

## MATH100+ : College Algebra for STEM with Support

### General Information

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Course Code (CB01) :	MATH100+
Course Title (CB02) :	College Algebra for STEM with Support
Department:	MATH
Proposal Start:	Fall 2024
TOP Code (CB03) :	(1701.00) Mathematics, General
CIP Code:	(27.0101) Mathematics, General.
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000642842
Curriculum Committee Approval Date:	12/13/2023
Board of Trustees Approval Date:	01/09/2024
Last Cyclical Review Date:	12/13/2023
Course Description and Course Note:	<p>MATH 100+ is a college (transfer) level course in algebra with a built-in support lab component. We cover many topics, including functions and their inverses, transformations of functions, first and second-degree equations and inequalities, logarithmic and exponential equations, graphs of linear and quadratic functions, conic sections, polynomial functions, exponential functions, logarithmic functions, real-world Science, Technology, Engineering, and Mathematics (STEM) applications, remainder and factor theorems, properties and applications of complex numbers, systems of equations, and sequences and series. When appropriate, we will discuss the cultural and historical context for these concepts, and throughout the course, we explore strategies for successful math-classroom experience and critical thinking/problem-solving strategies. Note: You will receive no credit for Math 100+ if you have completed Math 100, Math 110 or Math 110A AND Math 110B. You will receive a total of 5 units of credit for completion of Math 100+ and Math 110A.</p>
Justification:	New Course
Academic Career:	<ul style="list-style-type: none"><li>Credit</li></ul>
Author:	<ul style="list-style-type: none"><li>Suzanne Palermo</li></ul>

### Academic Senate Discipline

Primary Discipline:	<ul style="list-style-type: none"><li>Mathematics</li></ul>
Alternate Discipline:	
Alternate Discipline:	

## Course Development

### Basic Skill Status (CB08)

Course is not a basic skills course.

Allow Students to Gain Credit by Exam/Challenge

### Course Special Class Status (CB13)

Course is not a special class.

### Pre-Collegiate Level (CB21)

Not applicable.

### Grading Basis

- Grade with Pass / No-Pass Option

### Course Support Course Status (CB26)

Course is not a support course

## Transferability & Gen. Ed. Options

### General Education Status (CB25)

GE Status (CSU) B4, (UC) 2

### Transferability

Transferable to both UC and CSU

### Transferability Status

Approved

IGETC Area	Area	Status	Approval Date	Comparable Course
2-Math	Mathematical Concepts and Quantitative Reasoning	Pending	No value	No Comparable Course defined.

CSU GE-Breadth Area	Area	Status	Approval Date	Comparable Course
B4-Mathematics/Quantitative Reasoning	Mathematics/Quantitative Reasoning	Pending	No value	No Comparable Course defined.

C-ID	Area	Status	Approval Date	Comparable Course
MATH	Mathematics	Pending	No value	MATH 151 - College Algebra for STEM

## Units and Hours

### Summary

**Minimum Credit Units (CB07)** 4.5

**Maximum Credit Units (CB06)** 4.5

**Total Course In-Class (Contact) Hours** 108

**Total Course Out-of-Class Hours** 144

**Total Student Learning Hours** 252

### Credit / Non-Credit Options

**Course Type (CB04)**

Credit - Degree Applicable

**Noncredit Course Category (CB22)**

Credit Course.

**Noncredit Special Characteristics**

No Value

**Course Classification Code (CB11)**

Credit Course.

 Variable Credit Course**Funding Agency Category (CB23)**

Not Applicable.

 Cooperative Work Experience Education Status (CB10)**Weekly Student Hours**

	<b>In Class</b>	<b>Out of Class</b>
Lecture Hours	4	8
Laboratory Hours	2	0
Studio Hours	0	0

**Course Student Hours**

<b>Course Duration (Weeks)</b>	18
<b>Hours per unit divisor</b>	54
<b>Course In-Class (Contact) Hours</b>	
Lecture	72
Laboratory	36
Studio	0
<b>Total</b>	108
<b>Course Out-of-Class Hours</b>	
Lecture	144
Laboratory	0
Studio	0
<b>Total</b>	144

**Time Commitment Notes for Students**

No value

**Pre-requisites, Co-requisites, Anti-requisites and Advisories****Prerequisite**

Placement is based on academic background or satisfactory completion of MATH 90.

**OR****Prerequisite**

MATH90 - Intermediate Algebra for BSTEM

**Objectives**

- Solve absolute value equations and inequalities.
- Solve linear equations and compound inequalities.
- Perform operations with polynomials.
- Simplify complex fractions.
- Perform operations with radical expressions.
- Simplify expressions with rational exponents.
- Solve rational equations.
- Solve equations with radicals.
- Find the equation of a line parallel or perpendicular to a given line.
- Solve a system of linear equations using elimination substitution.
- Solve quadratic equations with real and complex solutions.
- Find the inverse of a function.
- Use the properties of logarithms to simplify and expand expressions.
- Solve logarithmic and exponential equations.

