michael. *College Algebra.* 11th ed., Pearson, 2020.

Resource Type
Textbook

Description
Abrahamson, Jay, et al. *College Algebra and Trigonometry*. E-book OpenStax (Rice University), 2021, https://openstax.org/details/books/algebra-and-trigonometry. Accessed 30 Sept 2022.

Library Resources

Assignments requiring library resources
Use of the Library's print and online resources to supplement application problems by researching models in various liberal arts studies, such as business, economics, biology, sociology and statistical studies related to these fields. Such applications may apply to the analyzing of graphs, or the use of applied formulas requiring solving by analyzing polynomials, exponential, or logarithmic functions. Use of textbooks on reserve.

Sufficient Library Resources exist
Yes

Example of Assignments Requiring Library Resources
Using library resources to explore applications of functions and graphing, such as finding examples of structures or natural phenomena that simulate various graphs and shapes, including using measurements to compute heights, widths, areas and volumes.

Distance Education Addendum

Definitions

Distance Education Modalities

Hybrid (1%–50% online)
Hybrid (51%–99% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups.
E-mail	Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class.
Face to Face (by student request; cannot be required)	Students requesting to speak to instructor in person for personal help on material, grade information, or discussion of policies and procedures.
Other DE (e.g., recorded lectures)	Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet.
Synchronous Dialog (e.g., online chat)	Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups.
E-mail	Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class.
Face to Face (by student request; cannot be required)	Students requesting to speak to instructor in person for personal help on material, grade information, or discussion of policies and procedures.
Other DE (e.g., recorded lectures)	Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet.

Synchronous Dialog (e.g., online chat)	Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups.
E-mail	Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class.
Other DE (e.g., recorded lectures)	Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet.
Synchronous Dialog (e.g., online chat)	Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests.

Examinations

Hybrid (1%–50% online) Modality
On campus

Hybrid (51%–99% online) Modality
On campus

Primary Minimum Qualification
MATHEMATICS

Review and Approval Dates

Department Chair
10/14/2022

Dean
10/17/2022

Technical Review
10/20/2022

Curriculum Committee
11/01/2022

DTRW-I
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000608544

DOE/accreditation approval date
MM/DD/YYYY