- Graph parabolas and circles centered at any point.
- Graph functions (linear, quadratic, exponential, logarithmic).

## Entry Standards

Entry Standards

No value

## Specifications

### Methods of Instruction

Methods of Instruction                      Lecture

Methods of Instruction                      Laboratory

Methods of Instruction                      Discussion

Methods of Instruction                      Collaborative Learning

Methods of Instruction                      Demonstrations

Methods of Instruction                      Presentations

### Out of Class Assignments

- Homework (eg. problem sets related to course content.)
- Group assignments and projects (e.g. determine the shape and dimensions of maximum area using a string of fixed length, determine if the shoe size and height of a group of students form a linear relationship)
- Graphing calculator and/or computer assignments

### Methods of Evaluation

### Rationale

Project/Portfolio	Projects (e.g. engineering presentation on structure of buildings and bridges)
Exam/Quiz/Test	Quizzes
Exam/Quiz/Test	Four to six chapter examinations are required
Exam/Quiz/Test	A comprehensive final examination is required

## Textbook Rationale

No Value

## Textbooks

Author	Title	Publisher	Date	ISBN
Blitzer, Bob	College Algebra	Pearson	2019	9780136165774

## Other Instructional Materials (i.e. OER, handouts)

No Value

## Materials Fee

No value

## Learning Outcomes and Objectives

### Course Objectives

Analyze the following functions: polynomial, rational, radical, absolute value, exponential and logarithmic (including definitions, evaluation, and domain and range).

Graph functions, including asymptotic behavior, intercepts, vertices and transformations.

Perform operations on functions.

Find inverses of functions; solve equations including: linear, polynomial, radical, rational, absolute value, exponential and logarithmic.

Solve linear, absolute value, and non-linear inequalities.

Solve linear and non-linear systems of equations and inequalities; apply the Fundamental Theorem of Algebra and related theorems to find the roots of a polynomial.

Model and solve STEM application problems.

Graph and algebraically analyze conic sections.

Use formulas to find sums of finite and infinite series.

## SLOs

Solve and graph various functions, equations, and inequalities at the college algebra level.

Expected Outcome Performance: 70.0

Critically analyze mathematical formulas, models, and graphs and be able to explain solutions clearly and effectively.

Expected Outcome Performance: 70.0

## Additional SLO Information

**Does this proposal include revisions that might improve student attainment of course learning outcomes?**

No

**Is this proposal submitted in response to learning outcomes assessment data?**

No

**If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.**

No Value

**SLO Evidence**

No Value

## Course Content

### Lecture Content

#### Basic Concepts (9 hours)

- Real numbers
- Exponents and radicals
- Algebraic expressions
- Rational expressions
- Mindset (growth, resilience, hardiness, and grit)

#### Equations and Inequalities (12 hours)

- First degree equations
- Quadratic equations
- Complex numbers
- Other types of equations
- Linear inequalities
- Quadratic and other non-linear inequalities
- Applications to STEM problems (uniform motion, geometry, mixture)
- Math test-taking techniques

#### Functions and Their Graphs (13 hours)

- Cartesian Coordinate System
- Graphs and equations
- Graphs of functions and relations including transformations
- Quadratic functions
- Operations on functions
- One-to-one functions and inverses
- College math support resources

#### Polynomial Functions (13 hours)

- The Remainder Theorem and the Factor Theorem
- Synthetic division
- The Fundamental Theorem of Algebra
- Rational roots

- Graphing polynomial functions
- Rational functions
- STEM optimization applications
- Study Skills: Critical thinking skills

**Exponential and Logarithmic Functions (12 hours)**

- Exponential functions
- Logarithmic functions
- Properties of logarithms
- Exponential and logarithmic equations
- Common and natural logarithms
- Applications to population growth and decay

**Systems of Equations (8 hours)**

- Systems of linear equations in 2 variables
- Systems of linear equations in more than 2 variables
- Non-linear systems of equations in 2 variables
- Modeling STEM problems using system of equations

**Other Topics (5 hours)**

- Conic sections – analytic geometry
- Sequences and series

**Total hours: 72**

**Laboratory/Studio Content**

**Algebra Review Content (18 hours)**

- Review of Factoring
- Review of Exponents
- Review of Simplifying Equations
- Review of Solving Equations

**College Algebra Content (18 hours)**

- Functions
- Graphing
- Solving Equations

**Total hours: 36**